



Office of Transport Safety Investigations

FERRY SAFETY INVESTIGATION

**COLLISION BETWEEN SYDNEY FERRIES' *DAWN FRASER*
AND A DINGHY, REGISTERED No. AAP694N
WALSH BAY, SYDNEY**

5 JANUARY 2007



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Office of Transport Safety Investigations
Level 17, 201 Elizabeth Street
Sydney NSW 2000

The Office of Transport Safety Investigations (OTSI) is an independent NSW agency whose purpose is to improve transport safety through the investigation of accidents and incidents in the rail, bus and ferry industries.

Established on 1 January 2004 by the *Transport Administration Act 1988*, and confirmed by amending legislation as an independent statutory office on 1 July 2005, OTSI is responsible for determining the causes and contributing factors of accidents and to make recommendations for the implementation of remedial safety action to prevent recurrence.

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GLOSSARY OF TERMS AND ABBREVIATIONS

Bow	Front area of vessel
Channel	Defined by the <i>Management of Waters and Waterside Lands Regulations NSW</i> to mean that part of an area of navigable waters which is <u>best suited</u> for the navigation of a vessel
CCTV	Closed Circuit Television
Fairway	Defined by the <i>Management of Waters and Waterside Lands Regulations NSW</i> as that part of an area of navigable waters which is <u>usually used</u> by vessels
Ferry	A vessel which seats more than 8 adult persons, as defined by the <i>Passenger Transport Act 1990 (NSW)</i> Part 1 Section 3
GPH	A General Purpose Hand, or 'Deckhand', is a duly qualified crewmember not engaged in navigational or engineering duties
ICAM	Incident Cause Analysis Method
ITSRR	The Independent Transport Safety and Reliability Regulator, NSW
Knot	Unit of speed: one nautical mile per hour, or about 1.85 km/h
NSW Police Marine Area Command	More commonly referred to as the "Water Police" and referred to throughout this report as such
Maritime Authority of NSW	More commonly referred to as "NSW Maritime" and referred to throughout this report as such
OTSI	The Office of Transport Safety Investigations
Orange Diamond Scheme	A scheme providing vessels entitled to display, and displaying, an Orange Diamond shaped sign to have a navigational privilege over sailing vessels
Schottel	Propulsion system, fitted to Rivercat class ferries, using steerable legs fitted with propellers
Sydney Ferries Corporation	More commonly referred to as "Sydney Ferries" and referred to throughout this report as such

SOPs	Standard Operating Procedures that are intended to standardise operations within and/or between organisations
Starboard	The right-hand side when facing forward on a vessel
Sydney Ports Corporation	More commonly referred to as “Sydney Ports” and referred to throughout this report as such
TAA	<i>Transport Administration Act 1988 (NSW)</i>
VOM	Vessel Operations Manual. The prime reference, issued by Sydney Ferries Corporation, containing technical information and operating instructions, for each class of ferries

EXECUTIVE SUMMARY

At about 6:56am on Friday 5 January 2007, Sydney Ferries' Rivercat *Dawn Fraser* was in transit from the Balmain Shipyard to Circular Quay to begin its daily scheduled services when it collided with a small aluminium runabout dinghy. The point of impact was approximately 300 metres West of the Sydney Harbour Bridge and 150 metres North-West of Dawes Point.

The dinghy was occupied by two adult males, one aged in his 60s and the other, who was his son, aged in his 30s. Just before the collision, the younger man jumped clear of the dinghy into the water, but his father was still in the dinghy when it was struck by *Dawn Fraser*. Another Sydney Ferries' vessel, *Charlotte*, which was passing by, contacted Harbour Control to alert the emergency services and then recovered both men from the water. The older of the two men was unconscious and had very obvious injuries, consistent with having been struck during the collision. *Charlotte's* crew administered cardio pulmonary resuscitation (CPR) and continued to do so until they were relieved by Ambulance officers. Once ashore, both men were transferred to St Vincent's Hospital for treatment but, on 13 January 2007, the older man died as a result of his injuries.

Dawn Fraser was not carrying passengers at the time of the accident and neither of the two crew members, nor another Sydney Ferries' employee who was on board but not on duty, were injured in the collision. *Dawn Fraser* remained in the general area of the collision while the two Fishermen were being recovered from the water by the crew of *Charlotte*. It later redeployed to Circular Quay under command of a relieving master. On arrival, the original Master and the GPH underwent drug and alcohol testing. A preliminary safety check of *Dawn Fraser* was also conducted before the vessel returned to Balmain Shipyard for a more detailed inspection. The dinghy was recovered by Sydney Ports and taken to the Water Police's facility at Balmain where it was impounded for forensic examination.

Findings

As a result of the lines of inquiry that have been followed to address the Terms of Reference for this investigation, OTSI has determined that there were a number of circumstances, factors and behaviours that combined at a single location and time to create a situation where this accident became the tragic outcome. Those circumstances, factors and behaviours are described in the Findings which follow:

a. Causation

In accordance with the requirements of s45A(2)(b) of the *Transport Administration Act 1988*, OTSI has determined that the collision was caused by the convergence of the following two prime factors:

- i. the manner in which *Dawn Fraser* was being handled made no provision for the prevailing environmental conditions of reduced visibility, and
- ii. the location of the dinghy, with its outboard motor shut down, in a section of Sydney Harbour's main shipping channel, while its occupants engaged in recreational fishing.

b. Contributory Factors

The following factors, which address specific matters identified in the Terms of Reference, had a bearing on the circumstances of the accident and contributed to its cause to varying extents:

- i. *Dawn Fraser* was operating in conditions of reduced visibility because it was heading directly into the glare of the morning sun and its reflected dazzle off the surface of the water;
- ii. the speed of approximately 22 knots, at which *Dawn Fraser* was being operated immediately before the presence of the dinghy became apparent, was excessive, given that the selected course the ferry was taking afforded reduced visibility;
- iii. although ferry operating procedures make provision for a GPH to be utilised as a 'lookout' to assist a master, the GPH on *Dawn*

Fraser was not tasked in this capacity, despite the prevailing conditions of reduced visibility, because he was otherwise engaged in preparing the ferry's berthing lines;

- iv. *Dawn Fraser's* Master was wearing sun glasses, but he did not fully utilise the pull-down tinted blinds on the bridge's windscreen to further reduce the effects of the glare and dazzle;
- v. although the extent to which *Dawn Fraser's* radar would have been useful in the prevailing conditions is questionable, and the extent to which the Master would have been able to monitor its screen without the assistance of the GPH is debatable, the fact is that the radar was of no potential assistance to the Master as it was not switched on;
- vi. the Fishermen were engaged in a pattern of fishing which positioned them drifting Westwards on the Southern side of the main shipping channel, whereas their direction of movement required them to be on the Northern side of the channel, and
- vii. because they were not keeping an adequate lookout while they were fishing in the main shipping channel, and because the dinghy's outboard motor was shut down, the two Fishermen were unable to move out of the way of *Dawn Fraser* when it became apparent that a collision was likely to occur.

c. Anticipation and Management of Risk

- i. Sydney Ferries' Vessel Operating Manuals (VOMs) do not specifically identify the actions required of a master in conditions of reduced visibility, but a Fleet Operations Temporary Memorandum dated 10 May 2006 (FOTM 2006-3) does. However, this policy document does not include glare and dazzle as being amongst the conditions requiring masters to exercise additional caution.
- ii. Fishing is permitted in the immediate area of the bridge. However, persons operating any vessel on Sydney Harbour are bound by a range of international and local rules and regulations

which require them to anticipate and manage safety risks. Nevertheless, it is a moot point whether these rules and regulations are understood by many recreational boaters and especially so when the requirement for a boating licence only becomes mandatory when a vessel is operated, under power, in excess of 10 knots. Irrespective, OTSI considers the juxtaposition of commercial shipping and vessels operating at speed, such as ferries and pleasure craft, as well as drifting fishing vessels, in a busy and relatively narrow part of the Harbour, to be inherently unsafe.

d. Appropriateness of the Emergency Response

- i. Sydney Ferries' response following the collision was both timely and effective, due to the proximity of another of its ferries, *Charlotte*, and the initiative of its crew. The two Fishermen were recovered from the water quickly and first aid was provided immediately thereafter. Emergency Services, including the Ambulance Service, Water Police and Sydney Ports were alerted and also responded quickly. Subsequent investigatory activity was also initiated in a timely manner.

e. Enhancement of the Safety of Ferry and Boating Operations on Sydney Harbour

- i. In order to provide for increased safety for both the travelling public and recreational users of the Harbour, it would be appropriate for NSW Maritime to consider extending the navigational privilege associated with the authorised display of the Orange Diamond to all of Sydney Ferries' vessels and by also affording these ferries priority over self-propelled and powered vessels.
- ii. The area in the immediate vicinity of the Harbour Bridge is extremely busy at various times, because of the large number of vessel movements into and out of Walsh Bay and Sydney Cove, and water conditions directly under the Bridge are like nowhere

else on the Harbour. While merchant and trading vessels are subject to a speed restriction in this area, other vessels are not unless they are in close proximity to another vessel. Given the unique conditions in the vicinity of the bridge, the circumstances of this accident and a subsequent accident involving a ferry and a recreational vessel which resulted in multiple fatalities, immediate consideration needs to be given to restricting the speed of all vessels in this area.

Recommendations

In order to prevent a recurrence of this type of accident, the following remedial safety actions are recommended for implementation by the organisations specified below:

a. Sydney Ferries Corporation

- i. Review its current watchkeeping standards and procedures for masters, to increase focus on the requirement to maintain a safe speed and a proper lookout at all times while ferries are underway;
- ii. Review its training and vessel operating instructions to emphasise the requirement for masters to exercise additional caution when operating in environmental conditions where visibility is reduced, and fully describe the techniques required to address such operating conditions;
- iii. Amend its FOTM (Fleet Operations Temporary Memoranda) 2006-03 to specifically identify glare and dazzle as additional factors requiring masters to adopt additional precautionary measures;
- iv. Review the proficiency of all masters in radar operating procedures and provide clear direction on the requirement for this important safety equipment to be used;
- v. Ensure GPHs are properly trained to perform the duties of a 'lookout', and

- vi. Require that a GPH or an Engineer must be employed as a 'lookout' to assist the Master whenever a ferry is underway in conditions of reduced visibility, including night time.

b. NSW Maritime Authority

- i. Impose a maximum operating speed limit on the approaches to, and under, the Sydney Harbour Bridge;
- ii. Issue, and distribute widely, a regulation or notice which specifically prohibits deliberately drifting, or deliberately stopping a vessel for other than the purpose of avoiding a collision, in the approaches to, and under, the Sydney Harbour Bridge;
- iii. Give consideration to extending the daytime 'priority over sail' Orange Diamond symbol currently granted to some of Sydney Ferries' vessels, to all its vessels and also to affording vessels displaying the Orange Diamond operational priority over self-propelled and powered vessels;
- iv. Recognising that not all recreational boaters hold a licence and therefore may not fully appreciate their obligations when operating a vessel, review its educational and safety awareness material, and the means by which it is promulgated, to ensure that its requirements are sufficiently explicit to be understood by, and are readily accessible to, the general public, and
- v. Recognising the uniqueness of Sydney Harbour and the extent to which it is used by commercial and recreational users, incorporate a chapter into the next edition of its *Boating Handbook* which deals with the specific challenges of operating a vessel, and the requirements to be observed, on Sydney Harbour.

PART 1 INTRODUCTION

Notification and Response

- 1.1 At 7:08am on 5 January 2007, the Office of Transport Safety Investigations (OTSI) Duty Officer was notified by Sydney Ferries that at 6:56am *Dawn Fraser*, a Rivercat class ferry, had collided with an open runabout/dinghy at Walsh Bay, capsizing it, and necessitating the recovery of its two occupants from the water. It also advised that one of the occupants had been severely injured.
- 1.2 Based on the information provided by the reporter, the Chief Investigator directed the deployment of an OTSI Investigating Officer to the incident site. This officer arrived at the incident site at 7:30am to commence the inspection, assessment and evidence collection process.

Initiation of Investigation

- 1.3 As a result of the primary evidence collected by the Investigating Officer and information subsequently obtained from Sydney Ferries, NSW Maritime and the Water Police, the Chief Investigator initiated a Ferry Safety Investigation in accordance with s46BA of the *Passenger Transport Act 1990*.

Interim Factual Statement

- 1.4 An Interim Factual Statement notifying OTSI's investigation and describing the incident in terms of what had happened was published on the OTSI website on 18 January 2007. On the same day, the Chief Investigator notified all of the Directly Involved Parties (DIPs) that OTSI was investigating the collision and requested that an officer be nominated in each organisation to act as the point of contact for all inquiries made by the appointed OTSI Investigator in Charge (IIC). The Terms of Reference for the Investigation were provided to the DIPs with this notification.

Terms of Reference

1.5 The terms of reference established by the Chief Investigator required the IIC to :

- a. establish why the accident happened, what caused it and what contributed to it;
- b. determine whether the ferry and the dinghy were being operated appropriately at the time of the accident;
- c. determine whether mechanical functions and/or design features contributed to cause the accident;
- d. identify whether there were any policy, organisational and/or administrative matters which relate to safety management which had a bearing on the circumstances of the accident;
- e. ascertain whether this type of accident had been, or should have been, anticipated and the effectiveness of any strategies that were in place to manage the related risks;
- f. assess the effectiveness of the emergency actions in response to the accident;
- g. make safety recommendations, the implementation of which would prevent, or at the very least, minimise the potential for recurrence of this type of accident, and
- h. propose any course of action in relation to other matters arising from the investigation that would enhance the safety of ferry and boating operations more generally within Sydney Harbour.

Methodology

1.6 OTSI utilises the ICAM (Incident Cause Analysis Method) approach in the conduct of its investigations and applies the Reason Model of Active Failures and Latent Conditions to its analysis of causative and contributory factors.

- 1.7 The underlying feature of the methodology is the “Just Culture” principle with its focus on safety outcomes rather than the attribution of blame or liability.

Consultation

- 1.8 On 9 May 2007, a copy of the investigation Draft Report was forwarded to Sydney Ferries, NSW Maritime, the Water Police, Sydney Ports, the Australian Maritime Officers’ Union (AMOU) and the Independent Transport Safety and Reliability Regulator (ITSRR). The purpose was to provide these DIPs with the opportunity to contribute to the compilation of this Final Report by verifying the factual information, scrutinising the analysis, findings and recommendations, and providing any commentary that would enhance the structure, substance, integrity and resilience of the Investigation Report. DIPs were requested to submit their comments by 18 May 2007. Submissions were received from the AMOU, ITSRR, NSW Maritime, Sydney Ferries, Sydney Ports and the Water Police.
- 1.9 The Chief Investigator considered all representations made by DIPs and where appropriate, reflected their advice in this Final Report. On 30 May and 13 June 2007, the Chief Investigator informed DIPs which matters from their submissions had been incorporated in this Final Report and where any proposal was excluded, the reasons for doing so.

Investigation Report

- 1.10 This report describes the collision which occurred at Walsh Bay Sydney on Friday 5 January 2007 and explains why it occurred. The recommendations that are made are designed to contribute to the maintenance of safe shipping, ferry and recreational boating operations on Sydney Harbour and to minimise the potential for a recurrence of this type of accident.

PART 2 FACTUAL INFORMATION

Before the Collision

- 2.1 After its crew of two had completed their normal start-up and pre-departure checks, *Dawn Fraser* left the Balmain Shipyard about 6:50am on Friday 5 January 2007, to travel to Circular Quay, a distance of about three kilometres to the East. The ferry was a few minutes behind schedule as it headed to Wharf 5 for its first passenger run of the day. The weather was fine and clear, but the sun was low in the Eastern Sky at the time.
- 2.2 *Dawn Fraser's* crew consisted of a master, who was also the designated engineer, and a GPH. Another Sydney Ferries' employee was also onboard, but solely for the purpose of being taken to Circular Quay. No fare-paying passengers were embarked.
- 2.3 The Master/Engineer was navigating, visually, from the vessel's bridge and the other two employees were below the bridge where the GPH was preparing the ferry's berthing lines. After rounding Goat Island, *Dawn Fraser* was headed in an Easterly direction at its normal service running speed of about 22 knots. As it approached the Sydney Harbour Bridge, the Master's visibility was significantly affected by the direct glare of the sun and its reflected dazzle off the surface of the water, and a long shadow was being cast to the West by the Bridge. The Master was wearing polarised sunglasses and was standing at the centre controls on the bridge. His height of eye above the water was about 4.2 metres.

The Collision

- 2.4 At interview, the Master indicated that shortly after passing Wharves 6-8 at Walsh Bay, and prior to passing under the Harbour Bridge, he heard a person cry out and saw a man standing in a dinghy about 30-50 metres off *Dawn Fraser's* starboard bow. In his written statement, the Master indicated that he immediately decreased speed in order to stop his vessel but, before it stopped, he saw the man jump from a dinghy. He

also recalled seeing another person in the dinghy and then felt an impact. The Master then manoeuvred the ferry keeping the two men, both of whom were now in the water, in sight, to affect a rescue.

After the Collision

2.5 Crew members on another Sydney Ferries' vessel, *Charlotte*, which was in the immediate area but travelling West, witnessed the collision. This ferry also approached the scene and its crew recovered the two men from the water. The younger of two men recovered seemed uninjured but it was immediately obvious that the older man had sustained a serious leg injury. The injured man received first aid immediately from *Charlotte's* crew. *Charlotte* was then relocated to a nearby wharf at Walsh Bay and both men were transferred to an ambulance. The older man did not appear to respond to attempts to resuscitate him by the crew and ambulance officers and was placed on a life support system in hospital. However, he did not recover from his injuries and died eight days later.

Emergency Response

2.6 Emergency services and response agencies were quickly informed of the accident by Harbour Control. On-call staff from the NSW Ambulance Service, Water Police, Sydney Ports' Marine Operations Unit and Sydney Ferries responded to the scene quickly to assist in the recovery of the two Fishermen and their dinghy. OTSI and NSW Maritime investigators were also on scene quickly to commence preliminary investigations.

Vessel Information

2.7 *Dawn Fraser* is one of seven Rivercat class ferries operated by Sydney Ferries. Rivercats are aluminium catamarans measuring 36.8m in length and 10.5m in width. They have a displacement of 58 tonnes, are surveyed to carry 230 passengers and are approved for high speed operations in calm waters. Rivercats are propelled by twin *Schottel* propulsion units, and *Dawn Fraser* was one of the first of the class to

enter service in 1992. It is powered by two General Motors supercharged and turbocharged V8 diesel engines, giving the vessel a normal service running speed of 22 knots. The Rivercats are not currently fitted with data-loggers or on-bridge CCTV.

- 2.8 The 4.9m aluminium dinghy was fitted with a 25 HP outboard motor and belonged to a member of a recreational fishing club to which the two Fishermen also belonged.

Crew Information

- 2.9 *Dawn Fraser's* Master first obtained marine qualifications in 1993. He joined Sydney Ferries, as a master, in August 2005 and qualified to operate Rivercats in September 2006. He had qualified on the First Fleet and Supercat class ferries prior to obtaining his Rivercat accreditation. At the time of the accident, the Master held a Restricted Master Class 4 qualification, a Marine Engine Driver 3 Certificate and a Local Knowledge Certificate for Sydney Harbour, i.e., he was appropriately qualified to operate *Dawn Fraser*. The GPH was also appropriately qualified.
- 2.10 The dinghy was being operated by a father and his son and the younger man had held a boating licence since October 2003.

Toxicology Results

- 2.11 NSW Water Police breath-tested *Dawn Fraser's* two crew members and the additional Sydney Ferries' off-duty employee; all three returned negative results. The crew members were also drug tested and returned negative results. OTSI was unable to ascertain whether the surviving Fisherman was subjected to similar testing.

Location Description

- 2.12 The collision occurred immediately to the West of the Sydney Harbour Bridge. Although there was relatively little traffic on the water at the time of the collision, this area and that immediately to the East of the Bridge, is often heavily trafficked in the mornings and early evenings and for

extended periods over weekends and public holidays by virtue of the proximity of Sydney Cove and Walsh Bay, and the views of the Opera House and Bridge afforded to embarked tourists. The narrowness of the Harbour in this area contributes to the congestion at these times. This makes it, in OTSI's view, a dangerous area in which to conduct recreational fishing, other than from the shoreline.

- 2.13 The approximate course of *Dawn Fraser's* usual track to Circular Quay is shown on the Chart at *Figure 1* and in the Aerial Photo at *Photo 1*. The Easternmost point of the track in *Photo 1* indicates the general locality of the collision.

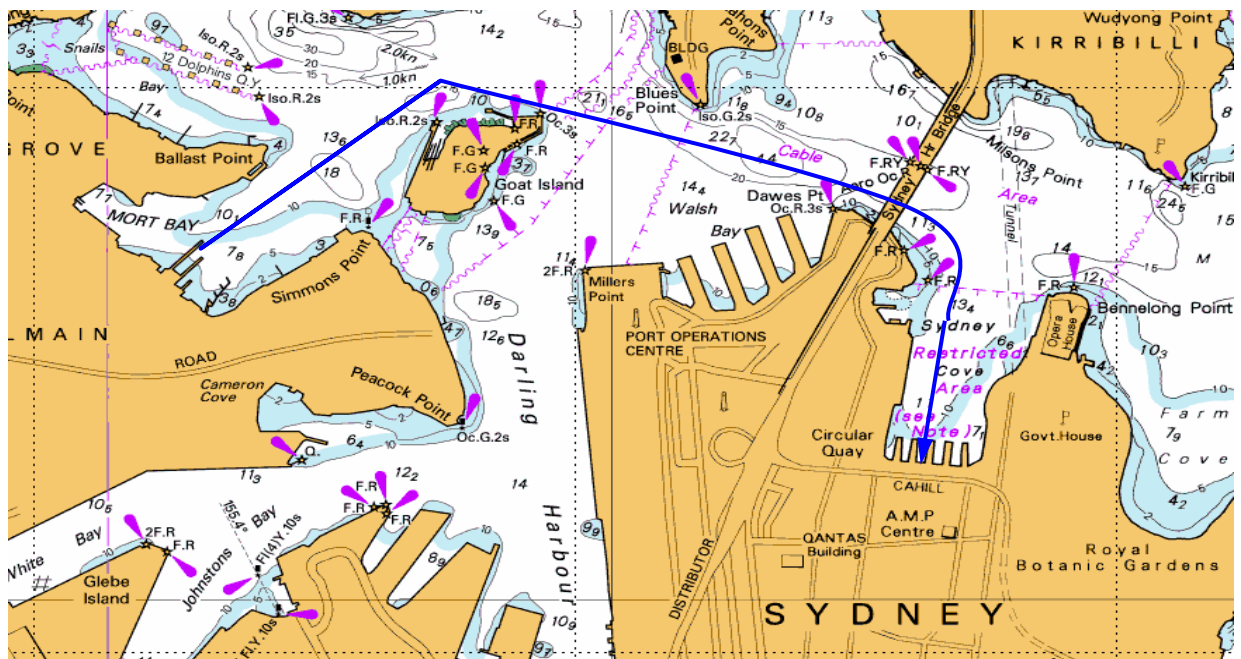


Chart 1:
Seafarer chart showing the approximate course of *Dawn Fraser's* usual track to Circular Quay



Photo 1: Aerial Photograph showing the approximate course of *Dawn Fraser*'s usual track, with the Eastern extremity indicating the general locality of the collision

Environmental Conditions

- 2.14 Meteorological reports and witnesses described the weather conditions as fine and clear at the time, with no significant cloud cover. There was a reported slight North-Easterly breeze and a temperature of around 25°C. The sun had risen at 5:50am and was shining low in the Eastern sky on a bearing of 108° and an altitude of 12°. High water was due at 10:17am and the sea state was slight.
- 2.15 *Photos 2, 3 and 4* were taken by OTSI's IIC from a recreational vessel at 7:00am on 17, 18, and 19 January 2007 respectively. While they do not represent the exact conditions that prevailed on 5 January 2007, and do not make allowance for the fact the Master was wearing polarised sunglasses on the day of the accident, they provide a reasonable indication of the conditions that would have been encountered by the Master as the *Dawn Fraser* headed towards the Harbour Bridge on the day of the accident.



Photo 2: Approaching Sydney Harbour Bridge from the West at 7:00am on 17Jan 07. Indicative of the Glare and Dazzle experienced on *Dawn Fraser* on 5 January 2007



Photo 3: Approaching Sydney Harbour Bridge from the West at 7:00am on 18Jan 07. Indicative of the Glare and Dazzle experienced on *Dawn Fraser* on 5 January 2007



Photo 4: Approaching Sydney Harbour Bridge from the West at 7:00am on 19 Jan 07. Indicative of the Glare and Dazzle experienced on *Dawn Fraser* on 5 January 2007

PART 3 ANALYSIS

Causation

- 3.1 The surviving occupant from the dinghy indicated that he and his father had been fishing at the time of the accident. He described commencing fishing in the area of the Harbour Bridge at about 6:00am and drifting in the navigable channel upstream of Sydney Harbour Bridge on the incoming tide and then periodically motoring back towards the Bridge to maintain their position in an area favoured by many fishermen. He described seeing a Rivercat approaching at “tremendous” speed and estimated the time between first seeing it and the collision as being less than five seconds during which time he stood up, waved his arms and yelled “Stop”, “Move”, “Divert” in an attempt to attract the attention of its master.
- 3.2 *Dawn Fraser’s* Master indicated to OTSI that although he was slightly behind schedule¹ as he departed Balmain, he had advised Ferries’ Control of this fact and was not under any pressure to make up the lost time. He recalled that he was operating *Dawn Fraser* at normal speed, which he indicated to be about 22 knots, and there being other vessels in the fairway before the accident, but he could only positively identify the *Charlotte*. He described hearing a cry, then seeing a man in dark clothing stand up in a dinghy and wave his arms. He also recalled then glimpsing a second, seated person who was wearing lighter coloured clothing.
- 3.3 The Master indicated that he first became aware of the presence of the dinghy and its occupants at a range of between 30-50 metres and on doing so he immediately pulled both *Schottel* throttle levers back to ‘idle-engaged’ and turned both steering handles to port. He was unsure of any effect that this might have had because he then felt an impact. In the absence of a data logger or CCTV coverage of activity in the vessel’s

¹ The delay was caused by another ferry having berthed astern of *Dawn Fraser* at Balmain.

bridge, OTSI had no way of corroborating the Master's description of his actions.

- 3.4 The crew of *Charlotte* advised that they had seen the dinghy shortly before the accident as they passed by it and noted that *Dawn Fraser's* speed and course did not appear to alter as it closed on the dinghy. A number of other witnesses provided statements to the Water Police corroborating the basic sequence of events as described by the Master and the surviving Fisherman.
- 3.5 OTSI concluded that neither the Master nor the Fishermen saw each other in sufficient time to avoid the collision, but that they had also created the conditions for the collision to occur by virtue of the manner in which they operated and positioned their respective vessels.

Appropriateness of the Manner in which the Vessels were Operated

Key Operating Requirements

- 3.6 Both the Master of *Dawn Fraser* and the Fishermen operating the dinghy were bound by the same rules and regulations on the day of the accident. Their key obligations were to maintain a proper lookout, to operate at a safe speed, to do everything possible to avoid a collision and to operate on the correct side of the channel. These requirements are derived from Rules 5, 6, 8 and 9 respectively of the *Convention on the International Regulations for Preventing Collisions at Sea, 1972*, more commonly referred to as the Collision Regulations, or COLREGS, to which Australia is a signatory. Rule 6 describes the factors that masters should take account of when determining a safe speed and describes the requirement for masters to adjust their speed in conditions of reduced visibility.

Operation of *Dawn Fraser*

- 3.7 The Master indicated that although he had only qualified on Rivercats in September 2006, he was comfortable in command of *Dawn Fraser* because he had operated it frequently during the previous four months.

While he could not recall having received any specific warnings about operating conditions prior to the commencement of his duties, he was aware of the glare of the sun and dazzle off the water as he headed Eastwards towards the Harbour Bridge and described it as “distracting”. Once the Master was clear of Mort Bay (Balmain), he was not bound by any specific speed restriction until such time as he reached Sydney Cove. He advised that he considered slowing down because of the glare and dazzle but did not do so because he had operated in similar conditions previously.

- 3.8 In addition to slowing down, the Master could have also altered his heading slightly as he transited, and employed a series of ‘dog-legs’ to avoid heading directly into the sun and glare. The Master said he made at least one such alteration but could not describe where this occurred. In the absence of a data logger or CCTV on the bridge, this action could not be confirmed. The Master could also have employed the GPH as an additional means of looking-out. Sydney Ferries’ SOPs state that a GPH should be utilised for such a purpose when not required for other duties. The Master indicated that while GPHs are normally used to look out during scheduled services, they are generally occupied with other tasks during the first run prior to commencing passenger services.

- 3.9 *Dawn Fraser* was fitted with *Furuno* FR7041R radar which has a function that allows a safety proximity sector detection audible alarm to be set, but the radar was in standby mode at the time of the collision and therefore would not have provided any indication of any vessel ahead. The Master indicated that he had not been given any instruction on the Rivercat’s radar as part of his type-rating and was not aware of any SOP or required standard for its use. Notwithstanding, all Masters are required to hold a Certificate of Competency which, amongst other things, requires them to have completed a written and practical assessment on the operation of radars. However, OTSI notes that this is not the first instance where it has established that radar was not in use during the course of its enquiries into previous matters involving Sydney Ferries’ vessels. OTSI is aware that radars have their limitations. In

certain areas and in certain conditions their functionality and utility can be degraded. Small vessels, and particularly those made of timber or fibreglass, may not be detected and in heavily trafficked areas, masters can also face the situation where there are so many 'contacts' that they can suffer from an overload of information. Even when this is not the case, a radar competes for a master's attention with other forms of instrumentation and equipment, and the requirement to maintain a visual lookout, especially so when the master is the only person on the bridge. Nevertheless, there will be times when radar can be of use, provided it is switched on. OTSI has concluded that, in the absence of any continuation training in the operation of radars, some masters may not be fully conversant with their use and/or that Sydney Ferries has not made its requirements for the use of radar sufficiently explicit.



Photo 5: *Dawn Fraser's* centre windscreen panel with the blind fully drawn

- 3.10 Upon inspection of *Dawn Fraser* shortly after the accident, OTSI noted that its windscreen and windows were clean. These glass surfaces were 'raked' back to minimise reflection and augmented by roll-down blinds to filter glare and dazzle. OTSI noted that these blinds had not been drawn

on two of the three panels forming the windscreen and that the centre blind had only been partially drawn. In effect, another means of diminishing the effects of reduced visibility from glare and dazzle had not been fully utilised. The extent to which this blind might have helped reduce the blinding effects of the glare and dazzle is depicted in *Photo 5* where the blind is fully drawn.

- 3.11 OTSI sought to establish whether there might have been other factors that affected the Master's concentration. He indicated that he enjoyed good health and that he had not been required to respond to calls on either the radio or his mobile phone at the time, nor did he initiate any such calls. He further indicated that there was no background distraction such as might have been caused by a transistor radio or CD player. The Master also indicated that he felt well rested at the start of the day, and there was nothing in his rosters that indicated to OTSI that he should have felt otherwise.
- 3.12 OTSI concluded that in operating *Dawn Fraser* on the course and at the speed that he did, without the benefit of an additional lookout, the Master did not appreciate the magnitude of the risks that his actions represented and when confronted with the consequence of that risk-taking in the form of an imminent collision, he was unable to prevent it.

Operation of the Dinghy

- 3.13 The surviving Fisherman said in his written statement that he and his father had fished on the Harbour previously. He described commencing to fish in the area of the Harbour Bridge at about 6:00am and allowing their dinghy to drift on a "very slow" incoming tide, approximately 30-50 metres from the Southern shoreline, whilst maintaining a lookout for other vessels. He further described re-starting the outboard motor at the end of one run and motoring back to a starting point near the bridge. The description of the pattern of fishing confirms that the outboard motor was being shut down between the drifts. The condition of the outboard motor was described as being "in reasonably good condition" and usually starting after "3 or 4 pulls".

- 3.14 While drift fishing is not prohibited in the area, the Fishermen would have been aware that the area on either side of the Bridge is heavily trafficked, particularly by ferries. They would also have been aware that they were under a fundamental obligation, like all vessel operators, to avoid a collision. Given that the surviving Fisherman held a boating licence, he should also have been aware that unless he was involved in crossing the channel, which he was not, his vessel was obliged to stay on the Starboard side. As the dinghy was moving Westwards, it should have been operated on the Northern side of the channel. The Fishermen clearly did not take these obligations into account. OTSI considers that had the two Fishermen had their outboard motor at least idling, and had they been maintaining a better lookout, they might have been able to move out of the way of the approaching ferry.
- 3.15 OTSI noted that the dinghy did not have any navigation lights. This meant that while the Fishermen commenced operating around the bridge on or about first light, which was at 5:50am, they transited from Hen and Chicken Bay, Cabarita to the Bridge before sunrise without the required form of illumination.
- 3.16 OTSI concluded that in operating their dinghy without navigation lights before sunrise enroute to the Harbour Bridge; in positioning themselves as they did, and in shutting down their outboard motor while drift fishing in the vicinity of the Bridge, the two Fishermen did not adhere to prescribed regulations and did not make adequate provision to ensure that they did not present a hazard to other users on the Harbour.

Mechanical Functions and/or Design Features

Dawn Fraser

- 3.17 The Master completed the required start-up and pre-departure checks and procedures before leaving Balmain and there is no indication, or suggestion, of an equipment or machinery failure or malfunction on-board *Dawn Fraser* in the lead-up to the collision. However, OTSI noted that the four bridge front screen support pillars are substantial and create small 'blind spots' from within the bridge. Such blind spots are not

unusual on commercial vessels and can be compensated for in several ways, e.g., moving from one control station to another and by employment of an additional lookout. During interview, the Master of *Dawn Fraser* stated that he was aware of these blind spots and indicated that he did shift his position to look around the pillars while he was in transit to Circular Quay on the morning of the collision.

The Dinghy

- 3.18 There was nothing to suggest that the condition or design of the dinghy contributed to the accident.

Policy, Organisational and/or Administrative Matters Relating to Safety Management

- 3.19 NSW Maritime, Sydney Ports and the Water Police share responsibility for safety on Sydney Harbour, and those operating vessels also have a responsibility to operate safely. NSW Maritime, in addition to other responsibilities, has primary regulatory responsibility, i.e., it establishes the boating rules and regulations that must be observed by those operating recreational and charter vessels and ferries in NSW, and is responsible for ensuring that these rules and regulations are complied with. NSW Maritime is also the licensing authority, i.e., it issues boating and vessel licences. Sydney Ports, through Harbour Control, facilitates the passage of all merchant and trading vessels coming into and going out of the Harbour and Port Botany. Harbour Control monitors the movements of such vessels by radio and radar and can also maintain a visual watch over the 'Lower Harbour'², which encompasses the area of the Bridge. While the focus of the latter activity is on ensuring the safe passage of merchant and trading vessels, by its very nature, it can also encompass recreational and charter vessels and ferries.

² This colloquial term was used by some people who spoke to OTSI to describe the area of the Harbour between Fort Denison and Goat Island.

- 3.20 In the event that there is an incident on the Harbour and Harbour Control is made aware of that incident³, it broadcasts a message to alert other vessels of the problem⁴. It would also alert NSW Maritime and/or the Water Police and might direct other vessels to stay away from the area of concern. However, NSW Maritime and the Water Police have relatively finite response capabilities, and particularly so after normal working hours, and these resources are generally not committed to other than higher-level contingencies.
- 3.21 OTSI interviewed a harbour pilot who reported, to Harbour Control, that he had seen a small dinghy that was unlit under the Harbour Bridge at approximately 1:00am on 5 January 2007. This sighting was only made as the large merchant ship he was piloting passed the dinghy. This dinghy was observed to be in the same location by the same pilot approximately two hours later. There was no way of establishing whether this was the same dinghy that later collided with *Dawn Fraser* because there was no record of this vessel being required to move on. On the basis of the statement provided by the surviving Fisherman, OTSI has taken it that it was not. However, this highlights that the two Fishermen were not alone in their practice of operating without lights and fishing in the immediate area of the Bridge. It also highlights the fact that not all reports of activities that are potentially dangerous are acted upon. The adequacy of monitoring and compliance/enforcement activity on the Harbour will be the subject of further elaboration in OTSI's investigation report into a collision involving another of Sydney Ferries' vessels and a motor launch, also in the vicinity of the bridge, on 28 March 2007.

Anticipation and Management of Risk

- 3.22 NSW Maritime, Sydney Ports and Sydney Ferries appreciate that there are risks, additional to those that present in other parts of the Harbour,

³ Harbour Control may be alerted to a problem by vessels that are in some form of distress or by others who have witnessed a vessel that is at risk or is presenting risks to others.

⁴ All commercial vessels are required to monitor Channel 13, a safety channel, whenever they are operating in the Harbour or on the Parramatta River. Most larger recreational vessels will also have this facility and it is a mandatory requirement for all vessels to have a marine radio if they are operated two nautical miles or more offshore. Operators of smaller recreational vessels operating on the Harbour are not obliged to have, or employ, such a facility.

under and immediately on either side of the Harbour Bridge, and there are several specific measures in place that are intended to mitigate these risks. The first of these is the promulgation of the area as a 'no anchoring' zone.

- 3.23 The second measure that is in place to mitigate risk in the area of the Harbour Bridge is a *Code of Conduct for Vessels Operating in Sydney Cove*. The Code, which was promulgated by NSW Maritime in January 2005, imposes specific navigational requirements upon vessels approaching the Harbour Bridge from the direction of Circular Quay. Properly observed, the Code provides for a degree of separation between commercial vessels coming out of the Cove and heading West under the Bridge and traffic passing under the Bridge, but heading East.
- 3.24 Throughout the course of its investigation, OTSI examined a range of rules and regulations pertaining to navigation and the avoidance of collision. As with many sets of rules, some aspects are open to interpretation. Some rules take precedence over others, but only in certain circumstances. OTSI noted that many of the rules and regulations have their foundation in international requirements that were primarily developed with international shipping and trade in mind. However, OTSI also recognised that some of the rules were based on what is best described as 'commonsense', such as the requirement to display navigation lights when operating between sunset and sunrise; to maintain a proper lookout on the water; to operate at safe speed, and the fundamental obligation to undertake all such measures as are possible to avoid a collision.
- 3.25 The Master held a Class 4 licence, recognised by NSW Maritime and the Australian Maritime Safety Authority (AMSA) and should have been in no doubt as to his obligations on the day of the accident. Both of the Fishermen should have been aware of the dangers of operating without lights while they transited in darkness to the Harbour. Given that the younger of the Fishermen held a boating licence, he should have been aware of the danger of operating on the wrong side of the channel. Irrespective of whether he was or was not aware of the requirement to

stay on the Starboard side of the channel, commonsense should have indicated to him and his father that they had placed themselves in a dangerous position and that there were additional dangers associated with shutting down their outboard motor while they were on the Harbour.

- 3.26 In examining these areas of 'knowledge', OTSI considered the implications of boaters only being required to hold a licence if they operate a vessel under power in excess of 10 knots. While holders of a boating licence are required to demonstrate their awareness of such matters as navigation rules and safe speed when they sit a knowledge test for their boating licence, those who operate boats without a licence, i.e., those travelling under 10 knots, rely largely on commonsense. While those sufficiently interested are able to obtain a free copy of NSW Maritime's *Boating Handbook* from any of its offices, OTSI considers that NSW Maritime needs to find additional ways to convey its requirements to those who operate a vessel but who do not have a licence. NSW Maritime might, for instance, emphasise the dangers associated with fishing in fairways and channels, and the operating requirements therein, to registered fishing clubs. It might also distribute such information via its website and in the literature that is issued with fishing and boating licences.
- 3.27 Given the uniqueness of Sydney Harbour and the number of people who operate vessels on it, OTSI considers that NSW Maritime should have an additional chapter in its *Boating Handbook* dedicated to the conditions and requirements for operating on the Harbour.
- 3.28 In addition to the need for greater 'awareness', observance of the rules and regulations, and the risks that must be managed, OTSI considers the juxtaposition of commercial shipping and vessels operating at speed, such as ferries and pleasure craft, as well as drifting fishing vessels in a busy and relatively narrow part of the Harbour, to be inherently unsafe. It believes, therefore, that any form of fishing, other than from the shoreline, should be prohibited in this area of the Bridge and the main shipping channel under it.

Effectiveness of the Emergency Response

- 3.29 OTSI considers the emergency response to have been both timely and effective, primarily due to the proximity of the *Charlotte* and the actions of its crew.

Other Matters that would enhance the Safety of Ferry and Boating Operations more generally within Sydney Harbour

- 3.30 Throughout the course of its investigation, there were three persistent 'themes' that emerged: that the Harbour is getting busier; that many recreational boaters do not know or do not observe the rules of the 'road', and that Sydney Ferries' vessels travel too fast.
- 3.31 NSW Maritime's 2006 Annual Report indicates that during the period 1996-2006, there was a 27.7% increase in the number of boating licences issued within NSW and a 32.4% increase in vessel registrations. OTSI also noted that commercial vessel registrations almost doubled in the same period. However, NSW Maritime believes that this has not necessarily translated into increased activity on the Harbour because access to the Harbour has not increased, i.e., that while the distribution of moorings and marinas may have changed, the overall number of moorings has not. It believes that the major area of 'growth' has been in towable vessels. OTSI considers that given the increases in boating licences and registrations, and the fact that approximately sixty percent of the State's population resides in Sydney, it is not unreasonable to assume that this would translate into increased traffic on the Harbour.
- 3.32 Perhaps not surprisingly, the second and third of the 'themes' were made by commercial operators and recreational operators respectively. OTSI appreciates why the masters of commercial vessels might consider that those with lessor or no boating qualifications might have a limited understanding of the rules and regulations. It also understands why recreational users of the Harbour might consider that Sydney Ferries' vessels travel too fast. It is not necessary to spend too long on the Harbour to see examples of the operators of recreational vessels failing

to observe basic rules of the road. On the other hand, speed has been identified as a causal or contributing factor in a number of the investigations that OTSI has conducted into accidents involving Sydney Ferries' vessels.

- 3.33 NSW Maritime and its predecessor, the NSW Waterways Authority, have given attention to the competing interests and needs of commercial and recreational users over time. The Waterways Authority commenced the development of a *Sydney Harbour Traffic Management Plan* in 2002. This plan was not adopted. However, key staff who worked on the Plan continued to do so after the Waterways Authority was replaced by NSW Maritime. The new Draft Plan is known as the *Sydney Harbour Safe Boating Plan*. NSW Maritime has advised OTSI that the Draft Plan has yet to be endorsed within the organisation and is considered to be a "working document" only at this time.
- 3.34 OTSI has limited familiarity with the content of the draft *Sydney Harbour Safe Boating Plan* to date but hopes to be able to provide further comment on it in the context of its investigation report into the collision between a ferry and a launch on the Harbour on 28 March 2007. That said, OTSI notes that the subjects of 'separation' and 'knowledge' are under consideration within the plan, and the Draft Plan considers it impractical to separate, to any great degree, commercial and recreational users on the Harbour. If this position is confirmed, OTSI believes that it would be appropriate for NSW Maritime to give consideration to an extension of the Orange Diamond Scheme. This scheme allows the Freshwater, Lady and First Fleet class vessels operated by Sydney Ferries to display an Orange Diamond symbol which entitles them to have priority over a sailing vessel, i.e., it reverses the normal priority which requires powered vessels to give way to sailing vessels. It is important to note that the Orange Diamond does not provide for an absolute right of way and the masters of ferries displaying such a symbol remain under an obligation to comply with the related provisions of the COLREGs. OTSI notes that, at a distance, the Orange Diamond, which is displayed on top of the ferry's superstructure, is not

particularly conspicuous and considers that an extension of the scheme to all Sydney Ferries might remove the scope for uncertainty by other vessel operators as to which of Sydney's Ferries have the related right of 'privilege' and which do not. OTSI also believes that consideration should be given to broadening the provisions of the scheme to perhaps require that powered vessels also stay out of the way of Sydney Ferries' vessels. Were NSW Maritime to agree to allow all of Sydney Ferries' vessels to display the Orange Diamond, this would result in 31 vessels, as opposed to the current 15, having the related right of way privilege. OTSI acknowledges that Sydney Ferries is not the only operator carrying fare-paying passengers. However, it is the carrier of the most passengers and its operations facilitate, more than any other operator's, the movement of Sydneysiders to and from work by other than road and rail. OTSI considers that it would not be practical to extend the scheme to all non-Sydney Ferries vessels operating as ferries on the Harbour because this would result in up to 75 vessels exercising the related right of way privilege.

3.35 During discussions on the possibility of an extension of the Orange Diamond scheme, concern was expressed on a number of occasions about the possibility that some of Sydney Ferries' masters might be encouraged to exercise less caution were the related privileges extended. OTSI considered such concern as legitimate and acknowledges that any extension of the Orange Diamond scheme would have to be accompanied by a commitment by Sydney Ferries' masters to pay increased attention to the requirements to maintain a proper lookout and to operate at a safe speed at all times. OTSI notes that with the impending introduction of a new range of technologies, such as data loggers onboard all of Sydney Ferries' vessels and an electronic customer information system allowing continuous visibility of a ferry's position, monitoring the speed at which Sydney Ferries' vessels are being operated will be less problematic.

3.36 In its limited examination of the Draft Plan, OTSI did not observe any intention to impose speed restrictions in the vicinity of the Harbour

Bridge. OTSI considers that in the light of what is known to be an area where there is a large volume and variety of traffic at various times throughout the week, and the concerns expressed to it by both recreational and commercial operators in the wake of this accident and the one that followed on 28 March 2007, immediate consideration should be given by NSW Maritime to the imposition of a speed restriction in the area of the Bridge. The extent to which speed should be restricted and the area to which the speed restriction should be applied is a matter which should rest with NSW Maritime. However, OTSI notes that following the tragic events of 28 March 2007, Sydney Ferries has restricted its vessels to a maximum speed of 15 knots in the area bound by a line drawn between Bennelong and Kirribilli Points to the East of the Bridge and Blues and Millers Points to the West (Lines A and B respectively, as indicated on *Chart 2* on page 25). OTSI supports this self-imposed restriction and commends it to NSW Maritime for wider application.

- 3.37 It is important to note that any speed restriction that NSW Maritime might apply would not obviate the requirement for those operating a vessel to determine what constitutes a safe operating speed at the time. Rather, it would provide them with an 'upper' speed limit. In making this recommendation, OTSI acknowledges that merchant and trading vessels are already restricted to a maximum speed of 10 knots in the area bound by a line drawn between Shark Point and Bradleys Head to the East of the Bridge (Line C on *Chart 2*) and to 8 knots in the area West of the Bridge to a line drawn between Ballast Point and Balls Head (Line D on *Chart 2*). In the event that NSW Maritime applies a speed restriction in the area of the Bridge, OTSI considers that such a restriction should not apply to merchant and trading vessels unless it is lower than the extant limits already imposed on such vessels.

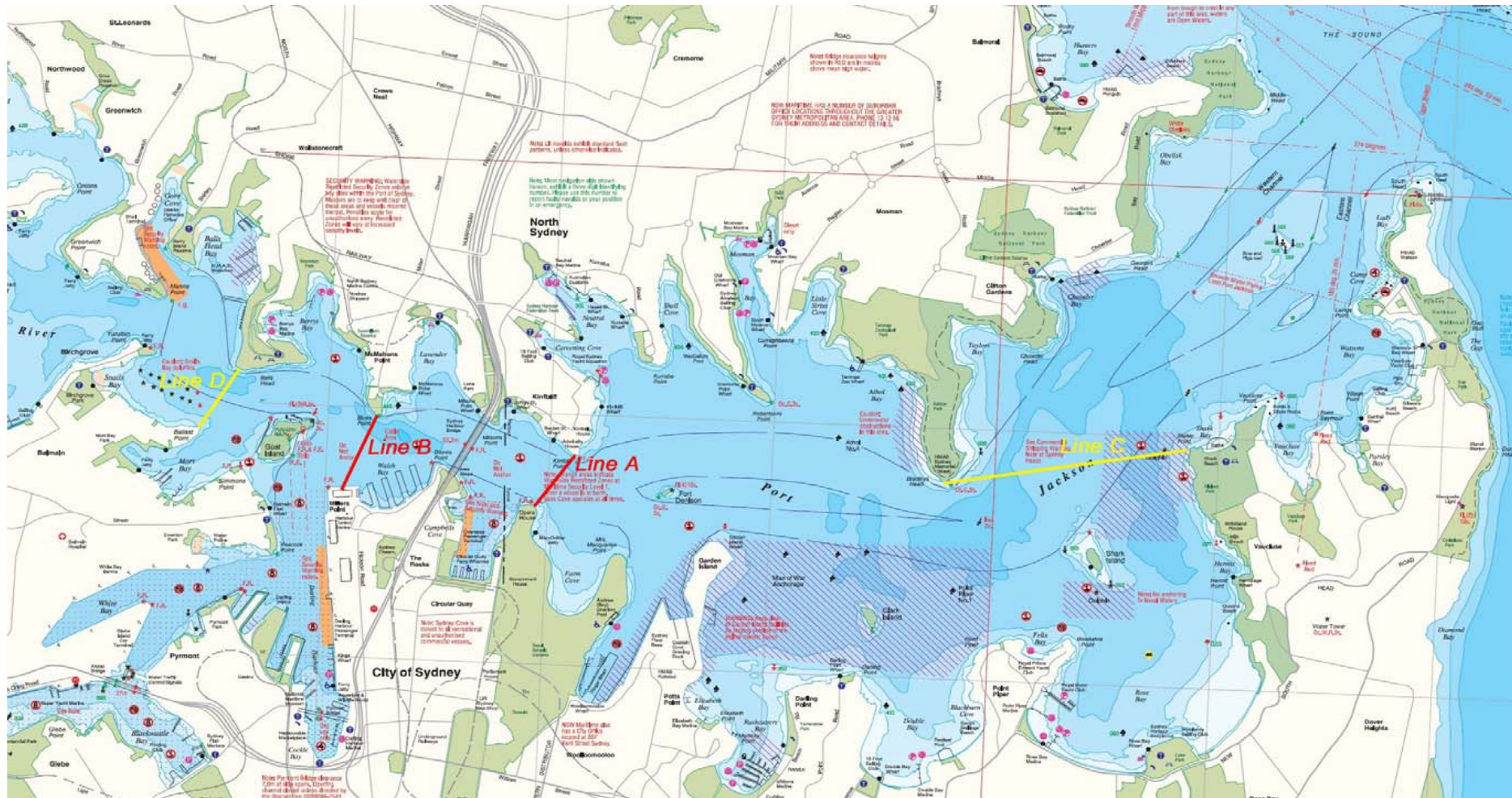


Chart 2: 'Lower' Harbour Environs with recommended and actual restricted speed landmarks indicated by Lines A and B and Lines C and D respectively

- 3.38 The circumstances of this accident indicate that at the time of the collision both the Dawn Fraser and the dinghy were engaged in the right and proper purposes for which each was intended. Unfortunately, neither was being handled appropriately for the environmental conditions which prevailed and in that part of the main shipping channel where the dinghy was located. The critical factors which formed the chain of events that successively and cumulatively resulted in one fatal culminating point are described in the Findings which follow in Part 4. The measures to prevent a recurrence of this type of accident are described in the Recommendations at Part 5.

PART 4 FINDINGS

4.1 As a result of the lines of inquiry that have been followed to address the Terms of Reference for this investigation, OTSI has determined that there were a number of circumstances, factors and behaviours that combined at a single location and time to create a situation where this accident became the tragic outcome. Those circumstances, factors and behaviours are described in the Findings which follow.

a. **Causation.** In accordance with the requirements of s45A(2)(b) of the *Transport Administration Act 1988*, OTSI has determined that the collision was caused by the convergence of two prime factors:

- i. the manner in which *Dawn Fraser* was being handled made no provision for the prevailing environmental conditions of reduced visibility, and
- ii. the location of the dinghy, with its outboard motor shut down, in a section of Sydney Harbour's main shipping channel, while its occupants engaged in recreational fishing.

b. **Contributory Factors.** The following factors had a bearing on the circumstances of the accident and contributed to its cause to varying extents. These factors address those aspects of the Terms of Reference which deal with environmental conditions; the operation of both vessels; the mechanical condition and design features of both vessels and matters relating to safety management:

- i. *Dawn Fraser* was operating in conditions of reduced visibility because it was heading directly into the glare of the morning sun and its reflected dazzle off the surface of the water;
- ii. the speed of approximately 22 knots, at which *Dawn Fraser* was being operated immediately before the presence of the dinghy became apparent, was excessive given that the selected course the ferry was taking afforded reduced visibility;
- iii. although ferry operating procedures make provision for a GPH to be utilised as a 'lookout' to assist a master, the GPH on *Dawn Fraser* was

not tasked in this capacity, despite the prevailing conditions of reduced visibility, because he was otherwise engaged in preparing the ferry's berthing lines;

- iv. *Dawn Fraser's* Master was wearing sun glasses, but he did not fully utilise the pull-down tinted blinds on the bridge's windscreen to further reduce the effects of the glare and dazzle;
- v. although the extent to which *Dawn Fraser's* radar would have been useful in the prevailing conditions is questionable, and the extent to which the Master would have been able to monitor its screen without the assistance of the GPH is debatable, the fact is that the radar was of no potential assistance to the Master as it was not switched on;
- vi. the Fishermen were engaged in a pattern of fishing which positioned them drifting Westwards on the Southern side of the main shipping channel, whereas their direction of movement required them to be on the Northern side of the channel, and
- vii. because they were not keeping an adequate lookout while they were fishing in the main shipping channel, and because the dinghy's outboard motor was shut down, the two Fishermen were unable to move out of the way of *Dawn Fraser* when it became apparent that a collision was likely to occur.

c. Anticipation and Management of Risk

- i. Sydney Ferries' Vessel Operating Manuals (VOMs) do not specifically identify the actions required of a master in conditions of reduced visibility, but a Fleet Operations Temporary Memorandum dated 10 May 2006 (FOTM 2006-3) does. However, this policy document does not include glare and dazzle as being amongst the conditions requiring masters to exercise additional caution.
- ii. Fishing is permitted in the immediate area of the bridge. However, persons operating any vessel are bound by a range of international and local rules and regulations which require them to anticipate and manage safety risks. Nevertheless, it is a moot point whether these rules and regulations are understood by many recreational boaters and

especially so when the requirement for a boating licence only becomes mandatory when a vessel is operated, under power, in excess of 10 knots. Irrespective, OTSI considers the juxtaposition of commercial shipping and vessels operating at speed, such as ferries and pleasure craft, as well as drifting fishing vessels, in a busy and relatively narrow part of the Harbour, to be inherently unsafe.

d. Appropriateness of the Emergency Response

- i. Sydney Ferries' response following the collision was both timely and effective, due to the proximity of another of its ferries, *Charlotte*, and the initiative of its crew. The two Fishermen were recovered from the water quickly and first aid was provided immediately thereafter. Emergency Services, including the Ambulance Service, Water Police and Sydney Ports were alerted and also responded quickly. Subsequent investigatory activity was also initiated in a timely manner.

e. Enhancement of the Safety of Ferry and Boating Operations on Sydney Harbour

- i. In order to provide for increased safety for both the travelling public and recreational users of the Harbour, it would be appropriate for NSW Maritime to consider extending the navigational privilege associated with the authorised display of the Orange Diamond to all of Sydney Ferries vessels and by also affording these ferries priority over self-propelled and powered vessels.
- ii. The area in the immediate vicinity of the Harbour Bridge is extremely busy, because of the large number of vessel movements into and out of Walsh Bay and Sydney Cove, and water conditions directly under the Bridge are like nowhere else on the Harbour. While merchant and trading vessels are subject to a speed restriction in this area, other vessels are not unless they are in close proximity to another vessel. Given the unique conditions in the vicinity of the bridge, the circumstances of this accident and a subsequent accident involving a ferry and a recreational vessel which resulted in multiple fatalities, immediate consideration needs to be given to restricting the speed of all vessels in this area.

PART 5 RECOMMENDATIONS

5.1 In order to prevent a recurrence of this type of accident, the following remedial safety actions are recommended for implementation by the organisations specified below:

a. Sydney Ferries Corporation

- i. Review its current watchkeeping standards and procedures for masters, to increase focus on the requirement to maintain a safe speed and proper lookout at all times while ferries are underway;
- ii. Review its training and vessel operating instructions to emphasise the requirement for masters to exercise additional caution when operating in environmental conditions where visibility is reduced, and fully describe the techniques required to address such operating conditions;
- iii. Amend its FOTM (Fleet Operations Temporary Memoranda) 2006-03 to specifically identify glare and dazzle as additional factors requiring masters to adopt additional precautionary measures;
- iv. Review the proficiency of all masters in radar operating procedures and provide clear direction on the requirement for this important safety equipment to be used;
- v. Ensure GPHs are properly trained to perform the duties of a 'lookout', and
- vi. Require that a GPH or an Engineer must be employed as a 'lookout' to assist the Master whenever a ferry is underway in conditions of reduced visibility, including night time.

b. NSW Maritime Authority

- i. Impose a maximum operating speed limit on the approaches to, and under, the Sydney Harbour Bridge;
- ii. Issue, and distribute widely, a regulation or notice which specifically prohibits deliberately drifting, or deliberately stopping a vessel for other than the purpose of avoiding a collision, in the approaches to, and under, the Sydney Harbour Bridge;

- iii. Give consideration to extending the daytime 'priority over sail' Orange Diamond symbol currently granted to some of Sydney Ferries' vessels, to all its vessels and also to affording vessels displaying the Orange Diamond operational priority over self-propelled and powered vessels;
- iv. Recognising that not all recreational boaters hold a licence and therefore may not fully appreciate their obligations when operating a vessel, review its educational and safety awareness material, and the means by which it is promulgated, to ensure that its requirements are sufficiently explicit to be understood by, and are readily accessible to, the general public, and
- v. Recognising the uniqueness of Sydney Harbour and the extent to which it is used by commercial and recreational users, incorporate a chapter into the next edition of its *Boating Handbook* which deals with the specific challenges of operating a vessel, and the requirements to be observed, on Sydney Harbour.