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Transport Accident
Investigation Commission

Te Komihana Tirotiro Aitua Waka

Annual Report 2017-2018

Prepared and published in accordance with the requirements of the Crown Entities Act 2004

Transport Accident Investigation Commission
Annual Report 2018

19 November 2018

Hon Phil Twyford
Minister of Transport
Executive Wing
Parliament Buildings
Wellington

Dear Minister

We have the honour to present to you this Annual Report of the Transport Accident Investigation Commission for the 12 months ended 30 June 2018.

It has been prepared and is signed in accordance with the provisions of the Crown Entities Act 2004.

Jane Meares
Chief Commissioner

Stephen Davies Howard
Deputy Chief Commissioner

Our Vision

No repeat accidents ever!

Our Mission

Safer transport through investigation, learning and influence

Our Values

Fairness
Impartiality
Independence
Competence
Integrity
Accessibility
Timeliness
Certainty

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1. Chief Commissioner's overview

The year in summary

The year under review has marked an important stage in the Commission's development. Strengthening our foundation has been the Commission's focus for the last three years, since receiving an increase in our baseline funding in 2015/16. Two years of intensive change followed: we increased staff numbers and our investigator resources, and developed plans and processes to support improved organisational performance.

The challenges have continued in 2017/18. As well as consolidating the changes the new resourcing brought us, Commissioners and staff have had a busy year with significant and large-scale activities: conducting a pivotal strategic planning exercise, conducting a major accident investigation on behalf of the Kiribati Government, jointly organising an international conference, and managing a return to our usual premises after a year in temporary offices.

Despite these added calls on the organisation, operations continued as planned. I am pleased to report that this year we met our volume targets for the first time since receiving our additional funding and — in line with our forecasts — we significantly improved timeliness.

We continue to make a difference to transport safety across the transport modes

Most importantly, we continued to make a real difference to reducing the risk of transport-related harm to New Zealanders and international transport users. For example, over the year we: made recommendations to the Civil Aviation Authority to improve the resilience to technological change in the aviation sector; recommended KiwiRail find immediate and long-term solutions to safety issues associated with the track and signalling infrastructure in the Wellington Station area; and identified navigation in pilotage waters as a safety issue in the maritime sector, making several recommendations to Maritime NZ, other government organisations, and an operator.

As a direct result of the Commission's recommendations and inquiries:

- the Director of Maritime NZ has been given powers to undertake non-notified drug and alcohol testing of workers in the commercial maritime sector to help reduce the risk of impaired performance by people in safety-critical roles

- KiwiRail has improved the management of train controllers' workload such that we have received no notifications of occurrences related to errors caused by stress or fatigue for two years

- the manufacturer of Robinson helicopters has been active in commissioning research and developing flight video recorders and flight data recorders to better understand how 'mast-bumping' accidents occur in these aircraft, a particular focus of recent aviation inquiries — although machine design has been just one aspect of our investigations, these initiatives will contribute to the international body of knowledge about how to reduce the risk of these accidents.

More information about these examples, which illustrate the impact we have made to transport safety, are in the body of the report.

The Commission welcomes the actions taken by recipients of our recommendations. We acknowledge that implementing solutions to the safety issues we identify sometimes requires substantial effort and resource. This reflects the nature of our inquiries, which are in-depth but undertaken with a broad view. What we learn from a single event, or the understanding we gain from a series of similar events, may have significant implications for the complex transport system as a whole. We express what we learn as findings and recommendations. These represent knowledge about safety issues within that system. System participants (regulators, operators, workers, or users) can then use that knowledge to respond to safety issues in their own context or circumstances.

The Commission provided expertise to the Kiribati Government

During the year, the Commission contributed its expertise and experience to the Kiribati Government. At the beginning of 2018, a team of the Commission's staff comprising two maritime investigators and one solicitor/analyst was appointed by the Republic of Kiribati to conduct an independent investigation into the tragic sinking of the domestic passenger and freight vessel *Butiraoi*. The vessel was on a trip between the Kiribati islands of Nonouti and Tarawa. Of the one hundred people who were on board, 93 are missing and presumed to have died.

The report was delivered to the Kiribati Government in early July 2018.

New Zealand hosted the Marine Investigators' International Forum conference

In November 2017, the Commission and the Marine Accident Investigators' International Forum (MAIIF) jointly organised MAIIF's annual conference, which was held in Rotorua. MAIIF is an international organisation, which seeks to advance maritime safety and the prevention of marine pollution through maritime accident investigation, and fosters co-operation and communication between investigators.

Attendance at MAIIF and other international forums is crucial for small organisations such as ours. These international forums offer opportunities for professional development, especially when they are held in New Zealand as more of our staff can attend. They build organisational resilience by connecting the Commission with accident investigation bodies in other countries. Should a major accident occur, the Commission would need to draw on the assistance of overseas agencies, and strong connections and relationships would mean a better and swifter response.

The conference organisation was a major task and it is a credit to those involved that the well-attended conference ran smoothly and successfully.

Return to our usual premises

Another major task for corporate staff was the organisation of the Commission's return to its usual premises in early 2018. After the November 2016 Kaikoura earthquake, staff were accommodated in temporary offices while remedial work was undertaken. The move back to our permanent home was accomplished with minimal disruption to the operation of the Commission's work.

An independent review found we are delivering the benefits sought from additional baseline funding

Our additional baseline funding received in 2015/16 was to enable us to be more effective in delivering accident investigations that meet Government and international expectations. The benefits sought were: improved timeliness, improved organisational resilience, and better preparedness to respond to a major event.

We established a change programme to apply the funding in accordance with the approved appropriation. In November 2017, an independent consultant completed a review of the benefits of the funding increase and reported we were on track to deliver the benefits sought.

Achievement of our targets

The reporting year has seen us 'reset' our casebook and meet our volume and timeliness targets for the first time since receiving the additional funding. This is a significant milestone for the organisation, allowing us to now look to the future from a firm foundation.

Looking to the future: a refresh of our Statement of Intent

The Commission's position in the strategic planning cycle required a refresh of our Statement of Intent. We operate in an environment of rapid technological change and must respond to this challenge and maintain the output performance expected of us if we are to continue to meet our statutory purpose.

The strategic focus for the period covered by our refreshed Statement of Intent is our capacity and capability to meet the demands technological change will make of us. This might be in terms of the type of event we investigate (for example, accidents involving automated vehicles) and our ability to gather

evidence from all available sources (for example, video or other data recorders). We are already adapting the skill make-up of our workforce. Over the year, we recruited a Forensic Data Recovery Specialist to work with the Accident Investigator (Recorders), recruited into the organisation in 2015/16. These specialist roles enable the Commission to draw on evidence available to it from all data sources.

The refreshed Statement of Intent is centred on making the Commission a resilient organisation, able to respond to disruptions in our operating environment and to external shocks such as a major accident or a natural disaster that disrupt our ability to operate. Looking ahead, resilience is key to our organisational health and capability.

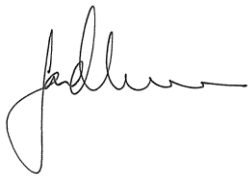
As part of our strategic planning in November 2017, we identified areas where we are at risk if we do not strengthen capacity and capability. Following this planning, we began a review of our workforce plan and a strategic analysis of our IT systems to build resilience. This work continues into 2018, as we prepare an investment bid to support our strategic direction. The Commission's strategic direction remains unchanged regardless of the outcome of the investment bid, but what actions we take to put our planning into effect will depend on the resources available.

Generating and transferring knowledge will provide a structure for enhancing the value of our work. We aim to improve analysis of data trends to better understand where we can add maximum value (that is, where we should be paying attention); and finding better ways of making the results of our inquiries accessible to others so that the knowledge we generate can add value to what they do.

Acknowledgement

I would like to thank my fellow Commissioners not only for their continuing contribution to the work of the Commission as an inquiry body, but also for their guidance and support as we undertake our role as the board of a Crown entity. These dual roles can be challenging and demanding, but we could not achieve them without the commitment of everyone at the Transport Accident Investigation Commission.

In particular, our Chief Executive, Lois Hutchinson, has continued to ably steer the Commission through this busy year. On behalf of my fellow Commissioners, I would like to thank her, and all the staff of the Commission, for their commitment in delivering on the Commission's statutory purpose and keeping us all focused on our aspirational vision for safer transport in New Zealand of "No Repeat Accidents – Ever!".



Jane Meares
Chief Commissioner

Organisational overview

"Our role is to help avoid transport accidents"

1 output class:

ACCIDENT OR INCIDENT INVESTIGATION AND REPORTING

2. Organisational overview

2.1. Our role is to help avoid transport accidents

The Transport Accident Investigation Commission Act 1990 establishes us as a standing commission of inquiry

The Commission's role is to determine the circumstances and causes of transport accidents and incidents with a view to avoiding similar occurrences in the future, rather than to ascribe blame to any person.[1] The Transport Accident Investigation Commission Act 1990 (the Act) enables the Commission to undertake its task.

The Act establishes the Commission as a standing commission of inquiry. It requires the Commission to investigate certain transport occurrences, then inform transport system participants — domestically and internationally — of what happened, the lessons that can be identified, and what might need to change to help prevent a recurrence. To achieve its purpose, the Commission must:

- decide whether to investigate (the Commission must do so if it believes that an accident or incident has significant implications for transport safety or that an inquiry would allow it to make recommendations that would improve transport safety)
- co-ordinate and direct the investigations it initiates and decide which other parties (if any) should be involved in its investigations
- consider evidence gathered by investigators, advice from experts, and the submissions of consulted people and organisations; and hold private or public hearings
- publish its findings and recommendations (the Commission has recommendatory powers only).

To support its functioning, the Commission has broad investigative powers under the Act, including the power of entry and inspection, and the power to seize, remove, and protect evidence. It also has wide powers under the Commissions of Inquiry Act 1908.

On occasions, coroners, the New Zealand Police, transport safety authorities (the regulators[2]) or WorkSafe New Zealand, may also investigate the same transport occurrences as the Commission is investigating.

[1] Section 4 of the Transport Accident Investigation Commission Act 1990.
[2] Maritime NZ, the Civil Aviation Authority, and the NZ Transport Agency.

2.2. Independence and impartiality is our underlying ethos

People can speak to us freely because we are independent and the evidence we gather is protected

The principles of independence and impartiality underpin the ethos of accident investigation the world over. Ensuring evidence is readily secured, and accessible for critical examination without hindrance or undue influence or pressure from vested interests is the cornerstone of state mandated accident investigation. The principles of independence and impartiality are manifest in the international transport Conventions where signatory states are obligated to conduct independent and impartial investigations.[3] New Zealand fulfils this obligation through the Act where it establishes the Commission as a commission of inquiry and expressly requires the Commission to act independently in performing its statutory functions. It is through the independent functioning of the Commission and protection of evidence that people can speak to us freely, and we can better understand what happened.

Under the Act, all the evidence gathered during an investigation has extensive legal protection from disclosure. Further, no finding, recommendation, or report published by the Commission is admissible in legal proceedings. These provisions mean people can speak to us freely about what happened in an accident without fear of prosecution resulting from the outcome of the inquiry.

2.3. Our organisation consists of Commissioners and their supporting staff

We are a small independent Crown entity, fully funded by the Crown

The Commission is a small independent Crown entity, fully funded by the Crown. Commissioners have two roles: firstly, as Commissioners they make determinations as to the circumstances and causes of the accidents and incidents before them; second, they are the Board of the Transport Accident Investigation Commission for the purposes of the Crown Entities Act 2004.

The Commission meets its obligations as a statutory decision-maker and board by sitting two days, usually in the third week of each month, February through to December each year. It is usual for the Commission to devote at least 75% of its time to hearing the cases before it, with the remaining time for board matters. On occasion the Board may meet by teleconference or conduct business by email between scheduled meetings.

The Commission had five members over 2017/18

Members of the Commission are appointed by the Governor-General. During 2017/18, there were five Commissioners:

- **Jane Meares** (Chief Commissioner): Jane is a commercial barrister based in Wellington. Jane undertakes a broad range of commercial and public sector advisory work, and holds several board memberships including the chair of the Parliamentary Counsel's risk and audit committee. Jane was first appointed a Commissioner in February 2015, and appointed Chief Commissioner in November 2016. Her term expires in October 2021.
- **Peter McKenzie CNZM QC** (Deputy Chief Commissioner): Peter is a commercial barrister in sole practice in Wellington. He has considerable commercial expertise and has lectured and consulted internationally on

[3] Paragraph 5.4, Annex 13 to the Convention on International Civil Aviation; Chapter 16 International Maritime Organization Casualty Investigation Code

company, banking, and securities law. Peter was appointed to the Commission in August 2015. His term expired in October 2018.

- **Stephen Davies Howard** (Commissioner): Stephen is a Wellington-based company director with a wealth of strategic international experience. He holds several board appointments including chair of a Regional Research Institute, the Centre for Space Science Technology. Stephen holds a commercial pilot licence and a commercially endorsed Ocean Yachtmaster's certificate. He was appointed to the Commission in August 2015. Stephen's term expires in April 2019.

- **Richard Marchant** (Commissioner): Richard is an Auckland-based barrister who has prosecuted a large number of cases on behalf of government agencies. He is a member of the New Zealand Bar Association and of the Criminal Bar Association, and is a member of the performance review committee of the Ministry of Justice. Richard was appointed to the Commission in November 2016. His term expires in April 2019.

- **Paula Rose QSO** (Commissioner): Paula is a Canterbury-based director and safety professional. She was formerly National Manager, Road Policing with NZ Police, and deputy Chair of the Independent Taskforce on Workplace Health and Safety. She holds a number of board positions including WorkSafe NZ. She was appointed to the Commission in May 2017. Paula's term expires in April 2019.

A Chief Executive and 27 staff support the Commissioners

A small organisation supports the Commissioners, who employ a Chief Executive. As at 30 June 2018, the Chief Executive had 27 staff, including three Business Services staff who were part time.

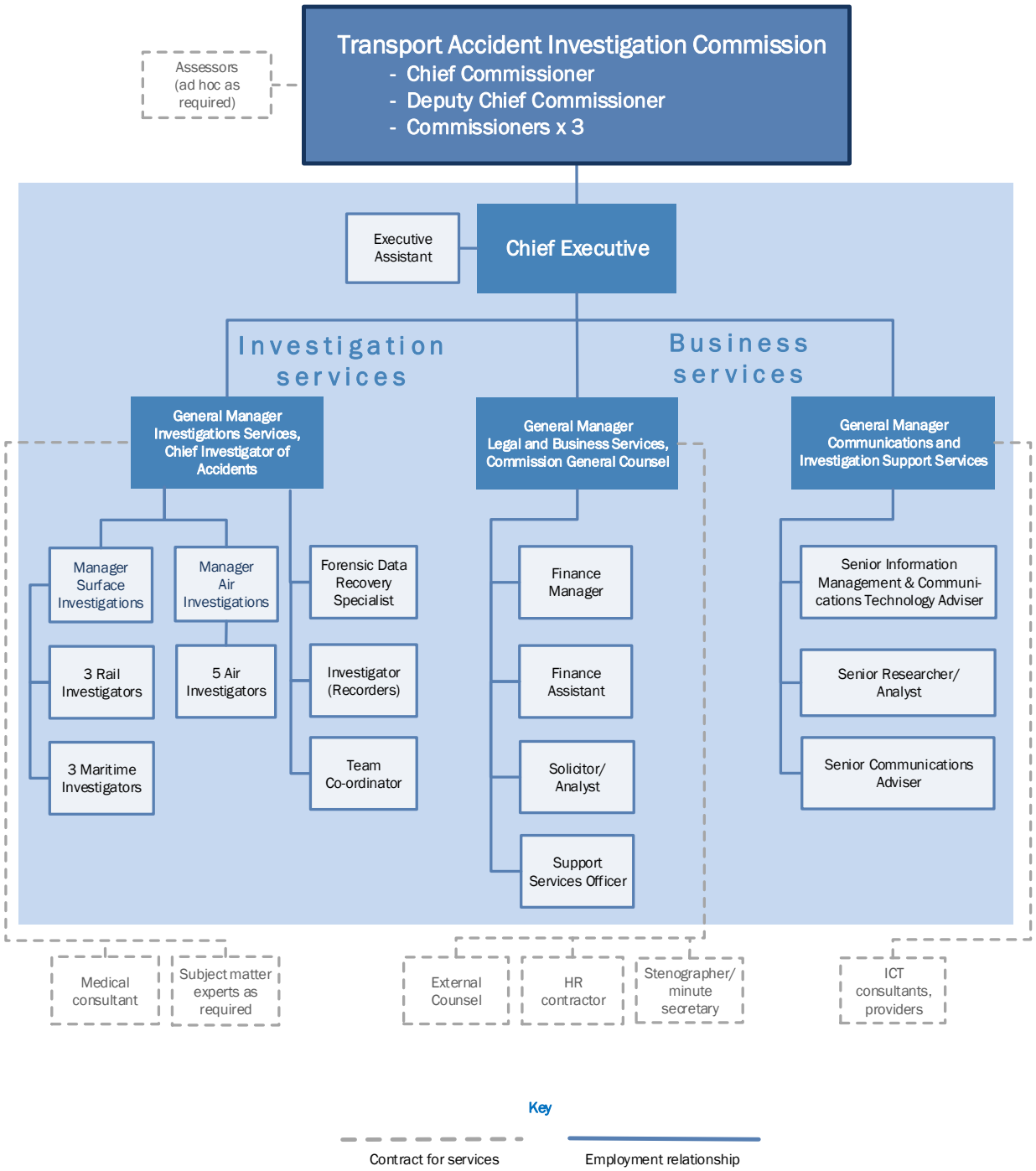
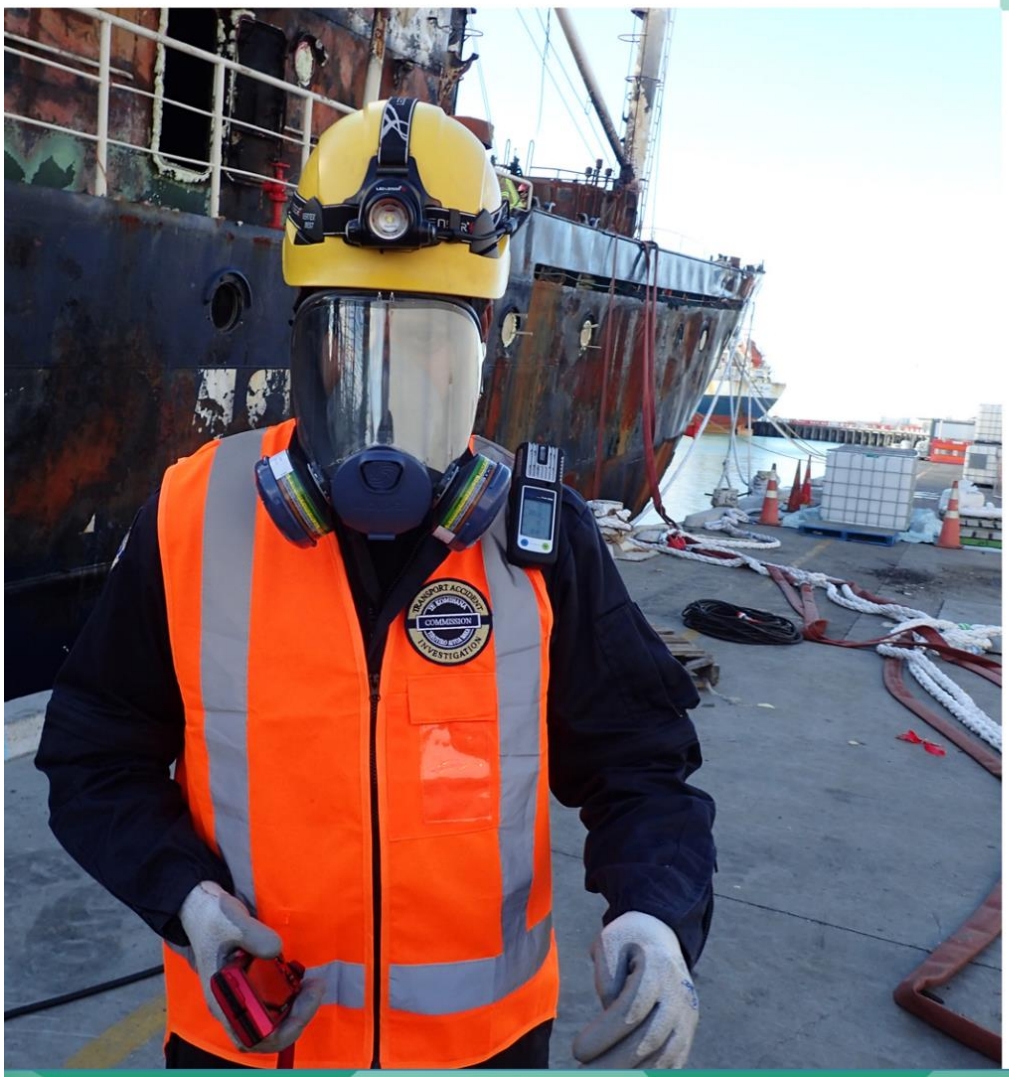


Figure 1: Organisational chart as at 30 June 2018

Our work: the year in review

"The core work of the inquiry process is to identify safety issues"



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DOMESTIC INQUIRIES HANDLED

3. Our work: the year in review

3.1. Our work follows an established procedure of investigation and formal fact-finding inquiry

A statutorily prescribed notification process initiates the Commission's work

The Commission's work is initiated by a statutorily prescribed notification process, which requires certain thresholds to be met for the Commission to open an inquiry and activate an investigation into an accident or serious incident. It is through the investigation and inquiry processes that safety issues relevant to the circumstances are identified and, where possible, causes ascertained.

Once the threshold to open an inquiry has been met, the Commission follows an established procedure of formal fact-finding inquiry. Key features of the inquiry process are:

- gathering facts through investigation and analysis
- forming preliminary findings as to circumstances and cause(s)
- consulting with those directly affected by the inquiry's initial findings
- considering submissions from affected persons (in the interests of natural justice)
- determining circumstances and cause(s) with findings, and recommendations for remedial action where appropriate
- publishing findings and recommendations.

The Commission's inquiry process is encapsulated in a work programme covering the general areas of activation, investigation, information, and communication.

The Commission's capacity is an average of 30 open cases at any time, with tolerance for substantial cases of procedural or technical complexity.

3.2. Each month we receive nearly 50 notifications of accidents and incidents

Notifications come mainly from transport sector regulators

The Commission receives notifications of certain incidents and accidents in air, rail, and maritime transport from various sources, but mainly from the respective modal regulators. The Commission then decides whether or not to open an inquiry.

In 2017/18 we received 808 notifications

During 2017/18, we received 808 notifications of accidents and incidents, compared with 1,157 in 2016/17.[4] The comparison in numbers of notifications between the two reporting periods is not statistically meaningful. Since the end of October 2017 (that is, for the last eight months of 2017/18), the number of maritime notifications has significantly reduced, from 50–80 per month to an average of about 10. At the Commission's request, Maritime NZ reviewed its arrangements for managing notifications, and is now sending only those that fall within statutory requirements (and not all notifications, as previously). Maritime NZ consulted the Commission as part of its review.[5] The new arrangements are similar to those we have with the Civil Aviation Authority and the NZ Transport Agency.

The proportion of accidents and incidents received by mode is shown below, compared with the 2017/18 year. (The charts exclude notifications related to maritime workplace occurrences outside the Commission's jurisdiction.)

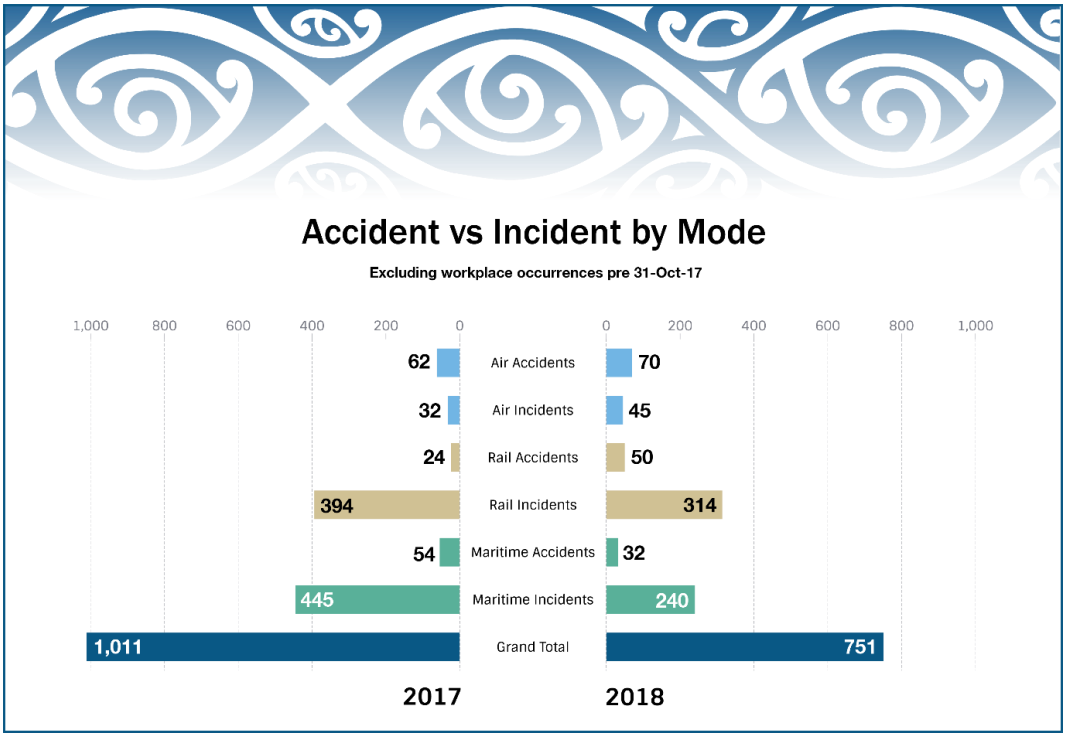

Figure 2: Numbers of notifications received

[4] The terms 'incident' and 'accident' are defined in the legislation covering each of the modes. Here, a generalised definition is used. Accidents are events where injury, death, or serious damage occurred, or could have occurred. An incident is an occurrence other than an accident.

[5] Maritime NZ, for ease of process, had been passing on to us all notifications it received. However, legally it is required to pass on only a sub-set of notifications: occurrences where commercial ships are involved, someone is seriously harmed, or there is an accident at the interface of civil and military maritime systems. The process resulted in Commission staff recording and responding to a large number of notifications about occurrences that were outside our jurisdiction and never going to be investigated by the Commission.

From the notifications we received, we opened 12 inquiries

Each notification is categorised against one or more event types. Appendix 2 shows data on the most frequent notifications, according to event type, for each mode. Trends in event types are monitored and taken into account when the Commission considers whether or not to open an inquiry into any particular occurrence. (A range of considerations guide this decision. These are set out in a Logic Guide, available on our website.[6])

The Commission opened 12 inquiries in 2017/18, representing about 1.5 percent of the notifications received (noting the change in numbers of maritime notifications, as described above).

Table 1: Notifications received and inquiries opened

	2017/18			2016/17		
	Notifications received	Inquiries opened	Inquiries not opened	Notifications received	Inquiries opened	Inquiries not opened
Air	115	5	110	94[7]	8	86
Rail	364	4	360	420	4	416
Maritime	329	3	326	643	7	636
Total	808	12	796	1,157	19	1,138

3.3. Investigations establish the facts and circumstances of accidents and incidents

Investigative staff dealt with 45 domestic inquiries during the year

As well as opening 12 inquiries, the Commission maintained progress on 12 continuing inquiries and closed a further 21 inquiries.

In addition to domestic inquiries, the Commission assisted ten investigations conducted by overseas investigation agencies. We also undertook, on behalf of the Kiribati Government, a technical investigation into the January 2018 sinking of the MV *Butiraoi* ferry. More detail on these international inquiries is provided later in this section.

Table 2: Inquiries opened and closed

	2017/18			2016/17			
	Open 30-Jun-18	Inquiries opened	Inquiries closed	Open 30-Jun-17	Inquiries opened	Inquiries closed	Open 30-Jun-16
Air	12	5	9	16	8	5	13
Rail	6	4	5	7	4	6	9
Maritime	6	3	7	10	7	6	9
Total	24	12	21	33	19	17	31

[6] https://taic.org.nz/how-we-work/why-and-what-we-investigate
[7] Last year reported as 92.

Accidents involving helicopters continue to dominate the aviation casebook

Of the 21 aviation inquiries the Commission dealt with over the year — either opened, closed, or continuing — 13 involved helicopters (one of these was a re-opened inquiry, for which new evidence had been received). The dominance of helicopter accidents in the casebook in part reflects the Commission's interest in accidents involving aircraft manufactured by the Robinson Helicopter Company (see section 4.4).

In one of the helicopter inquiries closed over the year,[8] the Commission found indications of a culture of non-compliance among some helicopter pilots in New Zealand. Should this situation exist, there is a possibility that the culture has become normalised. The core safety issue would therefore lie within the wider helicopter sector, and add unnecessary risk. The Commission did not fully explore this potential wider issue. However, the Commission was aware that the Civil Aviation Authority was reviewing the risk profile of the helicopter sector, and recommended that the Director of Civil Aviation included the issue of operational culture in that review.[9] The Director accepted this recommendation, and has now implemented it.

Rail investigations have centred on signalling within the Wellington rail yards

The Commission dealt with three inquiries during the year that involved signalling irregularities within the Wellington Railway Station, which resulted in near-collisions.[10] Nobody was injured in any of the occurrences.

Two of the inquiries are now closed. In one of these incidents, a signalling display box had been incorrectly configured. In the other, the driver of a train confused two signals and as a result, two passenger trains (one with no passengers) nearly collided. In the inquiry that is still open, also involving a signalling error, two metropolitan passenger trains were inadvertently put on a converging collision course. More details and recommendations resulting from the closed inquiries are given in section 3.5.

Navigation in pilotage waters was identified as a recurring theme in the maritime sector

In last year's annual report, the Commission commented on the unusually high number of open inquiries involving passenger ships. At the time, the investigations were still open and no common safety themes had yet emerged. As the inquiries progressed, the Commission identified navigation in pilotage waters as a theme. It was a factor in three of the five passenger ship occurrence, as well as one involving a bulk carrier.[11] (Pilotage waters are those areas in which a ship is usually required to use the services of a maritime pilot, although there are sometimes exemptions. A maritime pilot is an experienced and highly skilled sailor who has detailed knowledge of a particular waterway.)

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[8] Aviation inquiry AO-2014-005: *Eurocopter AS350-B2 (ZK-HYO), collision with terrain, during heli-skiing flight, Mount Alta, near Mount Aspiring National Park, 16 August 2014. Released December 2017*

[9] Recommendation 032/17

[10] Closed inquiry rail inquiry RO-2017-102: *Signals, operating irregularity, Wellington, 3 April 2017*; open rail inquiry RO-2017-103: *Two Metropolitan passenger trains, near collision, Wellington, 15 May 2017*; closed rail inquiry RO-2016-101: *Signal passed at danger leading to near collision, Wellington Railway Station, 28 May 2016*

[11] Maritime inquiries MO-2017-202: *Passenger vessel,* L'Austral*, grounding, Milford Sound, Fiordland, 9 February 2017*, MO-2017-201: *Passenger vessel* L'Austral *contact with rock Snares Islands, 9 January 2017*, MO-2016-202: *Passenger ship,* Azamara Quest*, contact with Wheki Rock, Tory Channel, 27 January 2016*, MO-2016-204: *Bulk carrier,* Molly Manx*, grounding, Otago Harbour, 19 August 2016*

Miscommunication and a lack of common understanding among the bridge management team under pilotage featured in these four inquiries, all of which have been completed since November 2017. The series of incidents involving bridge management that did not meet industry standards, and the presence of the problem in other jurisdictions, suggests that this is a safety issue that needs attention from the regulator, operators, and training providers. Recommendations issued as a result of the inquiries are discussed further in section 3.5.

Evidence is increasingly being drawn from digital sources

The Commission's investigators gather evidence from a wide range of sources, including examination of accident sites, wreckage, and witness interviews. Increasingly, valuable information about accidents and incidents can be drawn from sources such as flight data recorders, and vehicle and personal devices. Accessing this digital evidence requires specialist skills. In 2015/16, the Commission established a new role of Accident Investigator (Recorders). Over the reporting year, the Accident Investigator (Recorders) contributed to several investigations across all three modes. Examples are:

- In January 2018, the Commission opened an inquiry into a fatal tandem sky-diving accident, which occurred over water.[12] The Accident Investigator (Recorders) recovered data from the tandem master's water-damaged altimeter, and video from a 'GoPro' camera that were damaged when they hit the water. The data and video have been used to help reconstruct the accident.

- In October 2017, an empty log train collided with a truck at a level crossing, resulting in the death of the truck driver.[13] The Accident Investigator (Recorders) accessed data from the truck manufacturer's servers. The data provided accurate tracking of the truck's location and speed immediately before the accident. The information has been critical in helping understand what happened. The investigation is continuing.

- In June 2018, we closed our inquiry into the capsize and foundering of the charter fishing vessel *Francie* with the loss of eight lives. The accident happened in November 2016 as the skipper attempted to cross the Kaipara Harbour bar in poor weather.[14] The Commission found indications that the skipper had a tendency to accept a high level of risk when deciding to cross the Kaipara Harbour bar. This finding was based on complex trend analysis of an extensive database of bar crossings over several years, sourced from the local coastguard and matched with reference data.

In 2017/18 we recruited another specialist staff member

As technologies in the transport modes become more complex, the Commission needs more specialist skills to extract digital evidence. In May 2018, the Commission built on the expertise of the Accident Investigator (Recorders) with the establishment of, and recruitment into, the position of Forensic Data Recovery Specialist. These two specialist roles contribute

[12] Aviation inquiry AO-2018-001: *Tandem sky-diving operation, passenger fatality, Lake Wakatipu, 10 January 2018*
[13] Rail inquiry RO-2017-105: *Empty log train, collision with truck, Kawerau, 6 October 2017*
[14] Maritime inquiry MO-2016-206: *Capsize and foundering of the charter fishing vessel* Francie *with the loss of eight lives, Kaipara Harbour bar, 26 November 2016*

expertise that complements traditional investigation skills, allowing the Commission to draw on evidence available to it from data sources.

The Commission assisted in ten overseas inquiries in 2017/18

The Commission is part of a global network of transport accident investigation bodies prepared to meet their States' obligations to conduct investigations consistent with international requirements (the Convention on International Civil Aviation, or ICAO Convention; and International Maritime Organization's code on safety investigation).

In accordance with these conventions, the Commission participates in inquiries by international peer organisations into events in overseas jurisdictions. This occurs when the events involve New Zealand registered or manufactured vehicles or components, or a significant number of New Zealanders have died as a result of an accident.

During the year, the Commission assisted ten overseas inquiries under New Zealand's obligations as a signatory to the ICAO Convention. For example, in May 2018, the United States National Transportation Safety Board (NTSB) notified us of aircraft accident involving the failure of the propeller gearbox. The manufacturer of the gearbox was a New Zealand company, and a Commission investigator was appointed New Zealand's Accredited Representative under Annex 13 to the ICAO Convention. In this capacity, we co-operate and co-ordinate with the relevant agency — in this case the NTSB — including taking evidence on its behalf, if required.[15]

The Commission's investigators provided assistance to the Kiribati Government

Under Annex 13 to the Convention, the Commission is obliged to assist another signatory in investigating an incident or accident if that other signatory does not have the expertise or resources. We may also provide assistance outside ICAO obligations. The Commission is committed to our global obligations and to contributing our expertise and experience when and where we are able in the Pacific region.

At the beginning of 2018, a team comprising two maritime investigators and one solicitor/analyst was appointed by the Republic of Kiribati to conduct an independent investigation into the sinking of the domestic passenger and freight vessel *Butiraoi*.[16] The vessel was on a trip between the Kiribati islands of Nonouti and Tarawa. One hundred people were on board, 93 were missing and presumed to have died.

The investigation resulted in various recommendations to the Kiribati Government; most of these deal with systemic safety issues; but others related to more specific matters, which, if adopted, would make an immediate difference to safe practices.

The report was delivered to the Kiribati Government in early July 2018.

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[15] Aviation inquiry AO-2018-004: *Bob Frederick, Titan T-51, N51FB, engine failure on approach to landing, Goodyear, Arizona, 4 June 2017*

[16] Maritime inquiry MO-2018-201: *Freight vessel* Butiraoi*, Sinking, Kiribati, 18 January 2018*

3.4. The inquiry process tests the evidence and identifies safety issues

The inquiry process has three distinct elements: consideration of draft reports, consideration of submissions, and making recommendations

The Commission's inquiry process has three distinct elements. The first is consideration of draft reports prepared by the investigator in charge. Sometimes draft reports state or imply that the conduct of a specified person has contributed to the accident or incident. In these cases, the Commission must[17] release the report to interested persons[18] and allow them to comment on, or refute, those findings. The Commission generally allows 21 days for interested persons to make submissions or request further work.

The second element is marked by final draft reports being submitted to the Commission for consideration along with written submissions received from the interested persons. Depending on the issues raised in the written submissions, the Commission may hear oral submissions.

The third element is determining recommendations. Recommendations highlight the most serious safety issues identified in an inquiry and ask for something to be done. Recommendations can be issued at any time during the Commission's inquiry, although usually they are issued along with the published report.

In 2017/18 the Commission sat 11 times

In 2017/18 the Commission sat 11 times receiving 48 papers, approving 18 for consultation and 20 for publication, including 2 interim reports (the remainder were draft reports). In addition, the Commission issued 28 recommendations and closed 35.

Over the year, the Commission increased the time given to learning about the broader transport system

The Commission identifies safety issues within the New Zealand transport system and ensures that knowledge is transferred to others. We do this primarily through our inquiry reports, and through publication of the Watchlist. The Commission is aware that in generating knowledge, we must also absorb information from others. We are increasing the time dedicated to learning about the challenges and concerns faced by those who are closely involved with our inquiries — whether regulators, injured victims, operators, or the families of those who have died in the accidents we investigate.

Over the year, the Commission saw the benefit of our process for survivors and families. The process, which was implemented in 2016/17, ensures survivors and families are kept appropriately informed with consistent messaging across all inquiries, and are provided with regular, planned updates about how the inquiry is progressing through its various stages. The Commission may also meet with next-of-kin. The nature of the Commission's functions means that such meetings necessarily take place within the formal context of a hearing.

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[17] Transport Accident Investigation Commission Act 1990, Part 2, s14 (5).
[18] 'Interested persons' are persons likely to be affected by the report's findings and include the operator, manufacturer of the vehicle or vessel, engine manufacturer, involved state agencies and representatives of injured persons (Transport Accident Investigation Commission Act 1990, Part 2, s9).

3.5. Core information is expressed as findings, safety issues and recommendations

Identifying safety issues is the core work of the inquiry process

Safety issues are factors that either contribute to an accident or are unsafe conditions. They are the factors and conditions about which safety actions are taken or recommendations made. Identifying the safety issues is the core work of the inquiry process, and is crucial in establishing common circumstance and causes in repeated types of occurrences. Over 2017/18, the Commission observed common factors in the safety issues identified during inquiries across the modes — see the recommendations section below.

Findings are the Commission's conclusions

Findings are the Commission's conclusions having examined the underlying facts of the occurrence they are inquiring into. The number of findings loosely equates to the complexity of both the occurrence and the inquiry.

Recommendations communicate the required action to remedy safety issues

Recommendations communicate the required action to remedy the identified safety issues and so avoid similar accidents and incidents from recurring.[19] Not every inquiry generates recommendations: some highlight recommendations previously made; and sometimes (ideally) relevant parties will have already have acted, so a recommendation is not needed. Most recommendations are directed to regulators, and some to operators.

Interim reports or urgent recommendations are released as necessary to help avoid accidents. Publishing information early in the inquiry is especially important if the consequences for people and the environment are serious.

Table 3: Recommendations issued and closed (including recommendations contained in interim reports)

	2017/18 Recommendations			2016/17 Recommendations[20]		
Mode	Open 30-Jun-18	Issued	Closed	Open 30-Jun-17	Issued	Closed
Air	72	8	23	87	12	15
Rail	27	7	8	28	6	13
Maritime	100	13	4	91	11	9
Total	199	28	35	206	29	37

Note on number of recommendations issued. This number includes:

- recommendations contained in reports published in 2017/18 (38) minus any that had been issued in previous interim reports (3); or were issued in late June 2016/17, therefore falling into the 2016/17 financial year (7)
- recommendations contained in interim reports published during the year (none fell into this category in 2017/18)
- recommendations issued in late June 2017/18 but which were included in reports published in July 2018, therefore falling into the following financial year (no recommendations fell into this category).

[19] See Annex 13, Convention on International Civil Aviation Aircraft Accident and Incident Investigation, (10th Ed.), p 1-2.
[20] Note that figures in this table vary slightly from those reported in last year's annual report. Changes in data occur because the status of recommendations as at 30 June may be retrospectively changed. For example, a recommendation that is 'draft' as at 30 June may later have its status changed to 'open'; or an 'open' recommendation may be withdrawn). The 2016/17 Annual Report incorrectly reported 205 open recommendations as at 30 June 2017, open for an average of 1,390 working days. The corrected figure, shown in the table, is 206 open recommendations, open for an average of 1,386 working days.

Air recommendations concerned systemic matters related to air traffic control, as well as safety management systems for individual operators

The Commission closed an inquiry into a June 2015 incident in which the domestic air traffic control services for New Zealand were suddenly and unexpectedly interrupted for about four minutes.[21] During this outage, air traffic sector controllers in the national air traffic management centre at Christchurch lost radar and radio contact with the aircraft under their control. Although the sector controllers had alternative radio frequencies and standby radios to contact aircraft, not all of these systems worked as expected. The telephone system was also disrupted by the outage, which prevented normal communication between the sector controllers and the airport control towers around New Zealand.

The radar, radio and telephone services of the national air traffic control system were integrated in a digital data network. The interruption of services occurred during an upgrade program, and was initiated by a software code error in a device.

The Commission found that Civil Aviation Rules (CAR) Part 171, which defines how an aeronautical telecommunications network is to be managed, was not contemporary for the digital network technology used by Airways Corporation of New Zealand Ltd (Airways). Safety issues identified were: Airways' digital data network did not have the resilience necessary to support an air traffic control service; and the Civil Aviation Authority did not have the appropriate capability to determine independently if the Airways' aeronautical telecommunications network would perform as the rules required.

The Commission recommended that the Secretary for Transport update and restructure CAR Part 171 to include the wider scope of technology, software and navigation aids that are normal for a modern air navigation service and to make provision for the rule to cater for future changes in technology. The recommendation was accepted.[22]

Other aviation recommendations covered safety management systems for individual operators, and the audit of them by the Civil Aviation Authority[23]; and the dissemination of key lessons from a helicopter crash to aircraft operators and pilots.[24] (Three of the four recommendations are now closed.)

Rail recommendations covered operator change management processes, and drug and alcohol testing

Two rail inquiries closed involved incidents in the Wellington Railway Station. In one of these inquiries the Commission found that a safety-critical system related to signalling had not been fully tested for correct functionality, and users were not fully familiar with them. The Commission recommended improvements to processes for systems upgrades, and training and performance monitoring for operators.[25]

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[21] Aviation inquiry AO-2015-005: *Unplanned interruption to national air traffic control services, 23 June 2015*
[22] Recommendation 028/17
[23] Aviation inquiries AO-2017-001: *Eurocopter AS350 BA, ZK-HKW, Collision with terrain, Port Hills, Christchurch, 14 February 2017*, recommendation 016/17; and AO-2016-006: *Eurocopter AS350-B2, ZK-HYY, Collision with terrain during scenic flight, Mount Sale, near Arrowtown, 12 September 2016*, recommendation 005/18
[24] Aviation inquiry AO-2014-005: *Eurocopter AS350-B2 (ZK-HYO), collision with terrain, during heli-skiing flight, Mount Alta, near Mount Aspiring National Park, 16 August 2014,* recommendations 005/17 and 006/17
[25] Rail inquiry RO-2017-102: *Signalling irregularity, Wellington Railway Station, 3 April 2017*, recommendations 010/18 and 011/18

In the other inquiry, the Commission identified a heightened risk of trains colliding within the approaches to the Wellington Railway Station, because limited available space makes the track layout congested. If a driver fails to stop at a red light, the existing layout means there are fewer fail-safe back-up systems than would normally be associated with a modern track and signalling system. Consequently, there is an elevated risk of trains colliding in the area that will need to be managed now and in future.

Any increases in commuter train services through the tight track layout at Wellington increases the pressures within this bottleneck. Decongesting and modernising the track and signal infrastructure will require significant resources and long-term planning. In our report into the incident, we referred to a previous recommendation to the NZ Transport Agency to resolve issues related to developing standards of communication and crew management.[26] We made two new recommendations to KiwiRail on immediate and long-term solutions for managing the risk in the Wellington Station area.[27] All three recommendations have been accepted.

Other recommendations issued in the rail mode included two that were related to KiwiRail's policy for post-incident drug and alcohol testing and its ratio of random testing.[28] Both recommendations were accepted and have already been closed.

Maritime recommendations covered navigation in pilotage waters as well as operators' safety management systems and on-board equipment

The Commission published three reports in which we identified safety issues related to navigation in pilotage waters[29] (with a fourth published in July 2018[30]). Safe conduct of a ship through pilotage waters depends on high standards of passage planning and bridge resource management. (Bridge resource management is the bridge team's effective management and utilisation of all available resources, human and technical, to help ensure the safe completion of the ship's voyage. It includes, for example, the use of communication techniques designed to avoid misunderstandings, participants sharing the same understanding of a planned passage, and maintaining situational awareness.)

Miscommunication and a lack of common understanding among the bridge management team under pilotage have featured in the four inquiries. We made recommendations to the operator about various matters including standards of bridge resource management.[31] We made recommendations to the Department of Conservation (DOC) about risk assessment for navigation to sub-Antarctic islands.[32] And we recommended that Maritime NZ ensure

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[26] In 2012, as part of rail inquiry RO 2011-101, the Commission issued a recommendation (002/12) to the Chief Executive of the NZ Transport Agency to require the Executive of the National Rail System Standards (NRSS) to develop standards to ensure all rail participants meet a consistently high level of Crew Resource Management (now NTS); and communication that includes the use of standard rail phraseology.
[27] Rail inquiries RO-2016-101: *Signal passed at danger leading to near collision, Wellington Railway Station, 28 May 2016*, recommendations 033/17 and 034/17
[28] Rail inquiries RO-2016-102: *Train 140 passed Signal 10R at 'Stop' Mission Bush Branch line, Paerata, 25 October 2016*, recommendation 025/17; and RO-2015-103: *Track occupation irregularity, leading to near collision, Between Manunui and Taumarunui, 15 December 2015, recommendation 023/17*
[29] Maritime inquiries MO-2017-201: *Passenger vessel* L'Austral *contact with rock Snares Islands, 9 January 2017*; MO-2016-202: *Passenger ship,* Azamara Quest*, contact with Wheki Rock, Tory Channel, 27 January 2016*; MO-2016-204: *Bulk carrier,* Molly Manx*, grounding, Otago Harbour, 19 August 2016*
[30] Maritime inquiry MO-2017-202: *Passenger vessel,* L'Austral*, grounding, Milford Sound, Fiordland, 9 February 2017*
[31] Recommendations 002/18 and 003/18
[32] Recommendation 001/18

harbour authorities make available passage plans that meet international standards and are readily accessible in appropriate formats.[33]

The operator and DOC accepted the recommendations directed to them. Maritime NZ did not reject the recommendations, but did not consider it had the statutory powers to fully implement them; it has conveyed the recommendations to the relevant harbour authorities. An earlier (August 2016) urgent recommendation in relation to one of the inquires, about pilot training, was accepted by Maritime NZ.[34]

Recommendations to the Ministry of Health aim to contribute to ensuring that, across the whole transport system, people working in safety critical roles are medically fit

The Commission has made recommendations to the Ministry of Health that, if implemented, would strengthen processes across the transport system designed to ensure people in safety critical roles are medically fit to work. The recommendations arose from the Commission's inquiry into the February 2015 crash of a helicopter near the Lochy River, Queenstown.[35]

The Commission found potential for an applicant for a medical certificate to misrepresent their state of health by, for example, concealing medications or visits to multiple GPs and other health professionals.

The national health database currently being developed by the Ministry of Health would provide one means of reducing the risk. The Commission recommended the Chief Executive of the Ministry of Health consider adding to the national electronic health record database:[36]

- an individual's occupation
- a mechanism to draw health practitioners' attention to their obligation to notify the appropriate transport authority when a patient has a health condition or need for medication that could pose a threat to public safety in that individual's occupation.

3.6. Inquiry reports and the Watchlist communicate core messages

Reports communicate in detail the outcome of inquiries

Reports are the culmination of the Commission's investigation and inquiry processes and communicate the outcome. The Commission's reports give a detailed account of the accident and the analysis to determine the circumstances and causes. A report contains the core messages from the outcome of an inquiry — what happened and what needs to be done. Core messages are communicated in various ways to those who can act to improve safety. A report sets out the findings and identified safety issues, notes safety actions and recommendations made in response to the safety issues, and draws broader lessons for the transport sector.

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[33] Recommendations 029/17, 030/17, 031/17

[34] Urgent recommendation 017/16 issued in August 2016 for inquiry MO-2016-202. A second urgent recommendation for this inquiry, 016/16, also issued in August 2016 was accepted by Marlborough District Council and related to its harbour risk assessment for the safe navigation of ships through Tory Channel.

[35] AO-2015-002: *Mast bump and in-flight break-up, Robinson R44, ZK-IPY, Lochy River, near Queenstown, 19 February 2015*. The report from the inquiry was released in August 2016. The cause of the accident could not be conclusively determined. Shortly after the release of the report, the Commission was advised of new evidence concerning the mental health of the instructor prior to the crash, in 2014. In September 2016 the Commission resumed the inquiry to evaluate the new evidence, conduct further enquiries, and identify any relevant safety issues. An addendum to the report was released in July 2017. The addendum contained the findings and recommendations referred to above.

[36] Recommendation 022/17.

In 2017/18, we published final reports for 21 closed inquiries

In 2017/18, we published final reports for the 21 inquiries closed during the year. Six of these inquiries involved fatalities and/or serious injuries; in total, 13 people died in the accidents and seven seriously injured. Table 4 shows the breakdown by mode.

Table 4: Number of inquiries closed

2017/18				2016/17			
Air	Rail	Maritime	Total	Air	Rail	Maritime	Total
9	5	7	21	5	6	6	17

The Commission published interim reports for two open inquiries

The Commission releases interim reports when there is high public interest in an event, or when there is important information to communicate about the circumstances of an accident. The Commission issues urgent recommendations where necessary to deal with urgent safety issues.

In 2017/18, the Commission issued two interim reports. One of these, released in May 2018, was for the inquiry into the forced landing of a helicopter in to Porirua Harbour in May 2017.[37] Early in the inquiry, the Commission identified a safety issued related to historical maintenance on the aircraft involved in the accident. The safety issue was raised with the Civil Aviation Authority who issued a Continuing Airworthiness Notice related to certain aircraft.

In the second interim report, also released in May 2018, the Commission documented two safety issues it had identified in its inquiries into two incidents involving Trent 1000-J2 engines fitted to Boeing 787 aircraft.[38] The safety issues related to the modelling of the estimated time until replacement of affected turbine blades, and the consequences of inaccurate modelling. Safety actions were taken by international partners in relation to the identified safety issues, so no recommendations were issued.

The Watchlist communicates the highest-priority safety issues

The Watchlist is a safety monitoring publication, which presents the Commission's highest-priority safety issues in the aviation, maritime, and rail transport sectors. It is the Commission's mechanism for conveying key messages about how safety risks can be reduced, and where we consider the sector should be paying attention.

[37] Aviation interim report AO-2017-004: *Forced landing into Porirua Harbour (Pauatahanui Arm), MBB BK117A-3 Helicopter, ZK-IED, 2 May 2017*
[38] Aviation interim report combining AO-2017-009: *Boeing 787-9, registration ZK-NZE Trent 1000-J2 engine failure near Auckland, New Zealand, 5 December 2017*; and AO-2017-010: *Boeing 787-9, registration ZK-NZF Trent 1000-J2 engine failure near Auckland, New Zealand, 6 December 2017*

The items on the Watchlist relate to:

- The issue of people in safety-critical roles being impaired as a result of using drugs or alcohol.
- Encouraging the use of technologies to track aircraft, ships and boats, and rail vehicles. Since the publication of the Watchlist, good progress has been made in achieving visibility of trains on the rail network.
- The need for recreational boat users to demonstrate they understand and practise safe boating behaviour before getting out on the water.
- Safety for pedestrians and vehicles crossing rail tracks.
- The concern with New Zealand's rate of 'mast-bumping' accidents involving Robinson helicopters.

The Watchlist is reviewed annually

Each year, Watchlist topics are reviewed, and existing items are updated where necessary. As a result of the 2017/18 review, the five existing items were updated, and published to our website in September 2018. The Commission also considered a new item, which at the time of writing was still under consideration.

The Commission has created a presence on social media to extend and improve stakeholder engagement

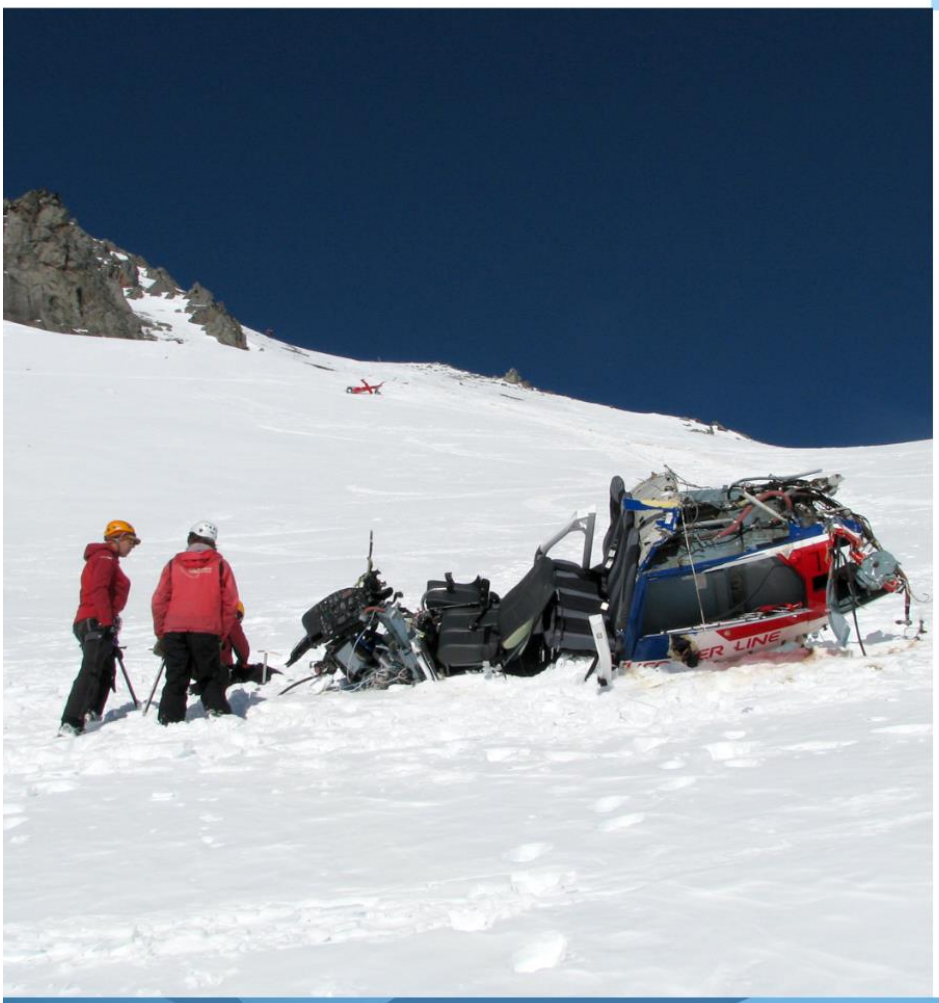
In October 2017, the Commission created a presence on social media platforms Facebook™, LinkedIn™, and Twitter™. This boost to our public profile seeks to extend and improve corporate communications and stakeholder engagement, as well as project and protect our external values.[39] It also ensures users of each channel have a legitimate official reference when discussing accidents and incidents being investigated by the Commission. Social media has raised expectations within the wider public about how and when information is made available.

The Commission's conservative use of social media will be consistent with our legal and other constraints, and expectations of us as an independent and impartial inquiry body and as an independent Crown entity. We will regularly monitor statistics on the use of Commission's social media sites to assess their effectiveness.

[39] Our external values are: fairness, impartiality, independence, competence, integrity, accessibility, timeliness, and certainty. These are adapted from the International Framework for Court Excellence, www.courtexcellence.com, published by National Center for State Courts U.S.A.

Our impact on the transport sector

"Recommendations are a call for action"



97%

OF RECOMMENDATIONS ACCEPTED OR PARTIALLY ACCEPTED ON ISSUE

4. Our impact on the transport sector

4.1. Recommendations are a call for action

Recommendations are part of the knowledge transfer system, informing transport regulators, the industry, and users about safety risks

Recommendations can be viewed as a call for action. They form a crucial part of the Commission's knowledge transfer system, because they represent knowledge about a safety risk. Recommendations are issued to pass specific knowledge to the recipients about that safety risk. They inform the decisions made by:

- transport regulators in determining the types of regulatory and other interventions they use in the future
- the transport industry and users in determining how they undertake future activities.

Our work therefore contributes to evidence-based decisions for improvement in transport safety

Recommendations hold information about particular states and conditions that are 'in play' in the transport system at a particular time; so they do not prescribe solutions to safety issues that attempt to hold for all future circumstances. Rather, they add value to the knowledge held by others in the transport system, enabling them to make evidence-based decisions for improvement in the safety system.

Our work is safety-focused. Transport regulators, industry and users operate within a broader context and therefore have a wider range of information and knowledge available to them.

Although the Commission's work is focused on specific safety issues, and must be added to, and used within, the wider context of the transport system, nevertheless, it can have significant implications for safety.

4.2. Others must respond to our recommendations for change to happen

The Commission's recommendations are not mandatory and if change is to happen, others must respond to our recommendations

The Commission's recommendations are not mandatory; it is up to the recipients of the recommendations to act on them to improve safety. The effectiveness of the Commission's work depends on recommendations being based on robust investigation and inquiry practices, and on being practicable; and on recipients being committed to responding to recommendations and dedicating the required resources to improve safety.

New Zealand's Transport Accident Investigation Commission Act 1990 is partly derived from international treaties. These treaties anticipate recommendations issued by the mandated investigation authority are acted upon — promptly. Annex 13 to the Convention on International Civil Aviation (Annex 13) specifically addresses this point[40] establishing the standards for issuing and receiving safety recommendations. Paragraph 6.10 of Annex 13 requires the state receiving a safety recommendation to inform the proposing state within 90 days of the notification of the safety recommendation what preventative action is taken or under consideration.

[40] See Annex 13 to the Convention on International Civil Aviation Aircraft Accident and Incident Investigation, (11th Ed.), chapter 6.

Where the receiving state declines to take action their reasons must be given.

In addition, Annex 13 recommends that states issuing safety recommendations should implement procedures to record responses; and the states receiving a safety recommendation should implement procedures to monitor the progress of action taken in response to it.

The Transport Accident Investigation Act 1990 incorporates into New Zealand's domestic law most of the standards and recommended practices for both aviation and maritime accident investigation. It is, however, silent on the procedures for managing oversight of recommendations. As a matter of good practice, the Commission records the responses to the recommendations we issue (paragraph 6.11, Annex 13), but we have no powers to require recipients to report progress in implementation. In practice, government agencies are active in submitting evidence to the Commission if they (the recipients) consider they have implemented a recommendation. If the Commission considers that the action taken gives effect to the recommendation proposal, the Commission records its status as 'closed, acceptable'; otherwise, recommendations are recorded as 'open'.

In 2017/18, we issued 28 recommendations

The reports published in 2017/18 contained 38 recommendations. The Commission issued 28 of these recommendations during the year, seven had been issued in June 2017 (that is, in the previous reporting year), and three had previously been published in interim reports. All 38 recommendations, and the responses to them, are included in the information provided in appendix 3.

Cross agency reporting on the status of open recommendations continues

In late 2016, the then Associate Minister of Transport requested that the Commission regularly report on what progress has been made by recipients in implementing the Commission's recommendations. In response, the Commission's Chief Executive sought and obtained the assistance of the heads of the transport sector regulators (Civil Aviation Authority, Maritime NZ, and NZ Transport Agency) in developing a collaborative reporting system.

In December 2017, the Commission presented to the Associate Minister, and published on the Commission's website, the first report on the status of open recommendations. The report, compiled from information supplied by the regulators, is a high-level 'snapshot' of the numbers of recommendations open, their age, expected time to closure, and a brief narrative of the actions being taken to implement them. The reporting is now taking place six-monthly.

Part of the work to improve reporting has been to identify 'historic' recommendations in the aviation and maritime modes, and begin preparing applications for their closure. This work had previously been routine in the rail mode and ad hoc in the others. The historic recommendations are older ones that may have been implemented, but not submitted for closure at the time; or they may have been superseded by events.

Work continues to close historic recommendations

Some of the 35 recommendations closed during the year have been the result of efforts by the Civil Aviation Authority and Maritime NZ to close historic recommendations. Thirteen recommendations (11 issued to the Civil Aviation Authority and two to Maritime NZ) had been issued in 2010 or earlier. Work is continuing to clear these older recommendations. Three open recommendations issued to the Civil Aviation Authority and 13 to Maritime NZ are older than 10 years.

4.3. We contribute to a transport system that protects people from transport-related injuries

The Commission can influence the transport system, but cannot improve transport safety on its own

The Commission's vision is that there are *No repeat accidents — ever!* Our principal goal is to protect people from transport-related injuries and death, thus supporting the Government's expectations for a safe transport system; but we also contribute to economic prosperity (by strengthening trust and confidence in the safety of transport operations) and to resilience and security (through our corporate programme to build organisational resilience and our contribution to transport sector resilience projects — discussed further in section 5).

Direct measurement of the Commission's influence on this outcome is difficult, because, for change to occur, we rely on sector participants to act in response to our inquiries and recommendations.

In many instances there is good reason for sector responses to be lengthy. The occurrences the Commission investigates involve large systems that are tightly coupled with other systems. This means that achieving change in behaviour or modifying processes often requires substantive change programmes, which take time to achieve. Depending on the transport systems involved and what is being asked to remedy identified transport safety risks — for example, regulatory change — implementation of a recommendation could take years.

Recommendations are about resolving identified safety issues, not implementing prescriptive solutions

Our recommendations seek resolution of identified safety issues rather than implementation of a prescribed solution. This approach allows regulators, and other recipients, to assess implementation options in the context of their competing priorities and resource constraints. Regulators must also consider options for implementation within the context of their intervention logic, including the logic for regulatory intervention, which can change over time.

Recommendations are made within the context of complex systems. Over recent years, the Commission has acknowledged this complexity by making recommendations to regulators rather than operators, because regulators are better able to influence and act on the system.

We gauge our effectiveness through case studies

Given the complexities of the transport system, and our lack of control over others' actions, we measure our influence on safety outcomes through case studies. Case studies provide a more complete picture of how our recommendations have effect. Case studies follow at section 4.4.

Our aim is to 'avoid similar occurrences in the future'. We achieve this aim through our inquiry function by identifying safety issues and making recommendations. But our reliance on others, and the complexity of the transport system, means there is no simple relationship between a recommendation and the change in the incidence of the event type over a given period of time. For example:

- The Commission's inquiries can effect change before a recommendation is made. Prompt action taken before the inquiry is closed, obviating the need for a recommendation, is the best outcome of an inquiry.
- There may be several causes to one event type, which may require more than one inquiry and several recommendations to have significant effect.
- The inquiry into an event may find several safety issues that although not a factor in the accident, nevertheless result in recommendations that have wide-ranging implications for improving safety.
- A practicable response to a recommendation may require a long time to plan and implement, especially if it requires legislative change.
- Reporting of the event type might increase as a result of an inquiry or recommendation; or measurement might in some other way be difficult, such as lack of reliable data to allow us to compare the rate of a particular event type before and after an inquiry.
- The Commission focuses on one event, but recipients may take a recommendation, or key lessons, and broaden its application to other contexts. This can be true especially where our reports and findings are sought by other agencies (national or international) to inform their own inquiries.
- Further, recommendations may initiate action, speed action, or complement actions being taken by others in the system who are also focused on reducing the incidence of certain types of occurrences.

Results of our stakeholder survey provide a proxy measure of our effectiveness

Each year, the Commission undertakes an online stakeholder survey, which, in part, acts as a proxy measure for the Commission's effect on transport sector outcomes. The survey includes three questions in particular that relate to our effectiveness. In the questions, respondents are asked to what extent they agree with certain statements, including, for example:

- *People take notice when TAIC speaks publicly on transport safety.*
- *TAIC has a positive influence on transport safety.*
- *TAIC generally fulfils its role of improving transport safety.*

The 2017/18 survey results were positive and show steady performance

In the 2017/18 survey, 101 respondents completed the survey. The independent research company who conducted the survey reported the results had an overall pattern to similar years. They concluded:

- *Stakeholders are positive in most areas in relation to the way TAIC staff conduct investigations and their professionalism*
- *Stakeholders are positive about the values that TAIC staff demonstrate, but continue to have concerns about the timeliness of investigations and the time it takes for findings to come out*
- *There is an opportunity for TAIC to do more in relation to influencing and improving transport safety*

(Note that the sample sizes are too small for percentage responses to be reported with any statistical meaning.)

With respect to the final bullet point, and as reflected in the Statement of Intent 2018-2022, the Commission has knowledge transfer as the cornerstone of its strategy starting in 2018/19. Our findings must be available for others so they know how to avoid a similar accident happening to them, and so that we can effectively contribute to the international body of knowledge on transport safety.

4.4. Case studies demonstrate the impact our work has on the transport safety system

The case studies on the following pages demonstrate how the Commission's work on identifying safety issues and making recommendations where action needs to be taken, together with a responsive sector agency, can achieve a safer transport system. **Note: The case studies contain summaries of inquiries; the full report is the official record of the findings and recommendations.**

Aviation case study: Research, and data and video recorders to help determine the cause of Robinson helicopters in-flight break-ups

The Commission's work: what we said

In October 2016, the Commission placed an item on its Watchlist titled *Robinson helicopters: mast bumping accidents in New Zealand*. The item was developed in response to a series of 14 accidents or incidents involving these helicopters (investigated either by the Commission or by the Civil Aviation Authority), including nine where low-G mast bumping is known to have occurred.[41] Eighteen people died in the 14 accidents, including nine in known low-G mast bumping accidents.

The item was placed on the Watchlist because: the Commission was concerned about the frequency of these accidents (six occurred between 2015 and 2016), the low-G related accident rate in New Zealand is considerably higher than in other parts of the world, and some of the Commission's related recommendations remained open.[42]

The sector response: what happened

The Commission sees good progress towards implementation of the actions we were seeking when we first placed this item on the Watchlist. For example, in a recommendation to the Federal Aviation Authority, the Commission had called for further research into the factors that can lead to mast bumping. The Robinson Helicopter Company has taken on this task, partnering with the University of Maryland to research the rotor and flight dynamics that drive aspects of mast bumping. The study will also attempt to improve resistance to mast bumping through design. An initial report has been produced and the research is continuing.[43]

Similarly, the Commission recommended that the Secretary of Transport promote, through the International Civil Aviation Organization, the need for cockpit video recorders and/or other means of data capture in certain classes of helicopter to help better determine why these accidents happen. The Commission also gave notice to the Director of Civil Aviation that the recommendation had been made.[44] The Civil Aviation Authority has advised it will initiate an assessment paper on the issue including a cost benefit analysis. Robinson Helicopter Company has advised the Commission that it is currently developing flight video recorders and flight data recorders for installation into its helicopters.[45]

Impact: what difference have we made

The Commission is encouraged by the efforts taken by the sector since this safety issue has been placed on the Watchlist, particularly the manufacturer's response to our recommendations, and its demonstrated commitment to safety. The manufacturer's research initiative, and its development of flight video recorders and flight data recorders will contribute to better understanding of how mast bumping accidents occur. Although the machine design is just one aspect of this safety issue, these actions will add significantly to the international body of knowledge about how to reduce the risk of these accidents.

The sector must continue its efforts to reduce the risk of mast bumping accidents occurring.

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[41] Mast bumping is contact between an inner part of a main rotor blade or a rotor hub and the main rotor drive shaft. Helicopters with a semi-rigid two-bladed rotor system, which Robinson used on its helicopters, are susceptible to mast bumping during low-G flight conditions. A low-G condition occurs when an object is subjected to a net vertical force less than the force of gravity. When the vertical force is zero, the object is described as being 'weightless'.

[42] For more detail about the safety issue and references to the relevant reports and recommendations from the Commission, refer to the Watchlist item, which can be found here on our website: https://taic.org.nz/watchlist

[43] Sridharan, Ananth & Chopra, Inderjit & Turnour, Stephen (2018). *Mast Bumping Simulation and Mitigation Analysis for Teetering Rotor Systems*. Paper presented the American Helicopter Society conference 'Aeromechanics Design for Transformative Vertical Flight 2018', San Francisco, CA, January 2018

[44] Aviation inquiry AO-2015-002: *Mast bump and in-flight break-up, Robinson R44, ZK-IPY, Lochy River, near Queenstown, 19 February 2015*, recommendations 014/16 and 015/16

[45] Written correspondence from the Robinson Helicopter Company to the Transport Accident Investigation Commission, 26 April 2018.

Aviation case study: Pilots better prepared to manage faulty landing gear

The Commission's work: what we said

In April 2018, the Commission closed four recommendations from two inquiries, both of which involved Bombardier 'Q300' aircraft landing without nose landing gear extended (no-one was injured in either accident).[46]

The earlier of these accidents occurred in September 2010. The Commission found that the aircraft's primary landing gear indication system had warned the pilots that the nose landing gear was 'unsafe'; however, the pilots were misled by an unreliable verification system, which indicated the landing gear was extended. The Commission recommended the Director of the New Zealand Civil Aviation Authority:

- urge the Canadian authorities (the state of manufacture of the aircraft) to require the manufacturer to improve the reliability of the landing gear verification system.
- monitor the investigation being undertaken by the operator and manufacturer into the causes of excessive wear of a part within the nose landing gear mechanism. [47]

In the second accident, which occurred in February 2011, the landing gear did not extend normally. The pilots performed the relevant procedures provided in a Quick Reference Handbook (QRH) for lowering landing gear via the aircraft's alternative system. The alternative system succeeded in getting the main landing gear to extend, but not the nose landing gear. There was nothing mechanically wrong, but the pilots did not pull hard enough on the handle that should have released the nose landing gear uplock. A much lesser pull was required when practising the procedure in the operator's flight simulator. The procedure provided no guidance as to the force required.

The Commission recommended the Director of Civil Aviation liaise with Transport Canada to make other National Aviation Authorities aware of this incident and of the desirability of flight simulators closely representing the actual forces required to extend alternative landing gear.

The Commission also identified a safety issue (not contributory to the accident) relating to the design of checklists and how they can lead to pilots making errors or missing important items during times of high workload. We had commented on this issue in a previous inquiry.[48] We recommended the Director of Civil Aviation urge operators to adopt QRH formats that reduce the possibility of misreading or omitting a procedural step. [49]

The sector response: what happened

The manufacturer and operator took a range of actions as a result of these recommendations. The manufacturer revised the Bombardier Flight Crew Operating Manual. The operator:

- revised its maintenance procedures, and has reported a 'dramatic improvement'[50] in the reliability of the verification system
- modified its flight simulator to improve its fidelity (that is, accuracy in representing the actual systems, controls, and performance)
- improved its checklists so that steps are less likely to be missed.

Impact: what difference have we made

These aircraft are used widely throughout the world — in Canada, North America, Europe, and Australia — with the New Zealand operator Air Nelson having one of the largest fleets (at 23 aircraft). The actions taken by the manufacturer therefore have national and international significance. As a result of the operator's actions, New Zealand pilots will be better trained, and better prepared, for similar incidents.

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[46] Aviation inquiry 2010-010: *Bombardier DHC-8-311, ZK-NEB, landing without nose landing gear extended, Woodbourne (Blenheim) Aerodrome, 30 September 2010*; Aviation inquiry 2011-002: *Bombardier DHC-8-311, ZK-NEQ, landing without nose landing gear extended, Woodbourne (Blenheim) Aerodrome, 9 February 2011*
[47] Recommendations 027/12 and 028/12
[48] Aviation inquiry AO-1995-011: *de Havilland DHC-8, ZK-NEY, controlled flight into terrain, near Palmerston North, 9 June 1995*
[49] Recommendations 036/12 and 037/12
[50] Correspondence from Air Nelson, 28 March 2018

Aviation case study: More rigorous processes for ensuring runway lighting meets standards

The Commission's work: what we said

An incident occurred in May 2013 in which the pilot of an Airbus A340 taking off before dawn at Auckland Airport, aligned the aircraft with the runway edge lights rather than the centre lights.[51] The Commission found several contributory factors, as well as two broader safety issues:

- differences between the intensity settings for aerodrome lighting that were used during this incident and the settings recommended by the International Civil Aviation Organization
- administrative errors and potential ambiguity in the way relevant International Civil Aviation Organization standards for airport design and operations might be interpreted.

The Commission could not determine whether either of these safety issues contributed to the incident. Nevertheless, the Commission made three recommendations:

- that the Director of Civil Aviation, in conjunction with the chief executive of Airways Corporation of NZ (Airways), checks that aerodrome runway lighting systems at all certificated aerodromes comply with the relevant section of the Civil Aviation Rules.
- that the chief executive of Auckland international Airport Ltd and the chief executive of Airways improve the ability of air traffic controllers to adjust the intensity of runway lighting, so that it is appropriate to the ambient light and at a level recommended by international guidelines.
- that the Director of Civil Aviation review the use of 'should' in advisory circulars so that any ambiguity regarding compliance requirements is removed. [52]

The sector response: what happened

In response to the first recommendation above, the Civil Aviation Authority and Airways have developed a runway lighting intensity monitoring and testing methodology.

In implementing the recommendation, Airways found that over 90 light fittings failed to meet the required intensity and had to be replaced. Airways has instigated regular testing of runway lights at all international airports, and the Civil Aviation Authority will include runway light intensity checks in all future applicable audits. The Commission closed the recommendation in October 2017.

Impact: what difference have we made

Runway lighting intensity that meets the required standards is crucial for take-off and landing safety. Actions taken in response to the Commission's recommendations will improve safety at New Zealand's international airports by ensuring lighting meets international standards. In particular, the regulator's auditing of runway lighting intensity will be more rigorous.

[51] Aviation inquiry AO-2013-006: *Misaligned take-off at night, Airbus A340, CC-CQF, Auckland Airport, 18 May 2013*
[52] Recommendations 020/15, 019/15, and 017/15

Rail case study: Reduced notifications of train control errors

The Commission's work: what we said

In April 2011, a near-collision occurred between a loaded coal train and an alicart rail vehicle in the Craigie-burn Staircase area.[53] (An alicart rail vehicle is a lightweight, self-propelled, two-seater rail vehicle designed primarily to transport infrastructure staff to remote locations or to perform detailed engineering inspections.)

The incident occurred because of a train controller's error. But the Commission found wider systemic issues that increased the risk of an error by the train controller. The safety issues identified related to managing risks associated with the train control function, including workload management.

The Commission made recommendations to the Chief Executive of KiwiRail, including to ensure:

- train control management has appropriate risk management protocols, and procedures to give the Chief Executive and the KiwiRail board assurance regarding appropriate risk assessment for train control
- appropriate protocols and/or arrangements for the proper management and co-ordination of routine and unplanned track infrastructure activities, so that train controllers are able to perform their safety-critical function without becoming unduly distracted or burdened.[54]

The sector response: what happened

KiwiRail has completed extensive work to implement these two recommendations, including: development of a risk management manual, workload management processes, a process called Quarterly Risk Reviews for all company work groups, and guidelines for planning and scheduling work activities. A new position has also been created to improve work area planning.

The recommendations were closed in July 2017.

Impact: what difference have we made

The purpose of KiwiRail's response has been to improve the management of train controllers' workload and to reduce the risk of errors related to stress or fatigue. The Commission has seen a reduction in the number of notifications it receives that relate to train control error — none have been received between the beginning of 2016 and the time of writing.

[53] Rail inquiry RO-2011-102: *Track occupation irregularity leading to near head-on collision Staircase-Craigieburn, 13 April 2011*.
[54] Recommendations 013/13 and 015/13 issued in September 2013

Maritime case study: Key lessons disseminated from inquiry into loss of a fishing vessel and all hands

The Commission's work: what we said

In October 2015, the fishing vessel *Jubilee* was lost 12 nautical miles off the Rakaia River mouth, along with the skipper and two crew members. [55] The Commission found that the largest-volume compartment on the vessel, the fish hold, did not have any automatic means of alerting the crew to excess water in the space, but relied on manual sighting through the main hatch to determine the amount of water in the hold. This situation had gone undetected during the construction of the vessel, the issuance of a fit-for-purpose certificate, entry into the safe ship management system, subsequent internal and external audits, and approximately seven years of commercial use.

The Commission made two recommendations to the Director of Maritime NZ, to:

- draw surveyors' and vessel owners' attention to the benefits of installing safety mechanisms designed to alert crew to any abnormal rises in water levels in compartments, particularly those compartments that compromise the reserve buoyancy or stability of fishing vessels.
- work with surveyors and designers of fishing vessels to ensure that fishing vessels have effective means of escape from all compartments for all reasonably foreseeable emergency situations.[56]

The sector response: what happened

In May 2017, Maritime NZ issued a safety bulletin disseminating safe practice tips for how vessel owners can install safety mechanisms to reduce the risk of undetected flooding of compartments where buoyancy or stability may be compromised.[57] The recommendation was closed in July 2017.

Shortly before the end of the 2017/18 reporting year (in May 2018), a safety bulletin relating to the second recommendation was published, together with a position statement on means of escape from crew spaces on fishing vessels (and a second position statement on means of escape from passenger spaces). The position statement clarifies the requirements for means of escape from crew accommodation spaces, and spaces in which the crew is normally employed (other than machinery spaces).

Impact: what difference have we made

Maritime NZ publishes its safety bulletins on its website. These are educational resources, which aim to raise awareness about safety matters. Information from safety bulletins is widely distributed among industry forums and magazines.

[55] Maritime inquiry MO-2015-203 *Loss of the fishing vessel* Jubilee *and all hands, 12 nautical miles off the Rakaia River mouth, 18 October 2015*
[56] Recommendations 16/17 and 014/17 issued in April 2014
[57] Safety Bulletins can be found here on Maritime New Zealand's website: https://www.maritimenz.govt.nz/commercial/safety/safety-updates/safety-bulletins

Case study: Drug and alcohol impairment

The Commission's work: what we said

In January 2012, 11 people died when a hot-air balloon crashed near Carterton in the Wairarapa.[58] Post-mortem toxicology tests revealed the pilot had a tetrahydrocannabinol (THC) level of 2 micrograms per litre of blood. THC is an active ingredient of cannabis. The Commission concluded that this THC level had been caused by both long-term and recent use of cannabis. While it is difficult to say how much each type of use contributed to the result, cannabis is known to affect a person's judgement and decision-making ability. Poor judgement and poor decision-making were factors contributing to this accident. The Commission found that the pilot's use of cannabis could not be excluded as a factor contributing to the pilot's errors of judgement, and therefore to the accident.

The Commission had previously made recommendations to the Government about passing legislation to address the safety issue of the use of performance-impairing substances in all transport modes. As a result of this inquiry, the Commission made a further recommendation on this matter to the Secretary for Transport: to complete, as a matter of priority, all necessary work that will support the introduction of appropriate legislation or rules that will:

- prescribe allowable maximum levels for alcohol
- prohibit persons from operating an aircraft, vessel or rail vehicle if they are impaired by drugs
- require operators to implement drug and alcohol detection and deterrence regimes, including random testing
- prescribe post-occurrence testing requirements for drugs and alcohol.

This legislation or these rules should apply:

- across the aviation, maritime and rail transport modes
- to persons operating an aircraft or a marine craft for recreational purposes.[59]

The sector response: what happened

The Ministry of Transport undertook an extensive policy review prompted by the Commission's recommendations. In early 2016, the then Government announced the introduction of random testing in the commercial aviation and maritime sectors (the rail sector was considered to have sufficient measures already in place).[60] It was intended that by 2017 it would be mandatory for all commercial aviation and maritime operators to have drug and alcohol management plans, which were to include random testing approved by the regulators. Random testing, as part of a management plan, was seen to further strengthen the culture of zero tolerance for drug and alcohol use in the transport sector. The Directors of Civil Aviation and Maritime NZ were also to have been given the power to authorise testing of safety sensitive staff.

In December 2017, the newly-elected Government passed the Maritime Transport Amendment Act 2017, which gave the Director of Maritime NZ the power to undertake non-notified testing of workers in commercial operations; however, it excluded from the amendments the measures for random testing.

Impact: what difference have we made

The recommendation remains open, because further work is required before its full intent is met. However, the Commission considers the Ministry of Transport's policy review was a positive response to the recommendation. It welcomes the changes brought about in the commercial maritime sector as a result of the Maritime Transport Amendment Act 2017. When investigating an accident, the Commission cannot require survivors, including those in safety-critical roles, to be tested for performance-impairing substances. This makes it difficult to assess the contribution, if any, of performance-impairing substances to an accident or incident. The power of the maritime regulator to undertake non-notified alcohol and drug testing in the commercial maritime sector will go some way to providing a solution. The Civil Aviation Act is currently under review.

No changes have been made to the recreational boating sector.

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[58] Aviation inquiry AO-2012-001: *Hot-air balloon collision with power lines and in-flight fire, near Carterton, 7 January 2012*
[59] Recommendation 012/13
[60] The announcement is here on the New Zealand Government's website: https://www.beehive.govt.nz/release/aviation-and-maritime-safety-strengthened

Non-financial reporting: delivering effective investigations

"The focus has been on consolidating gains"

57%

OF INQUIRIES CLOSED WITHIN 2 YEARS (TARGET 60%)

5. Non-financial reporting: delivering effective investigations

5.1. Organisational focus has been on consolidating gains

The strategic direction as set out in the Statement of Intent 2015-2019 was maintained

The Commission's overarching aspirational goal — our vision — is for there to be No repeat accidents – ever! The Commission seeks to pursue this goal by working to ensure safety issues are properly identified and resolved. The *Statement of Intent 2015-2019* sets out five strategic objectives to ensure the Commission contributes to a safer transport system and meets its statutory obligations. The strategic objectives are:

- Deliver sound, cost effective Crown entity performance
- Develop and maintain responsive reciprocal stakeholder relationships
- Share inquiry and entity information
- Develop and maintain capable staff
- Properly conduct investigations

Strategic intentions, which are informed by the strategic objectives, are organisation themes setting management priorities for the Commission's daily operations and on-going organisational development. The strategic intentions for 2017/18 are shown in Table 5.

Table 5: Strategic objectives and intentions for 2017/18

Strategic objectives	Strategic intentions for 2017/18
Deliver sound, cost effective Crown entity performance	Continuously improve operating efficiency
Develop and maintain responsive reciprocal stakeholder relationships	Develop and maintain inquiry stakeholder programme
Share inquiry and entity information	Communicate more about what the Commission does, learns, and recommends to help improve transport safety
Develop and retain capable staff	Acquire, develop and retain strategic skills
	Develop and maintain a workforce plan
Properly conduct investigations	Develop and maintain inquiry and investigation best practice

Good progress is being made against strategic objectives

The remainder of this section reports activity during the year contributing to the good progress being made in achieving the Commission's strategic objectives.

An independent consultant reviewed the benefits of the 2015/16 funding increase, and found we are on track to deliver the benefits sought

As the result of a funding review in 2014, the Commission received additional baseline funding of $6.462 million over four years from 2015/16. The high-level benefits sought from the increased funding were: improved timeliness, improved organisational resilience, and better preparedness for responding to a major event.

In mid-2015 we established a four-year change programme to apply the additional funding in accordance with the approved appropriation, with the first two years involving intensive change.

In November 2017, at the mid-point of the four-year change programme, an independent consultant completed a review of the benefits of the funding increase. The review found we are on track to deliver the benefits sought by the funding. By the end of June 2018, all but one of the Change Management Programme projects were either complete, or brought into the usual business of the Commission. (The final project, the Quality Assurance Framework was live at the end of September 2018.)

The Commission's position in the strategic planning cycle required a refresh of the Statement of Intent

In November 2017, the Board and senior managers undertook their annual planning round in preparation for a refreshed Statement of Intent for 2018-2022. The strategic focus for the period covered by the Statement of Intent is the Commission's capacity and capability to meet the challenge of an operating environment that is undergoing rapid technological change.

The Commission's response to this challenge will be critical to our continuing effectiveness in achieving our statutory purpose. In preparing the Statement of Intent, we considered:

- What is changing?
- Are we ready for what is coming?
- What do we need to do to meet the technology challenge?

The intent is to make the Commission a resilient organisation, able to respond to disruptions in our operating environment and to external shocks such as a major accident or a natural disaster that disrupts our ability to operate. Resilience includes being able to continue the knowledge transfer process throughout the life of the inquiry, from the gathering and analysis of evidence to the publication of the inquiry report.

Work began on internal and transport sector resilience projects

In April 2017, the Commission adopted a Major Accident, Business Continuity and Organisational Resilience Policy. Since then we have scoped the internal work programme required by the policy, and have it underway. TAIC is participating in monthly meetings of the transport sector resilience network. The sector views our conceptual framework, and some activities under the work programme, as exemplars.

New Zealand hosted the Marine Accident Investigators' International Forum conference, offering an opportunity for building connections and professional development

In November 2017, the Commission and the Marine Accident Investigators' International Forum (MAIIF) jointly organised MAIIF's annual conference, which was held in Rotorua. MAIIF is an international NGO with formal participation rights at the International Maritime Organization (a UN-specialist agency). It seeks to advance maritime safety and the prevention of marine pollution through maritime accident investigation; and fosters co-operation and communication between investigators.

The Commission considers attendance at MAIIF and other international forums (such as the International Transportation Safety Association) as crucial for building capability; and for building organisational resilience by maintaining responsive, reciprocal stakeholder relationship programmes. International forums are key in connecting the Commission with accident investigation bodies in other countries. This is especially important given the size of the Commission. Should a major accident occur, the Commission would need to draw on the assistance of overseas agencies. Having existing connections and relationships would mean a better and swifter response.

Having the conference held in New Zealand was particularly beneficial. It meant that more than one staff member was able to attend and benefit from the professional development opportunities that such forums offer.

Strategic objective: Deliver sound, cost effective Crown entity performance

Strategic intention	Continually improve operating efficiency	
Measure	*Target 2017/18*	*Progress*
Change management programme successfully applies increased funding for intended purposes and effect	Post-implementation review assesses programme successes, and learnings; including commentary on productivity changes and expectations, and any remedial management actions required.	The change management programme is largely complete. Only the Quality Assurance Framework project is still to be officially closed, although it was live with staff training in progress at the end of September 2018. An independent consultant reviewed the benefits of the 2015/16 funding increase, and found that we are on track to deliver the benefits sought by the funding. (See earlier this section)
Evaluate all-of-government and shared services opportunities as they arise, and implement if appropriate	To be reported/implemented by 30 June.	All appropriate government and shared services opportunities have been implemented. Over 2017/18, we joined the all-of-government consultancy services contract, took up a Telecommunications as a Service contract, renewed our membership of the external legal services contract, and joined the all-of-government external recruitment services contract.

Strategic objective: Develop and maintain responsive, reciprocal stakeholder relationships

Strategic intention	Develop and maintain inquiry stakeholder programme	
Measure	*Target 2017/18*	*Progress*
Inquiry stakeholder contact programme developed and implemented	Review programme implementation	The Commission's next-of-kin stakeholder process is fully operational. The Commission contacts survivors and next-of-kin at milestones during the course of an inquiry, and at least six-monthly. In these interactions, we note in general terms the current stage of the inquiry, what stages are coming next, and direct people to the website for information about how we work and the rules we follow. We are sensitive to ensuring communications are appropriate and where necessary take advice from other government agencies, for example the Ministry for Pacific Peoples, on the best approach. On occasion, we work with the Ministry of Foreign Affairs and Trade or international colleague agencies in situations where victims' families live overseas. Over the year, a policy for the broader inquiry stakeholder contact programme was put in place. Guidelines to support the policy are now being finalised.

Strategic objective: Share inquiry and entity information

Strategic intention	Communicate more about what the Commission does, learns, and recommends to help improve transport safety	
Measure	*Target 2017/18*	*Progress*
Watchlist updated at least annually	Reviewed and published by 30 June.	The Commission updated the five existing items after consulting with relevant parties. The items have been refreshed on the Commission's website. A new item was being considered, but had not yet been finalised at the time of writing. See the section on the Watchlist at the end of section 3, 'Our work in review'.
Website provides accessible and comprehensive past and current inquiry and corporate information, including provision for user subscription to notifications of relevant content changes	Annual positive growth in website visits and online subscribers to website publishing notifications	The Commission's new website went live in November 2017. We have begun quarterly reporting of various statistics, with the statistics so far indicating an upward trend in site visits, correlating with activity on inquiries (either the opening of an inquiry or the publication of a report). Management reporting of the number of subscribers began at the end of the March 2018 quarter when there were approximately 680 subscribers. By the end of June 2018, the number was 704.

Strategic objective: Develop and maintain capable staff

Strategic intention	Acquire, develop and retain strategic skills	
Measure	*Target 2017/18*	*Progress*
Number of fully qualified investigators/total number of investigators (excluding Chief Investigator)	13/15	As at June 2018, the Commission had 14 investigators, 11 of whom are considered fully effective. (It takes two to three years for investigators to gain sufficient training, investigative experience, and expertise to be considered fully effective.) Also, in the reporting year we acquired a Forensic Data Recovery Specialist into the Investigation Services team to strengthen our capability in digital evidence gathering (refer to section 3.3).
Strategic intention	**Develop and maintain a workforce plan**	
Measure	*Target 2017/18*	*Progress*
Workforce plan developed	Implementation against finalised deliverables	The Commission's workforce plan has been developed and implemented.

Strategic objective: Properly conduct investigations

Strategic intention	Develop and maintain investigation best practice	
Measure	*Target 2017/18*	*Progress*
Review against ICAO (International Civil Aviation Organization) standards every two years	Self-review	In line with ICAO's approach, the Commission has moved to a process of continuous improvement. As set out in our new Statement of Performance Expectations for 2017/18, we will conduct seven investigation audits each year and remedy any deficiencies.
Complete reviews of investigation and inquiry guidelines	Maintenance	The inquiry protocols review has been completed and is being maintained. (Inquiry protocols give general guidance to successive Commissions on the inquiry process, including appropriate questioning at various points. The protocols also provide tools for the Commission to influence more directly the work of the investigators, for example through written directions on matters of process or policy.)
Successful judicial review of a Commission inquiry process or decision	0	No judicial reviews of a Commission inquiry process or decision.
Successful challenge to an Ombudsman, the Privacy Commissioner, or the Human Rights Commissioner of an administrative decision or action	0	No challenges to an Ombudsman, the Privacy Commissioner, or the Human Rights Commissioner of an administrative decision or action.

5.2. Corporate organisation

Workforce profile

The demographic profile of the Commission's staff is shown in Table 6. The Commission is a committed Equal Employment Opportunities employer.

Table 6: Employee workforce composition

		As at 30 June				As at 30 June	
		2018	2017			2018	2017
Total number of staff		28	29	Total number of staff		28	29
Gender	Male	18	20	Disability	Yes	0	0
	Female	10	9		No	28	29
Ethnicity	European	25	27	Age	<41	7	6
	Maori	0	0		41-50	7	7
	Asian	2	1		51-55	4	5
	Pacific	0	0		56-60	5	7
	Other	1	1		>60	5	7

Organisational culture

The Commission's employees come from specialised disciplines, giving rise to a strong professional culture.

The Commission has strong international relationships with its peer organisations enhanced through investment in accident investigation training for its investigation staff with an internationally recognised provider, and ongoing professional development for corporate staff.

The Commission actively encourages investigative and other staff to work together in multi-disciplinary teams on accident cases or projects.

5.3. Developing and maintaining staff

Recruitment

The Commission widely advertises available positions, and conducts a comprehensive recruitment process. That process includes a diverse recruitment panel, practical and psychometric assessments, and thorough curriculum vitae and reference checks to increase the validity of appointees.

All new employees and other workers, for example contract staff, are subject to an individualised induction process to help them quickly assimilate into the organisation. Our expectations include those set out in the Public Service Code of Conduct as well the Commission's ethical foundations based on its values. The organisation's zero tolerance towards harassment and bullying and its obligations regarding health and safety are also part of induction.

Training and development

The base skill pivotal to the Commission's successful performance is factual investigation. Credible factual investigation depends, in part and as a starting point, on transport sector experience and expertise. This base skill must be supported by strong investigative and analytical experience and expertise. It takes at least two years for a new investigator arriving with a strong transport background to become adequately trained and experienced to be regarded as fully effective.

The Commission's training programme ensures staff members develop and maintain the knowledge and skills essential to their specialist work. The Commission funds investigators to complete (multi-modal) fundamental and (mode-specific) advanced training courses at Cranfield University in the United Kingdom. Investigators may also undertake modal specific training and professional education opportunities beyond the maintenance of professional credentials that might be required for a role.

The Commission also supports professional corporate staff to maintain currency in their professional disciplines. Corporate staff were funded to attend professional courses and international working meetings. Table 7 below shows the training hours for investigators and other staff over 2017/18. Table 8 shows how many years investigators have been employed since undergoing the fundamental training course.

The Commission has in place an organisation-wide approach to development opportunities. The purpose is to enable a consolidated performance and career development opportunity for all employees.

Table 7: Training hours

Staff are capable		2017/18 Actual (hours)	2017/18 Target (hours)	2016/17 Actual (hours)
Training hours per annum *Target is based on 100 hours per annum per investigator; and 40 hours per annum for other staff plus one tertiary programme (negotiated)*	Investigators Other staff	**1,582** **223**	1,000 200-400	1,679 1,061

Table 8: Investigators' employment post-qualification

Organisational capability is maintained and strengthened	2017/18 Actual	2017/18 Target	2016/17 Actual
Percentage distribution of years employed post-qualification (investigation staff*)			
1-5 years	**47%**#	20%	47%
6-10 years	**33%**	60%	35%
10+ years	**20%**	20%	18%

*Figures include Chief Investigator of Accidents
#Includes one investigator who completed qualifications in May 2018.

5.4. Good employer initiatives

Work design

As a smaller organisation the Commission requires flexibility in the workforce to quickly respond to operational needs. Investigators in particular are required at times to work outside normal office hours. To balance these demands, the Commission allows flexible working hours and time in lieu (that is, additional to alternative holidays) to employees who are required to work in the weekends.

With an ageing workforce, the Commission is open to considering options for managed retirement. This practice supports operational capability and succession planning, and maximises the institutional knowledge of experienced employees.

Remuneration and recognition

The Commission offers a pay-for-performance remuneration system designed to attract and retain high performing employees. The remuneration system incorporates options for providing rewards and recognition, as well as leave entitlements.

A safe and healthy working environment

The Commission remains committed to promoting a safe and healthy working environment for employees. The Commission's health and safety focus is risk-based — for the Commission this means the focus is on ensuring the health and safety management system is in place and followed in relation to investigations at accident sites, our wreckage facility, and other in-the-field investigation management activities. As part of our health and safety system the Commission provides training and protective and corporate clothing appropriate to roles, as well as medical examinations for investigators.

In addition, the Commission contributes to gym memberships or similar exercise-related subscriptions, contributes to eye examinations and prescription glasses, and funds optional flu vaccinations. There are floor wardens and trained first aiders in the work place, fully-stocked first aid kits on each floor, and staff receive regular health and safety training.

The Commission is mindful also of the health and safety of others with whom we have contact in the course of an investigation. For example, when we finish our work at an accident site, or release wreckage back to its owner, we ensure chemicals or other hazards have been minimised and, where possible, removed.

Harassment and bullying prevention

The Commission has a zero tolerance approach to harassment and bullying, which is set out in its Code of Conduct. The Code is based on State Service Commission's guidelines. The Commission's position on harassment, including sexual harassment and bullying, are made known to new employees and other onsite workers during inductions. This ensures a strong and clear message about unacceptable behaviour is delivered early in an employee's working life with the Commission.

Statement of performance for output targets

"Volume and timeliness measures have improved"

21

INQUIRIES CLOSED (TARGET 20-25)

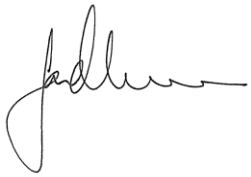
Statement of responsibility

We are responsible for the preparation of the Transport Accident Investigation Commission's financial statements and statement of performance, and for the judgements made in them.

We are responsible for any end-of-year performance information provided by the Transport Accident Investigation Commission under section 19A of the Public Finance Act 1989.

We have the responsibility for establishing and maintaining a system of internal control designed to provide reasonable assurance as to the integrity and reliability of financial reporting.

In our opinion, these financial statements and statement of performance fairly reflect the financial position and operations of the Transport Accident Investigation Commission for the year ended 30 June 2018.



Jane Meares
Chief Commissioner

Peter McKenzie, QC, CNZM
Deputy Chief Commissioner

25 October 2018

6. Statement of performance for output targets

The Commission has one output class: accident or incident investigation and reporting

The Commission has one output class: accident or incident investigation and reporting.

The appropriation for this output class is intended to achieve the conduct and completion of independent inquiries into selected aviation, rail, and maritime safety occurrences with the intent of helping to prevent recurrences.

All but two performance measures were within 5% of target or better

This section provides an overview of the Commission's performance results for this financial year. Details of inquiries active during the year, including metadata from which some of the following measures are calculated, are given in the appendices.

Volume, timeliness, and quality targets for the year were achieved (within 5% of the target or better). The average cost of inquiries was 13% higher than budget. Nine of the 21 inquiries closed during the year were in the aviation mode. These inquiries tend to be more expensive than rail and maritime inquiries. Aviation inquiries are also more resource intensive in terms of the number of investigators involved in the initial site investigation, which means more overhead is allocated to them.

With respect to impact measures, the average of open recommendations increased rather than decreased. As discussed in section 4.2, work continues with the relevant regulators to close historic recommendations.

Refer to the Statement of Comprehensive Revenue and Expense in section 7 for the revenue and expenditure of this output class. Table 10 and Table 11 report against the targets set out on pages 2 and 4 of the *Statement of Performance Expectations 2017-2018.*

Volume and timeliness measures have improved significantly

Volume and timeliness indicators for the current financial year show significant improvement since the Commission received additional funding in 2015/16. In 2017/18 we closed 21 inquiries compared with 13 in 2015/16. The average age of those inquiries when closed was 426 working days compared with 664 in 2015/16 (a decrease of over a third).

Table 9: Key volume and timeliness indicators 2015/16 to 2017/18

Indicators	2017/18	2016/17	2015/16
Volume: inquiries completed	21	17	13
Timeliness, closed inquiries: percentage closed within 440 working days	57%	35%	23%
Timeliness, open inquiries: average age of open inquiries (12-month rolling average, working days)	227	307	365

Table 10: Performance measures for the year ended 30 June 2018 (Financial, volume, timeliness, and quality)

Measure	Actual 2017/18	SPE Target 2017/18	Actual 2016/17
Financial			
Average cost of domestic inquiries closed*	$340k	$300k[1]	$352k
Volume			
Number of reports published for domestic inquiries • Final reports* • Interim reports	 21 2	 20-25 4	 17 4
Number of inquiries by overseas jurisdictions assisted*	10	4-8	10
Number of domestic inquiries in progress at each month's end (12 month rolling average, as at 30 June)*	27[2]	30	32[2]
Timeliness			
For domestic inquiries in progress as at 30 June, the proportion open for fewer than 440 working days increases*	92%	60%	79%
For domestic inquiries completed, the proportion open for fewer than 440 working days increases*	57%	60%	35%
Quality			
Judicial reviews of Commission inquiries that overturn decisions or identify process issues*	0	0	0
Successful challenge to an Ombudsman, the Privacy Commissioner, or the Human Rights Commission of an administrative decision or action	0	0	0

Notes

References to 'working days' and 'days' are calculations using a year of 220 working days.

[1]Calculated by allocating all costs (including general overheads) to inquiries. A proportion of overheads is allocated to all open inquiries, and a further proportion of overheads is allocated according to time spent on each inquiry.

[2]The number of inquiries open as at 30 June 2018 was 24 (compared with 33 as at 30 June 2017).

*Performance measure for the appropriation for this output class.

Table 11: Performance measures for the year ended 30 June 2018 (Impact)

Measure	Actual 2017/18	SPE Target 2017/18	Actual 2016/17
Impact			
Stakeholders' assessments of the Commission's work on transport safety	Most stakeholders believe Commission having positive impact[1]	Most stakeholders believe Commission having positive impact	Most stakeholders believe Commission having positive impact
Average age of open safety recommendations	Average age increased[2]	Average age declines	Average age increased
Agencies' response to investigations	86% a further 11% were partially accepted, 3% were referred elsewhere	90% of safety recommendations made are accepted by recipient upon issue*	62% a further 28% were partially accepted, or accepted conditional on resources, 10% were rejected or referred elsewhere
	Achieved Safety actions: 104 Recommendations: 28	Number of safety actions > Number of recommendations[3]	Achieved Safety actions: 70 Recommendations: 29
	Achieved Safety actions: 104 Safety issues: 57	Number of safety actions > Number of safety issues[3]	Achieved Safety actions: 70 Safety issues: 33

Notes

References to 'working days' and 'days' are calculations using a year of 220 working days.

[1] The Stakeholder Survey is a qualitative measure, and therefore reporting percentage responses has little statistical value. In 2017/18, 101 respondents participated in online surveys (surveys are conducted twice a year). See section 4.3 for a summary of the results of the survey.

[2] The average age of open safety recommendations increased from 1,386 working days as at 30 June 2017 to 1,452 working days as at 30 June 2018, an increase of 4.8%. (Last year the 2017 figure was reported as 1,390 — see notes to Table 3.)

[3] Safety issues are factors that either contribute to an accident or are unsafe conditions (see section 3.5). Safety actions are actions taken by an operator or regulator during an inquiry that remedy a safety issue. Ideally, safety actions remove the need for a recommendation.

*Performance measure for the appropriation for this output class.

Financial Statements

"We are wholly funded by the Crown"

$5.7m

CROWN FUNDING

7. Financial statements

TRANSPORT ACCIDENT INVESTIGATION COMMISSION
STATEMENT OF COMPREHENSIVE REVENUE AND EXPENSE FOR THE YEAR ENDED 30 JUNE 2018

	Notes	Actual 2018 $000	Budget 2018 $000	Actual 2017 $000
Revenue				
Funding from the Crown		5,740	5,530	5,639
Interest revenue		21	22	22
Other revenue	2	190	52	51
Total Revenue		5,951	5,604	5,712
Expenditure				
Audit Fees		20	19	19
Commissioners' fees	9	306	291	211
Depreciation and amortisation expense	5&6	219	237	213
Lease, rentals and outgoings		774	658	640
Personnel costs	8	3,279	3,378	3,441
Other expenses		1,221	1,021	1,216
Total Expenditure		5,819	5,604	5,740
Net Surplus/(Deficit)		132	-	(28)
Other Comprehensive revenue and expense		-	-	-
Total Comprehensive revenue and expense		132	-	(28)

Explanations of major variances against budget are provided in note 18.

The accompanying notes form part of these financial statements.

TRANSPORT ACCIDENT INVESTIGATION COMMISSION
STATEMENT OF FINANCIAL POSITION AS AT 30 JUNE 2018

Assets	Notes	Actual 2018 $000	Budget 2018 $000	Actual 2017 $000
Current assets				
Cash and cash equivalents	3	1,315	1,116	1,066
Receivables	4	9	2	36
Prepayments		22	24	85
Total current assets		1,346	1,142	1,187
Non-current assets				
Property, plant and equipment	5	278	299	328
Intangible assets	6	374	359	495
Total non-current assets		652	658	823
Total assets		1,998	1,800	2,010
Liabilities and taxpayers' funds				
Current liabilities				
Payables and deferred revenue	13	239	145	357
Employee entitlements	7	254	250	285
Total current liabilities		493	395	642
Non-current liabilities				
Employee entitlements	7	31	35	26
Total non-current liabilities		31	35	26
Total liabilities		524	430	668
Net assets		1,474	1,370	1,342
Equity				
General funds	14	1,474	1,370	1,342
Total equity		1,474	1,370	1,342

Explanations of major variances against budget are provided in note 18.

The accompanying notes form part of these financial statements.

TRANSPORT ACCIDENT INVESTIGATION COMMISSION
STATEMENT OF CHANGES IN EQUITY FOR THE YEAR ENDED 30 JUNE 2018

	Note	Actual 2018 $000	Budget 2018 $000	Actual 2017 $000
Balance at 1 July		1,342	1,370	1,370
Total comprehensive revenue and expense for the year		132	-	(28)
Balance at 30 June	14	1,474	1,370	1,342

Explanations of major variances against budget are provided in note 18.

The accompanying notes form part of these financial statements.

TRANSPORT ACCIDENT INVESTIGATION COMMISSION
STATEMENT OF CASH FLOWS FOR THE YEAR ENDED 30 JUNE 2018

	Notes	Actual 2018 $000	Budget 2018 $000	Actual 2017 $000
Cash flows from operating activities				
Receipts from the Crown		5,740	5,530	5,639
Interest received		21	52	22
Receipts from other revenue		194	22	44
Payments to suppliers		(2,414)	(1,984)	(2,252)
Payments to employees		(3,302)	(3,378)	(3,426)
GST (net)		57	-	(6)
Net cash flows from operating activities		296	242	21
Cash flows from investing activities				
Purchase of property, plant and equipment		(52)	(66)	(98)
Purchase of intangible assets		-	-	(46)
Sale of property, plant and equipment		5	-	-
Net cash flows from investing activities		(47)	(66)	(144)
Cash Flows from Financing Activities				
Net Cash Flows from Financing Activities		-	-	-
Net (decrease)/increase in cash and cash equivalents		249	176	(123)
Cash and cash equivalents at the beginning of the year		1,066	940	1,189
Cash and cash equivalents at the end of the year	3	1,315	1,116	1,066

Explanations of major variances against budget are provided in note 18.

The GST (net) component of cash flows from operating activities reflects the net GST paid to and received from the Inland Revenue Department. The GST (net) component has been presented on a net basis, as the gross amounts do not provide meaningful information for financial purposes and to be consistent with the presentation basis of other primary financial statements.

The accompanying notes form part of these financial statements.

1. Statement of accounting policies

Reporting Entity

The Transport Accident Investigation Commission (TAIC) is an independent Crown entity established under the Transport Accident Investigation Commission Act 1990. Its main purpose is to inquire into maritime, aviation and rail occurrences within New Zealand with a view to determining their causes and circumstances rather than ascribe blame and to assist overseas agencies.

TAIC's ultimate parent is the New Zealand Crown.

TAIC may also co-ordinate and co-operate with overseas accident investigation authorities or represent New Zealand during accident investigations conducted by overseas authorities in which New Zealand has a specific interest.

TAIC's investigation capability is occasionally extended, on either a pro bono public or a cost recovery basis to Pacific Island States.

TAIC has designated itself as a public benefit entity (PBE) for financial reporting purposes.

The financial statements for TAIC are for the year ended 30 June 2018, and were approved by the Board on 25 October 2018.

Basis of preparation

The financial statements have been prepared on a going concern basis, and the accounting policies have been applied consistently throughout the period.

Statement of compliance

The financial statements of TAIC have been prepared in accordance with the requirements of the Crown Entities Act 2004, which includes the requirement to comply with generally accepted accounting practice in New Zealand (NZ GAAP).

The financial statements have been prepared in accordance with Tier 2 PBE accounting standards. The Commission has elected to report in accordance with Tier 2 due to having expenditure of less than $30m.

These financial statements comply with PBE accounting standards.

Presentation currency and rounding

The financial statements are presented in New Zealand dollars and all values are rounded to the nearest thousand dollars ($000).

Summary of significant accounting policies

Significant accounting policies are included in the notes to which they relate.

Significant accounting policies that do not relate to a specific note are outlined below.

Foreign currency transactions

Foreign currency transactions are translated into NZ$ (the functional currency) using the spot exchange rates at the dates of the transactions. Foreign exchange gains and losses resulting from the settlement of such transactions and from the translation at year end exchange rates of monetary assets and liabilities denominated in foreign currencies are recognised in the surplus of deficit.

Goods and services tax

All items in the financial statements are stated exclusive of GST except for receivables and payables, which are stated on a GST inclusive basis. Where GST is not recoverable as input tax then it is recognised as part of the related asset or expense.

The net amount of GST recoverable from, or payable to, the Inland Revenue Department (IRD) is included as part of receivables or payables in the statement of financial position.

The net GST paid to, or received from, the IRD, including the GST relating to investing and financing activities, is classified as an operating cash flow in the statement of cash flows.

Commitments and contingencies are disclosed exclusive of GST.

Income tax

TAIC is a public authority and consequently is exempt from the payment of income tax. Accordingly, no provision has been made for income tax.

Budget figures

The budget figures are derived from the statement of performance expectations as approved by the Board at the beginning of the financial year. The budget figures have been prepared in accordance with NZ GAAP, using accounting policies that are consistent with those adopted by the Board in preparing these financial statements.

Critical accounting estimates and assumptions

In preparing these financial statements, TAIC has made estimates and assumptions concerning the future. These estimates and assumptions may differ from the subsequent actual results. Estimates and assumptions are continually evaluated and are based on historical experience and other factors, including expectation of future events that are believed to be reasonable under the circumstances.

The estimates and assumptions that have a significant risk of causing a material adjustment to the carrying amounts of assets and liabilities within the next financial year are:

- Useful lives and residual values of property, plant, and equipment – refer to Note 5.
- Useful lives of software assets – refer Note 6.

Critical judgements in applying the Commission's accounting policies

Management has exercised the following critical judgements in applying accounting policies:

- Leases classification – refer Note 12.

2. Revenue

Accounting policy

The specific accounting policies for significant revenue items are explained below:

Funding from the Crown

TAIC is primarily funded from the Crown. This funding is restricted in its use for the purpose of TAIC meeting the objectives specified in its founding legislation and the scope of the relevant appropriations of the funder.

TAIC considers there are no conditions attached to the funding and it is recognised as revenue at the point of entitlement.

The fair value of revenue from the Crown has been determined to be equivalent to the amounts due in the funding arrangements.

Donated assets

Where a physical asset is gifted to or acquired by TAIC for nil consideration or at a subsidised cost, the asset is recognised at fair value and the difference between the consideration provided and fair value of the asset is recognised as revenue. The fair value of donated assets is determined as follows:

- For new assets, fair value is usually determined by reference to the retail price of the same of similar assets at the time the asset was received.
- For used assets, fair value is usually determined by reference to market information for assets of a similar type, condition, and age.

Interest

Interest revenue is recognised by accruing on a time proportion basis the interest due for the investment.

Rental revenue

Lease receipts under an operating sublease are recognised as revenue on a straight-line basis over the lease term.

Breakdown of other revenue and further information

	Actual 2018 $000	Actual 2017 $000
Rental revenue from property subleases	41	24
Other revenue	149	27
Total revenue	190	51

3. Cash and cash equivalents

Accounting policy

Cash and cash equivalents includes cash on hand, deposits held on call with banks, and other short-term, highly liquid investments with original maturities of three months or less.

Breakdown of cash and cash equivalents and further information

	Actual 2018 $000	Actual 2017 $000
Cash at bank and on hand	597	366
Short-term deposits maturing in less than 3 months	718	700
Total cash and cash equivalents	1,315	1,066

4. Receivables

Accounting policy

Short-term receivables are recorded at the amount due, less any provision for uncollectability.

A receivable is considered uncollectable when there is evidence the amount due will not be fully collected. The amount of the impairment is the difference between the amount due and the present value of the amounts expected to be collected.

Breakdown of other revenue and further information

	Actual 2018 $000	Actual 2017 $000
Receivables (gross)	9	36
Less: provision for uncollectability	-	-
Total receivables	9	36
Total receivables comprises:		
Receivables from the sale of goods and services (exchange transactions)	9	36

5. Property, plant and equipment

Accounting policy

Property, plant and equipment consists of the following asset classes: buildings, leasehold improvements, furniture and office equipment.

All assets classes are measured at cost, less accumulated depreciation and impairment losses.

Additions

The cost of an item of property plant and equipment is recognised as an asset if, and only if, it is probable that future economic benefits or service potential associated with the item will flow to TAIC and the cost of the item can be measured reliably.

Work in progress is recognised at cost less impairment and is not depreciated.

In most instances, an item of property, plant and equipment is initially recognised at its cost. Where an asset is acquired through a non-exchange transaction, it is recognised at its fair value as at the date of acquisition.

Disposals

Gains and losses on disposals are determined by comparing the proceeds with the carrying amount of the asset. Gains and losses on disposals are reported net in the surplus or deficit. When revalued assets are sold, the amounts included in revaluation reserves in respect of those assets are transferred to the accumulated surplus/(deficit) within equity.

Subsequent costs

Costs incurred subsequent to initial acquisition are capitalised only when it is probably that future economic benefits or service potential associated with the item will flow to TAIC and the cost of the item can be measured reliably.

The costs of day-to-day- servicing of property, plant, and equipment are recognised in the surplus or deficit as they are incurred.

Depreciation

Depreciation is provided on a straight line basis on all property, plant, and equipment at rates that will write-off the cost of the assets to their estimated residual values over their useful lives. The useful lives and associated depreciation rates of major classes of property, plant, and equipment have been estimated as follows:

Fixed asset type	Useful life (years)	Depreciation rate
Buildings (store)	5 – 50	2% to 20%
Computer equipment	2 – 10	10% to 50%
Furniture and equipment	2.1 – 14	7% to 48%

Leasehold improvements are depreciated over the unexpired period of the lease or the estimated remaining useful lives of the improvements, whichever is the shorter.

The residual value and useful life of an asset is reviewed, and adjusted if applicable, at each financial year end.

Impairment of property, plant and equipment

TAIC does not hold any cash-generating assets. Assets are considered cash-generating where their primary objective it to generate a commercial return.

Non-cash –generating assets

Property, plant and equipment and intangible assets that have a finite useful life are reviewed for impairment whenever events or changes in circumstances indicate that the carrying amount may not be recoverable. An impairment loss is recognised for the amount by which the asset's carrying amount exceeds its recoverable service amount. The recoverable service amount is the higher of an asset's fair value less costs to sell and value in use.

Value in use is determined using an approach based on either a depreciated replacement cost approach, restoration cost approach, or a service units approach. The most appropriate approach used to measure value in use depends on the nature of the impairment and availability of information.

If an asset's carrying amount exceeds its recoverable service amount, the asset is regarded as impaired and the carrying amount is written-down to the recoverable amount. The total impairment loss is recognised in the surplus or deficit.

The reversal of an impairment loss is recognised in the surplus or deficit.

Movement for each class of property, plant, and equipment are as follows:

	Buildings	Computer equipment	Furniture and office equipment	Total
	$000	$000	$000	$000
Cost				
Balance as at 1 July 2016	298	198	158	654
Balance at 30 June 2017	339	241	167	747
Balance at 1 July 2017	339	241	167	747
Additions	10	37	5	52
Disposals	-	(38)	(2)	(40)
Balance at 30 June 2018	349	240	170	759
Accumulated depreciation				
Balance as at 1 July 2016	99	118	115	332
Balance at 30 June 2017	125	163	131	419
Balance at 1 July 2017	125	163	131	419
Depreciation Expense	29	56	13	98
Elimination on disposal	-	(34)	(2)	(36)
Balance at 30 June 2018	154	185	142	481
Carrying Amounts				
At 1 July 2016	199	80	43	322
At 30 June 2017 and 1 July 2017	214	78	36	328
At 30 June 2018	195	55	28	278

As at year end there was no work in progress (2016-17: nil)

6. Intangible Assets

Accounting policy

Software acquisition and development

Acquired computer software licenses are capitalised on the basis of the costs incurred to acquire and bring to use the specific software.

Costs associated with maintaining computer software are recognised as an expense when incurred.

Amortisation

The carrying value of an intangible asset with a finite life is amortised on a straight-line basis over its useful life. Amortisation begins when the asset is available for use and ceases at the date that the asset is derecognised. The amortisation charge for each financial year is recognised in the surplus or deficit.

The useful lives and associated amortisation rates of major classes of intangible assets have been estimated as follows:

Fixed asset type	Useful life (years)	Depreciation rate
Software	2.1 – 10	10% - 48%

Impairment of intangible assets

Refer to the policy for impairment of property, plant, and equipment in Note 5. The same approach applies to the impairment of intangible assets.

Breakdown of intangible assets and further information

Movement for each class of intangible assets are as follows:

	Acquired Software	Total
	$000	$000
Cost		
Balance at 1 July 2016	1,003	1,003
Balance at 30 June 2017 and 1 July 2017	1,037	1,037
Additions	-	-
Disposals	-	-
Balance at 30 June 2018	1,037	1,037
Accumulated amortisation		
Balance at 1 July 2016	431	431
Balance at 30 June 2017 and 1 July 2017	542	542
Amortisation expense	121	121
Disposals	-	-
Impairment losses	-	-
Balance at 30 June 2018	663	663
Carrying amounts		
At 1 July 2016	572	572
At 30 June 2017 and 1 July 2017	495	495
At 30 June 2018	374	374

As at year end there was no work in progress (2016-17: nil)

7. Employee entitlements

Accounting policy

Short-term employee entitlements

Employee benefits that are due to be settled within 12 months after the end of the period in which the employee renders the related service are measured based on accrued entitlements at current rates of pay.

These include salaries and wages accrued up to balance date and annual leave earned, but not yet taken at balance date.

Long-term employee entitlements

Employee benefits that are due to be settled beyond 12 months after the end of the year in which an employee provides a related service, such as long service leave, have been calculated based on:

- Likely future entitlements accruing to employees based on years of service, years to entitlement, the likelihood that employees will reach the point of entitlement, and contractual entitlement information
- The present value of the estimated future cash flows.

Presentation of employee entitlements

Annual leave and vested long service leave are classified as a current liability. Non-vested long service leave expected to be settled within 12 months of balance date is classified as a current liability. All other employee entitlements are classified as non-current liabilities.

Breakdown of employee entitlements

	Actual 2018 $000	Actual 2017 $000
Current portion		
Accrued salaries and wages	64	63
Annual leave	169	202
Long service leave	21	20
Total current portion	254	285
Non-current portion		
Long service leave	31	26
Total non-current portion	31	26
Total employee entitlements	285	311

8. Personnel Costs

Accounting policy

Superannuation schemes

Defined contribution schemes

Obligations for contributions to KiwiSaver are accounted for as a defined contribution superannuation scheme and are recognised as an expense in the surplus or deficit as incurred.

Breakdown of personnel costs and further information

	Actual 2018 $000	Actual 2017 $000
Salaries and wages	3,124	3,212
Defined contribution plan employer contributions	83	87
Increase/(decrease) in employee entitlements	(13)	15
Recruitment	23	63
Other staff costs	62	64
Total personnel costs	3,279	3,441

9. Commissioner remuneration

The total value of remuneration paid or payable to each Board member during the year was:

Commissioner	Actual 2018 $000	Actual 2017 $000
Ms J Meares	102	67
Mr P McKenzie, QC (Deputy Chief Commissioner)	50	49
Mr S Davies Howard (Commissioner)	54	53
Mr R Marchant (Commissioner)	50	34
Ms S Paula Rose (Commissioner)	50	8
Total Commissioner remuneration	306	211

10. Employee remuneration

	Actual 2018	Actual 2017
Total remuneration paid or payable:		
$100,000-$109,999	2	2
$110,000-$119,999	5	4
$120,000-$129,999	1	1
$130,000-$139,999	2	5
$140,000-$149,999	3	1
$150,000-$159,999	-	2
$160,000-$169,999	1	-
$170,000-$179,999	-	-
$180,000-$189,999	-	1
$190,000-$199,999	1	-
$200,000-$209,999	-	-
$210,000-$219,999	-	-
$220,000-$229,999	-	-
$230,000-$239,999	-	1
$240,000-$249,999	1	-
Total employees	**16**	**17**

During the year ended 30 June 2018, 1 employee received compensation and other benefits in relation to cessation totalling $32,533 (2017 $0).

11. Related party transactions

TAIC is a wholly owned entity of the Crown.

Related party disclosures have not been made for transactions with related parties that are within a normal supplier or client/recipient relationship on terms and conditions no more or less favourable than those that it is reasonable to expect TAIC would have adopted in dealing with the party at arm's length in the same circumstances. Further, transactions with other government agencies (for example, Government departments and Crown entities) are not disclosed as related party transactions when they are consistent with the normal operating arrangements between government agencies and undertaken on the normal terms and conditions for such transactions.

Key management personnel compensation

	Actual 2018 $000	Actual 2017 $000
Commission Members		
Remuneration	306	211
Full-time equivalent members	0.93	0.66
Leadership Team		
Remuneration	744	732
Full-time equivalent members	3.99	4
Total key management personnel remuneration	1,050	943
Total full time equivalent personnel	4.92	4.66

The full-time equivalent for Board members has been determined based on the frequency and length of Board meetings and the estimated time for Board members to prepare for meetings.

12. Operating Leases

Accounting policy

An operating lease is a lease that does not transfer substantially all the risks and rewards incidental to ownership of an asset to the lessee.

Lease incentives received are recognised in the surplus or deficit as a reduction of rental expense over the lease term.

Operating leases as lessee

The future aggregate minimum lease payments to be paid under non-cancellable operating leases are as follows:

	Actual 2018 $000	Actual 2017 $000
Not later than one year	535	610
Later than one year and not later than five years	2,006	1,952
Later than five years	58	543
Total non-cancellable operating leases	2,599	3,105

TAIC leases two properties and has operating leases for photocopier equipment, meeting room hardware and i-phones. A significant portion of the total non-cancellable operating lease expense relates to the lease of one and a half floors of an office building. The lease expires on August 2023. TAIC does not have the option to purchase the asset at the end of the lease term.

There are no restrictions placed on TAIC by any of its leasing arrangements.

13. Payables and deferred revenue

Accounting policy

Short-term payables are recorded at their face value.

Breakdown of payables

	Actual 2018 $000	Actual 2017 $000
Payables under exchange transactions		
Creditors	32	208
Income in advance	-	25
Accrued expenses	82	56
Total payables under exchange transactions	114	289
Payables under non-exchange transactions		
Taxes payables (GST,PAYE, and rates)	125	68
Total payables under non-exchange transactions	125	68
Total payables	239	357

14. Equity

	Actual 2018 $000	Actual 2017 $000
Accumulated surplus/(deficit)		
Balance at 1 July	1,342	1,370
Surplus/(deficit) for the year	132	(28)
Balance at 30 June	1,474	1,342

15. Financial instruments

The carrying amounts of financial assets and liabilities in each of the financial instrument categories are as follows:

	Actual 2018 $000	Actual 2017 $000
Loans and receivables		
Cash and cash equivalents	1,315	1,066
Receivables	9	36
Total loans and receivables	1,324	1,102
Financial liabilities measured at amortised cost		
Payables (excluding taxes payable)	114	289
Total financial liabilities measured at amortised cost	114	289

16. Contingencies

Contingent liabilities

There were no contingent liabilities existing at balance date. (2017: Nil)

Contingent assets

At balance date TAIC was continuing to receive reparations for money that was taken fraudulently. Reparations received at 30 June 2018 were $5,200 (2017: $4,800). The contingent asset at balance date is $272k (2017: $277k).

During the year earthquake business disruption insurance claim monies were received for costs of moving to and setup of a temporary office. At balance date the additional rental cost portion of the claim is still with insurers who are disputing the claim. The amount in dispute is $70k.

17. Events after the balance date

There were no significant events after balance sheet date.

18. Explanation of major variances against budget

Explanations for significant variations from the TAIC's budgeted figures in the statement of performance expectations are as follows:

Statement of comprehensive revenue and expense

Funding from the Crown

Funding from the Crown is $210k higher than budgeted due to additional funding received to cover earthquake costs not covered by insurance.

Other revenue

Other revenue is $138k higher than budgeted due to insurance monies received for earthquake disruption costs and contributions received towards a maritime safety forum held by the Commission.

Lease, rentals and outgoings

Lease, rentals and outgoings are $116k higher than budgeted due to costs of a temporary office rented as a result of the Kaikoura earthquake that caused damage to the Commission's usual office premises at 80 The Terrace. At the time of setting the budget an early return to 80 The Terrace was looking likely and it was assumed an onerous lease would be provided for in the 2016/17 financial statements. An early return did not take place due to ongoing safety issues with 80 The Terrace and an onerous lease was not provided for resulting in additional rental costs in this financial year.

Other expenses

Other expenses are $200k higher than budgeted due to more consultants engaged than anticipated to assist with completing the change programme, and various other projects including the new website, funding review and workforce planning.

Statement of financial position

Cash and cash equivalents

Cash and cash equivalents are higher than budgeted due to timing of creditor payments and additional funding received for earthquake disruption costs.

Property, plant and equipment

Property, plant and equipment are less than budgeted due to some budgeted capex purchases being deferred due to the earthquake disruption.

Payables

Payables are higher than budgeted mainly due GST payable on additional Crown funding received in May and June.

Statement of changes in cash flows

The statement of changes in cash flows shows a net movement in cash for the period $73k higher than budgeted mainly due to additional Crown funding received for earthquake disruption costs.

AUDIT NEW ZEALAND
Mana Arotake Aotearoa

Independent Auditor's Report

To the readers of the Transport Accident Investigation Commission's financial statements and performance information for the year ended 30 June 2018

The Auditor-General is the auditor of the Transport Accident Investigation Commission (the Commission). The Auditor-General has appointed me, Clint Ramoo, using the staff and resources of Audit New Zealand, to carry out the audit of the financial statements and the performance information, including the performance information for an appropriation, of the Commission on his behalf.

Opinion

We have audited:

- the financial statements of the Commission on pages 54 to 67, that comprise the statement of financial position as at 30 June 2018, the statement of comprehensive revenue and expense, statement of changes in equity and statement of cash flows for the year ended on that date and the notes to the financial statements including a summary of significant accounting policies and other explanatory information; and
- the performance information of the Commission on pages 26 to 36 and 49 to 51.

In our opinion:

- the financial statements of the Commission on pages 54 to 67:
    - present fairly, in all material respects:
        - its financial position as at 30 June 2018; and
        - its financial performance and cash flows for the year then ended; and

- comply with generally accepted accounting practice in New Zealand in accordance with Public Benefit Entity Reporting Standards Reduced Disclosure Regime; and

- the performance information on pages 26 to 36 and 49 to 51:
  - presents fairly, in all material respects, the Commission's performance for the year ended 30 June 2018, including:
    - for each class of reportable outputs:
      - its standards of delivery performance achieved as compared with forecasts included in the statement of performance expectations for the financial year; and
      - its actual revenue and output expenses as compared with the forecasts included in the statement of performance expectations for the financial year; and
    - what has been achieved with the appropriation; and
    - the actual expenses or capital expenditure incurred compared with the appropriated or forecast expenses or capital expenditure.
  - complies with generally accepted accounting practice in New Zealand.

Our audit was completed on 25 October 2018. This is the date at which our opinion is expressed.

The basis for our opinion is explained below. In addition, we outline the responsibilities of the Commissioners and our responsibilities relating to the financial statements and the performance information, we comment on other information, and we explain our independence.

Basis for our opinion

We carried out our audit in accordance with the Auditor-General's Auditing Standards, which incorporate the Professional and Ethical Standards and the International Standards on Auditing (New Zealand) issued by the New Zealand Auditing and Assurance Standards Board. Our responsibilities under those standards are further described in the Responsibilities of the auditor section of our report.

We have fulfilled our responsibilities in accordance with the Auditor-General's Auditing Standards.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Responsibilities of the Commissioners for the financial statements and the performance information

The Commissioners are responsible on behalf of the Commission for preparing financial statements and performance information that are fairly presented and comply with generally accepted accounting practice in New Zealand. The Commissioners are responsible for such internal control as they determine is necessary to enable them to prepare financial statements and performance information that are free from material misstatement, whether due to fraud or error.

In preparing the financial statements and the performance information, the Commissioners are responsible on behalf of the Commission for assessing the Commission's ability to continue as a going concern. The Commissioners are also responsible for disclosing, as applicable, matters related to going concern and using the going concern basis of accounting, unless there is an intention to merge or to terminate the activities of the Commission, or there is no realistic alternative but to do so.

The Commissioner's responsibilities arise from the Crown Entities Act 2004 and the Public Finance Act 1989.

Responsibilities of the auditor for the audit of the financial statements and the performance information

Our objectives are to obtain reasonable assurance about whether the financial statements and the performance information, as a whole, are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion.

Reasonable assurance is a high level of assurance, but is not a guarantee that an audit carried out in accordance with the Auditor-General's Auditing Standards will always detect a material misstatement when it exists. Misstatements are differences or omissions of amounts or disclosures, and can arise from fraud or error. Misstatements are considered material if, individually or in the aggregate, they could reasonably be expected to influence the decisions of readers, taken on the basis of these financial statements and the performance information.

For the budget information reported in the financial statements and the performance information, our procedures were limited to checking that the information agreed to the Commission's statement of performance expectations and statement of intent.

We did not evaluate the security and controls over the electronic publication of the financial statements and the performance information.

As part of an audit in accordance with the Auditor-General's Auditing Standards, we exercise professional judgement and maintain professional scepticism throughout the audit. Also:

- We identify and assess the risks of material misstatement of the financial statements and the performance information, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from

error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.

- We obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Commission's internal control.

- We evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by the Commissioners.

- We evaluate the appropriateness of the reported performance information within the Commission's framework for reporting its performance.

- We conclude on the appropriateness of the use of the going concern basis of accounting by the Commissioners and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Commission's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditor's report to the related disclosures in the financial statements and the performance information or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditor's report. However, future events or conditions may cause the Commission to cease to continue as a going concern.

- We evaluate the overall presentation, structure and content of the financial statements and the performance information, including the disclosures, and whether the financial statements and the performance information represent the underlying transactions and events in a manner that achieves fair presentation.

We communicate with the Commissioners regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

Our responsibilities arise from the Public Audit Act 2001.

Other information

The Commissioners are responsible for the other information. The other information comprises the information included on pages 2 to 105 but does not include the financial statements and the performance information, and our auditor's report thereon.

Our opinion on the financial statements and the performance information does not cover the other information and we do not express any form of audit opinion or assurance conclusion thereon.

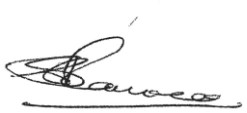
In connection with our audit of the financial statements and the performance information, our responsibility is to read the other information. In doing so, we consider whether the other information is materially inconsistent with the financial statements and the performance

information or our knowledge obtained in the audit, or otherwise appears to be materially misstated. If, based on our work, we conclude that there is a material misstatement of this other information, we are required to report that fact. We have nothing to report in this regard.

Independence

We are independent of the Commission in accordance with the independence requirements of the Auditor-General's Auditing Standards, which incorporate the independence requirements of Professional and Ethical Standard 1 (Revised): Code of Ethics for Assurance Practitioners issued by the New Zealand Auditing and Assurance Standards Board.

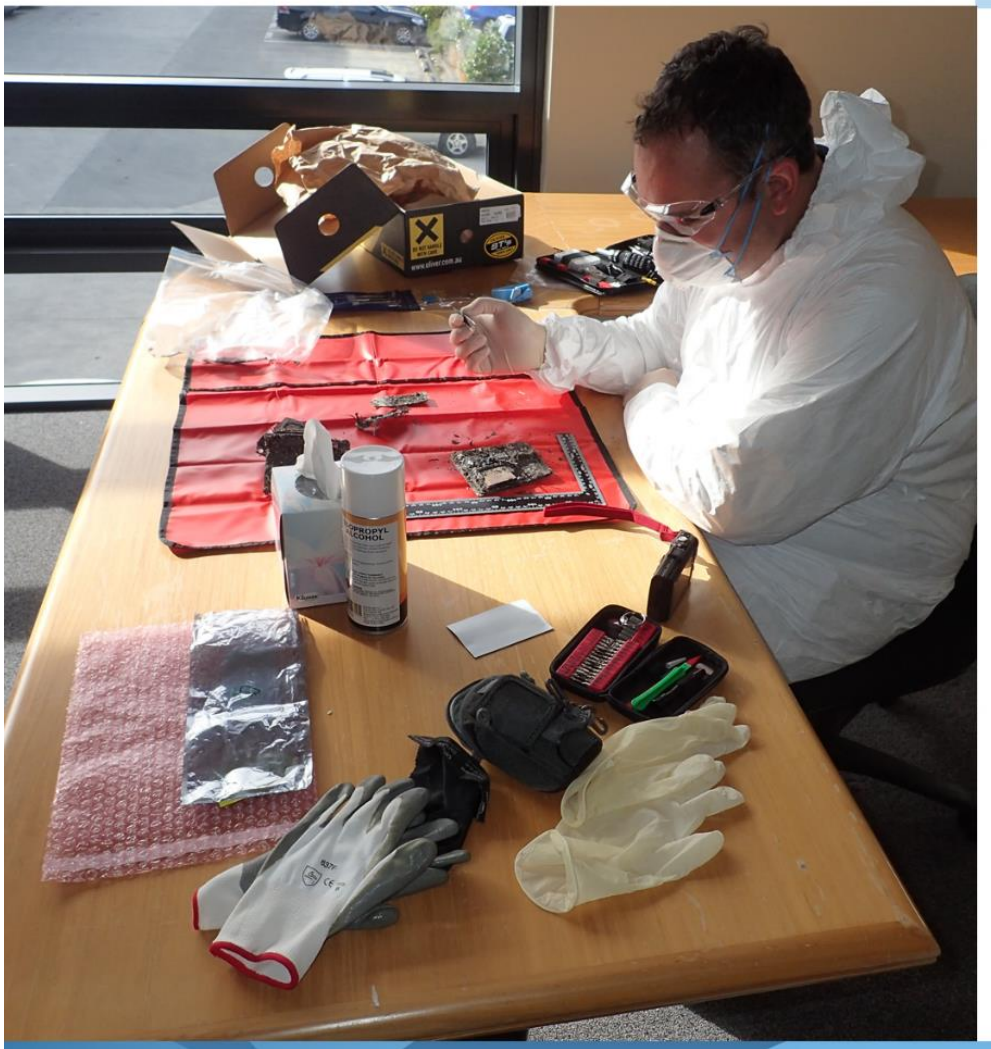
Other than in our capacity as auditor, we have no relationship with, or interests, in the Commission.



Clint Ramoo
Audit New Zealand
On behalf of the Auditor-General
Wellington, New Zealand

Appendices

"Our casebook is varied and challenging"



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NOTIFICATIONS RECEIVED 12 INQUIRIES OPENED

Appendix 1: Inquiries open as at 30 June 2018

Table 12 is ordered by date launched for all inquiries (domestic and overseas assist) live at the end of the financial year. Appendix 3 contains information on the inquiries closed during the year.

Table 12: Inquiries open as at 30 June 2018

Inquiry #	Mode	Description	Launched	Type
15-004	Air	Australian-registered B737 VH-VOP, Landing event, Christchurch	11/05/2015	Overseas assist
15-007	Air	AS350BA Eurocopter, ZK-HKU, collision with terrain, Fox Glacier	21/11/2015	Domestic
15-009	Air	Break down of traffic separation, Hamilton control zone	17/12/2015	Domestic
16-003	Air	Air Kasthamandap 9N-AJB, PAC 750 XL, Chilkhaya, Kalikot District, Nepal	9/03/2016	Overseas assist
16-007	Air	Robinson R44, impact with terrain, Glenbervie Forest, Northland	1/11/2016	Domestic
16-008	Air	Robinson R66, impact with ground, Hokonui Hills, Southland	14/11/2016	Domestic
17-101	Rail	Freight train, unauthorised entry to work site, Pongakawa	7/02/2017	Domestic
17-202	Maritime	*L'Austral*, contact with rock, Milford Sound	9/02/2017	Domestic
17-203	Maritime	Passenger vessel *Emerald Princess*, explosion resulting in crew fatality, Port Chalmers, Dunedin	9/02/2017	Domestic
17-204	Maritime	*Seabourn Encore*, contact with cement carrier, Timaru	12/02/2017	Domestic
17-002	Air	Robinson R22, impact with terrain, Reefton	27/03/2017	Domestic
17-003	Air	ATR aircraft, landing gear, Nelson	10/04/2017	Domestic
17-004	Air	BK117 Helicopter, forced landing into Porirua Harbour (Pauatahanui)	2/05/2017	Domestic
17-103	Rail	Two Metropolitan passenger trains, near collision, Wellington	17/05/2017	Domestic
17-005	Air	Australian-registered Fletcher aeroplane, impact with terrain, Bathurst, Australia	20/06/2017	Overseas assist
17-007	Air	Jetstar Airbus A320, descent below published minima, Christchurch	14/08/2017	Domestic
17-104	Rail	Passenger train, unauthorised immobilisation of train at station platform, Baldwin Station, Auckland	19/09/2017	Domestic
17-205	Maritime	Cargo ship *Kokopo Chief*, fire on-board, Port of Tauranga	24/09/2017	Domestic
17-105	Rail	Empty log train, collision with truck, Kawerau	6/10/2017	Domestic

Inquiry #	Mode	Description	Launched	Type
17-106	Rail	Mainline locomotives, SPAD, Invercargill	14/11/2017	Domestic
17-008	Air	Boeing 777, descended below lowest safe altitude, Brisbane	24/11/2017	Overseas assist
17-009	Air	Boeing 787-900, engine abnormality, Auckland	5/12/2017	Domestic
17-010	Air	Boeing 787-900, engine abnormality, Auckland	7/12/2017	Domestic
18-001	Air	Tandem skydiving operation, passenger fatality, Lake Wakatipu	10/01/2018	Domestic
18-201	Maritime	Freight vessel *Butiroai*, Sinking, Kiribati, 18 January 2018	18/01/2018	Second-ment
18-002	Air	Australian registered Boeing 737-8FE, tail strike on take-off, Auckland Airport	1/02/2018	Overseas assist
18-202	Maritime	*Dong Won* 701, caught fire, Port of Timaru	10/04/2018	Domestic
18-101	Rail	Passenger train derailment, Auckland	9/05/2018	Domestic
18-003	Air	PAC 750 XL Aeroplane, engine abnormality requiring engine shut-down and glide landing, Sentanui Airport, Jayapura, Papua, Indonesia	25/05/2018	Overseas assist
18-004	Air	Bob Frederick, Titan T-51, N51FB	28/05/2018	Overseas assist
18-203	Maritime	Container ship *Leda Maersk*, grounding, Port Chalmers	11/06/2018	Domestic
18-005	Air	Hughes MD600N helicopter, impact with terrain, North East of Waiouru	14/06/2018	Domestic

Comparison of the Commission's casebook as at 30 June 2018 with the same time last year

The graphs below are 'snapshots' of the Commission's casebook at 30 June 2017 and 30 June 2018. Each column on the graph represents an inquiry. The graphs show that, compared with the same time last year, the Commission had fewer open 'aged' inquiries (2 compared with 7). A smaller proportion of closed inquiries were over 440 working days when they closed (43% compared with 65%); there were 2 (10%) older than 660 working days (3 years) when they closed, compared with 5 (29%) last year

Open inquiries are shown as a line above the horizontal axis.

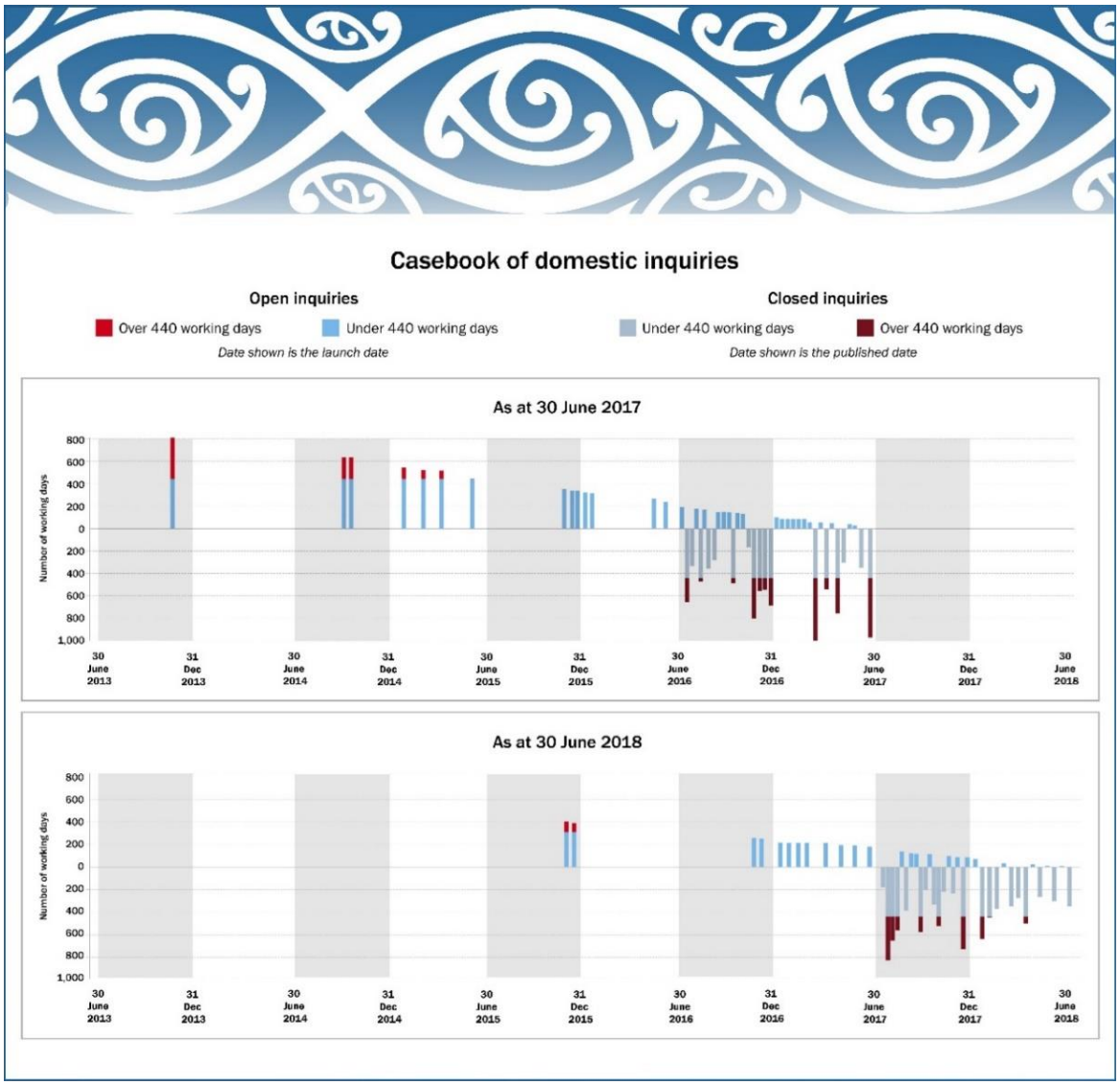
- The horizontal axis shows when the inquiry was opened.
- The vertical axis indicates how long the inquiry had been open as at 30 June.

Closed inquiries are shown below the horizontal axis**.**

- The horizontal axis shows when the inquiry was closed.
- The vertical axis indicates how old the inquiry was when it was closed.

The red sections of the lines indicate where the age of an inquiry has exceeded 440 working days (two calendar years).

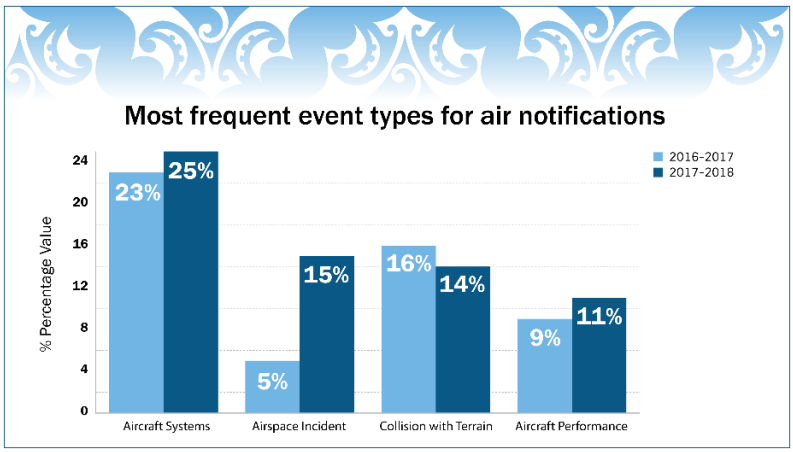
Both graphs have the same time scale. (Note that some dates have been slightly offset so that individual inquiries can be seen more clearly on the graphs.)

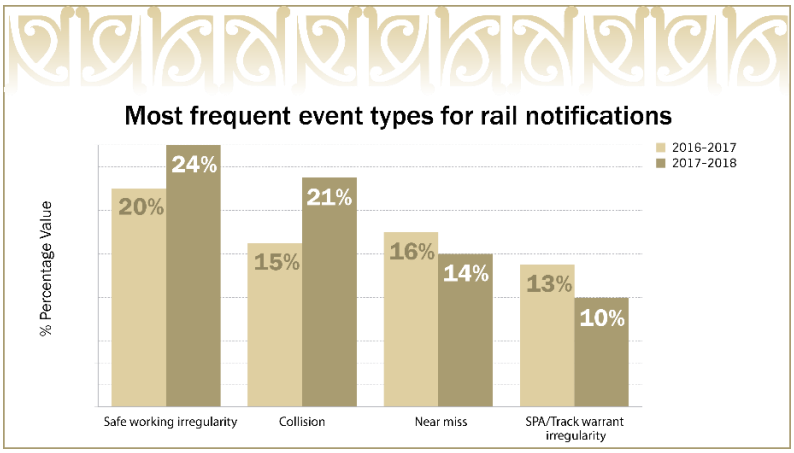


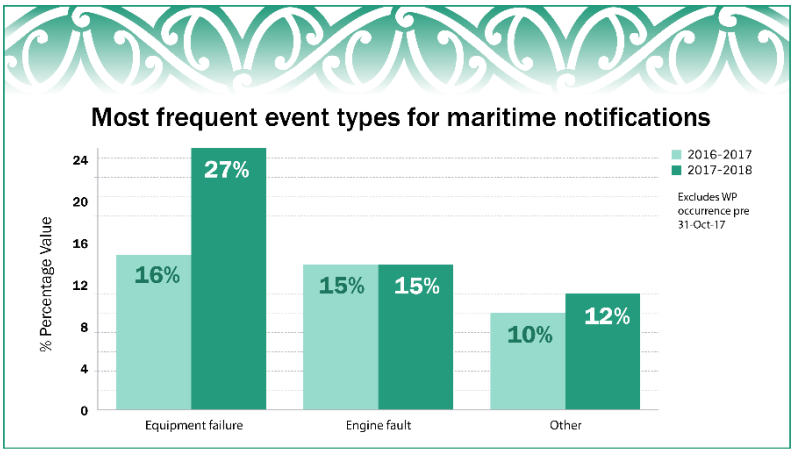
Appendix 2: Notifications and caseload data for 2017/18

Notifications

The most frequent notifications, according to event type, are shown below for each mode for the 2017/18 year. These are the events types against which more than 10% of notifications were categorised, compared with the frequency for the 2016/17 year.







Caseload

Table 13: Caseload data 2017/18

		Air			Rail			Maritime			Total		
		Jun-16	**Jun-17**	**Jun-18**	Jun-16	Jun-17	Jun-18	Jun-16	Jun-17	Jun-18	Jun-16	Jun-17	Jun-18
Caseload at year end													
Inquiries	Opened	3	8	5	3	4	4	5	7	3	11	19	12
	Continued	10	8	7	6	3	2	4	3	3	20	14	12
	Total	13	16	12	9	7	6	9	10	6	31	33	24
Elapsed WD	Opened	297	847	554	268	315	501	638	817	228	1,203	1,979	1,283
	Continued	4,152	3,903	2,656	3,102	1,213	553	2,126	1,153	913	9,380	6,269	4,122
	Total	4,449	4,750	3,210	3,370	1,528	1,054	2,764	1,970	1,141	10,583	8,248	5,405
Average WD	Opened	99	106	111	89	79	125	128	117	76	109	104	107
	Continued	415	488	379	517	404	277	532	384	304	469	448	344
	Total	342	297	268	374	218	176	307	197	190	341	250	225
Completed by year end													
	Inquiries completed	4	5	9	6	6	5	3	6	7	13	17	21
	Elapsed WD	2,086	2,762	4,431	3,998	3,543	1,872	2,545	2,972	2,642	8,629	9,277	8,945
	Average WD	522	552	492	666	591	374	848	495	377	664	546	426
Total active inquiries during year													
	Active inquiries	17	21	21	15	13	11	12	16	13	44	50	45
	FTE investigators	5.3	5.3	5.3	3.3	4.3	3.3	4.3	4.3	3.3	13.0	14.0	12.0

Notes:

- Opened = opened in that year (and remaining open at the end of the year), Continued = remained open throughout that year, Completed by year end = closed in that year, WD = working days (220 WD/calendar year).
- Inquiry numbers exclude assistance to overseas inquiries which also consumes investigator time.
- The investigator establishment is 13.0 full time equivalents (FTE), with one working across all modes. At 30 June 2018, a maritime investigator role was vacant. The numbers exclude the two modal managers.
- Total average working days figures for 2015/16 were incorrectly reported in last year's Annual Report.

Appendix 3: Key lessons, safety actions, and recommendations

The following pages set out the impact information (as represented by the key lessons, safety actions and recommendations) for the inquiries completed in 2017/18.

Please note that the carefully worded contents of inquiry reports have been extensively précised in this summary to give a quick impression of the inquiries' complexity and impact. The published inquiry reports are the definitive record which must be referred to for any other purpose.

Recipients' responses to the Commission's recommendations, at the time of issue, are included in the information. Some of these are précised; again, the published inquiry reports, which contain the recommendations, are the definitive record.

Aviation inquiry *AO-2015-002R Mast bump and in-flight break-up, Robinson R44, ZK-IPY, Lochy River, near Queenstown, 19 February 2015* (addendum to inquiry AO-2015-005)

Event type	**Mast bump and in-flight break-up**
Safety issues	2 safety issues were identified: • There are currently ways for a holder of an aviation document to circumvent the civil aviation process that is designed to prevent pilots flying if they are not medically fit to do so. • There's low awareness among medical practitioners of their duty to report to the Civil Aviation Authority if they become aware that a pilot has developed a medical condition that would render them unfit to fly.
Findings (number) *Greater ≈ more complex*	4
Key lessons (number and précis) *"What did we identify that others should take heed of to avoid it happening to them?"*	No key lessons were identified further to the original report.
Safety actions (number and précis) *"What has been done while the inquiry's been underway that's removed the need for a relevant recommendation?"*	No safety actions were taken further to the original report.
Recommendations (number and précis) *"What needs to change to reduce the likelihood of a recurrence?"*	3 recommendations were made to the Director of Civil Aviation: • That he improves ways to inform medical practitioners of the requirement to report to the Civil Aviation Authority any health issues with a Civil Aviation Authority licence-holder that may mean that person is unable to exercise the privileges of their licence safely. • That he considers measures to ensure that other appropriate health practitioners, not included under the current definition in the Civil Aviation Authority Act, notify the Director when they are aware, or have reasonable grounds to suspect, that the holder of a Civil Aviation Authority licence has a medical condition that may interfere with the privileges to which their medical certificate relates. • That he reviews the medical application process: ○ to ensure that it promotes a positive reporting culture for applicants

	○ that is more robust in identifying potentially serious health issues that may interfere with the safe exercise of the privileges to which applicants' medical certificates relate ○ to ensure that the system supports medical examiners exercising their discretion to consult medical practitioners when assessing applications for medical certificates. 1 recommendation was made to the Chief Executive of the Ministry of Health: • That he considers adding the following functions to the national electronic health record database under development: ○ that a person's occupation be added to the record to allow monitoring of individuals who hold transport-related documents that require periodic medical checks, and who have potentially adverse health conditions or medications, so that the appropriate authority can be alerted to possible public safety risks ○ a mechanism to draw the attention of all health practitioners to their obligation to notify the appropriate transport authority when a person or patient has a health condition or need for medication that could pose a threat to public safety in that individual's occupation.
Response	The Civil Aviation Authority for the most part accepted the recommendations. However, it stated that under the Civil Aviation Act, the Director could not require an applicant, as a precondition to the issue of a medical certificate, to provide information from their GP or other medical practitioner, or to authorise the Civil Aviation Authority to access that information, in the absence of reasonable cause in a specific case for requesting that information. It also considered the second recommendation was better directed to the Secretary of Transport. The Ministry of Health accepted the recommendation, but could not commit to the functionality being implemented because it was still working through the approval processes for the national electronic health record database.

Rail inquiry *RO-2014-105 Near collision between train and hi-rail excavator, Wairarapa Line near Featherston, 11 August 2014*

Event type	**Near collision**
Safety issues identified	3 safety issues were identified: • The process for planning and approving the worksite was not completed. • The process for planning and approving the worksite allowed one person to carry out the rail protection duties over two separate worksites within a protected work area for a 52.5-hour track occupation period, with no relief • There was insufficient management of the rail protection officer's day-to-day workload, which likely contributed to the officer being fatigued when reporting the track as clear, when it was not.
Findings (number) *Greater ≈ more complex*	5
Key lessons (number and précis) *"What did we identify that others should take heed of to avoid it happening to them?"*	2 key lessons were identified: • Not following operating procedures designed to provide for safe railway operations is highly likely to result in an accident. • Decisions that can affect the safety of railway workers should never be based entirely on assumptions, as in this case when clearance was given for trains to pass through the area when workers were still occupying the track.

Safety actions (number and précis) *"What has been done while the inquiry's been underway that's removed the need for a relevant recommendation?"*	3 safety actions have been taken by KiwiRail: • A new site safety rule setting out new safety procedures has been introduced. • A consultation document on a change proposal for track protection was issued. The document showed how KiwiRail intended to reduce the frequency of track occupation incidents by training and appointing dedicated rail protection officers and separating their duties from those of a work supervisor/team leader/leading hand. • The role of protection planner has since been introduced.
Recommendations (number and précis) *"What needs to change to reduce the likelihood of a recurrence?"*	1 recommendation was made to the Chief Executive of KiwiRail: • That he reviews the company's Fitness for Work Policy to ensure that the workloads of personnel undertaking safety-critical work, including staff not on a roster, are managed effectively and that the risk of their suffering from the effects of fatigue is mitigated.
Response	KiwiRail confirmed that it accepted the intent of the recommendation and would scope the compliance requirements and undertake the actions to allow closure of the recommendation.

Aviation inquiry *AO-2015-001 Pacific Aerospace Limited 750XL, ZK-SDT, Engine failure, Lake Taupō, 7 January 2015*

Event type	**Engine failure**
Safety issues identified	3 safety issues were identified: • The measurement specifications for overhauled compressor turbine blades that had been through a strip and recoat repair process were not exactly the same as those for new blades. Blades that had been through that repair process, without verification of critical dimensions, might fail before the next 3,000-hour inspection. • When aircraft maintenance staff do not refer to the current Instructions for Continuing Airworthiness for a task, safety might be compromised. • Parachute drop pilots were not required to wear lifejackets or flotation devices if their flights were expected to remain within gliding distance of land. That downplayed the possibility of a pilot having to ditch an aeroplane or having to use the emergency parachute when over or near water.
Findings (number) *Greater ≈ more complex*	3
Key lessons (number and précis) *"What did we identify that others should take heed of to avoid it happening to them?"*	3 key lessons were identified: • Operators and pilots engaged in skydiving operations should carefully assess the risk of having to use an emergency parachute or landing in water, and ensure that they have the appropriate training and equipment. Pilots must have a thorough understanding of the care and use of emergency parachutes. • Aircraft maintenance engineers should not commence any task related to airworthiness without ensuring that they have the current procedure and information necessary for the task. • Operators and maintenance providers should ensure that they comply fully with any registration or other requirements of aircraft certification.
Safety actions (number and précis) *"What has been done while the inquiry's been underway that's*	5 safety actions have been taken:

removed the need for a relevant recommendation?"	• The operator painted the rear bulkheads of its aeroplanes white, which allowed pilots to see cabin occupants more easily in the cockpit rear-view mirror. • To improve the preparedness of drop pilots for an emergency parachute descent, the operator has since added a voluntary tandem jump to the parachute drop pilot training. A group training session with tandem masters is also included in the annual competency testing for pilots. • The operator now provides lifejackets for its tandem masters. • The manufacturer revised the relevant engine Repair Requirement Document to reflect the dimension requirements of new compressor turbine blades. • The manufacturer was to publish a revision to the relevant A engine maintenance manual requiring enhanced inspections of all single-engine applications in the skydiving role.
Recommendations (number and précis) *"What needs to change to reduce the likelihood of a recurrence?"*	1 recommendation was made to the Chief Executive of Skydive Taupo: • To investigate options for equipping their parachute drop pilots with effective flotation devices.
Response	Skydive Taupo Ltd confirmed it would implement the recommendation, and once the suitable flotation equipment has been confirmed and made fit for purpose, pilot training would be introduced and conducted regarding water landing procedures. The recommendation was closed in September 2017.

Aviation inquiry *AO-2013-010 Aerospatiale AS350B2 'Squirrel', ZK-IMJ, collision with parked helicopter, near Mount Tyndall, Otago, 28 October 2013*

Event type	**Collision**
Safety issues identified	2 safety issues were identified: • When pilots do not inform their flight-following organisations of changes to their routes or destinations, any search and rescue action that is required could be delayed or misdirected • The widespread practice of allowing passengers to leave and return to a helicopter parked on snow while the rotors are turning is hazardous.
Findings (number) *Greater ≈ more complex*	12
Key lessons (number and précis) *"What did we identify that others should take heed of to avoid it happening to them?"*	2 key lessons were identified: • Transport operators should keep formal records of concerns about operational staff and how they are dealt with. Record keeping is consistent with the safety management system goal of improving system quality. • Pilots should ensure that they inform their flight-following organisations of any changes to their operating areas or destinations.
Safety actions (number and précis) *"What has been done while the inquiry's been underway that's removed the need for a relevant recommendation?"*	1 safety action has been taken: • The Civil Aviation Authority issued an airworthiness directive that required the weight and balance to be calculated before every flight of a Squirrel helicopter when people or cargo occupied the two-place front seat.
Recommendations (number and précis)	1 recommendation was made to the Director of Civil Aviation:

"What needs to change to reduce the likelihood of a recurrence?"	• To ensure that helicopter operators who conduct snow landings address in their safety management systems the hazard of passenger disembarkation and embarkation during those landings while the rotors are turning.
Response	The Director accepted the recommendation and stated that when operators' Safety Management Systems are certificated it would be ensured that all significant aviation risks are identified and managed.

Rail *RO-2015-103 Track occupation irregularity, leading to near collision, Between Manunui and Taumarunui, 15 December 2015*

Event type	**Track occupation irregularity**
Safety issues identified	3 safety issues were identified: • The operator's system allowed the team leader, with all of the tasks and responsibilities associated with that role, to take on the safety-critical role of rail protection officer. • The poor standard of non-technical skills among the workers who were on-site. • The rail protection officer's positive post-incident test result for methamphetamine.
Findings (number) *Greater ≈ more complex*	5
Key lessons (number and précis) *"What did we identify that others should take heed of to avoid it happening to them?"*	3 key lessons were identified: • Workers responsible for the safety and wellbeing of track staff should not be burdened with tasks and responsibilities that detract from that role. • All operational staff need to be trained and well-practised in non-technical skills to prevent one-person errors resulting in accidents and incidents. • It is never acceptable for workers to be affected by performance-impairing substances, regardless of their role.
Safety actions (number and précis) *"What has been done while the inquiry's been underway that's removed the need for a relevant recommendation?"*	9 safety actions were taken by the operator. • Infrastructure line managers were asked to confirm they were taking all appropriate safety measures. • Materials issued on the importance of crew resource management. • Workers operating at an infrastructure worksite were required to carry a Competency Card as proof their competencies were valid and current. • Materials issued to infrastructure workers highlighting the need to co-ordinate the movement of rail vehicles within a protected worksite. • New engineering services task instruction posted on the use of the Worksite Entry Train Alert System. • Consulted on a proposal to reduce the risks of track occupation by separating the rail protection officer and work supervisor (team leader) roles and having protection planners approve all planned worksites. • Updated the Commission on the Interceptor system, which will intervene by applying brakes on a train that does not stop at a protected worksite. • Progressed plans to separate the rail protection officer and work supervisor (team leader) roles and have protection planners approve planned worksites.

	• Agreed with the NZ Transport Agency actions and deadlines for the operator to implement a safety improvement plan to raise the standard of non-technical skills training to its 'at risk' staff.
Recommendations (number and précis) *"What needs to change to reduce the likelihood of a recurrence?"*	1 recommendation was made to the Chief Executive of KiwiRail: • That he addresses KiwiRail's low-ratio random testing programme.
Response	KiwiRail confirmed it was increasing its random drug and alcohol testing regime from 10% per annum to 20% per annum. The recommendation was closed in March 2018.

Maritime inquiry *MO-2015-201 Passenger ferry Kea, collision with Victoria Wharf, Devonport, 17 February 2015*

Event type	**Collision**
Safety issues identified	4 safety issues were identified: • The operator's training and familiarisation system failed to ensure the master was properly trained in and familiar with the *Kea*'s propulsion control system. • The operator's system allowed the *Kea* to enter and continue service using a mode of operation known to be faulty and resulting in incidents. • The regulatory system did not ensure an appropriate level of surveyor oversight of the project to replace the *Kea*'s propulsion control system. • The operator had not assessed the risk of operating ferries with unsecured passenger seating.
Findings (number) *Greater ≈ more complex*	7
Key lessons (number and précis) *"What did we identify that others should take heed of to avoid it happening to them?"*	3 key lessons were identified: • Masters and other bridge crew must use all available means for monitoring the status of their manoeuvring and control systems, all the time. • Masters must be properly trained in and fully familiar with all aspects of their vessels' control systems and equipment. • The regulatory requirements are minimum requirements, which do not relieve operators of their responsibility to assess and mitigate all operational risks.
Safety actions (number and précis) *"What has been done while the inquiry's been underway that's removed the need for a relevant recommendation?"*	15 safety actions have been taken by the operator: • Introduced an enhanced training regime. • Appointed a dedicated training Master for *Kea*. • Comprehensive review and enhancement of vessel manuals and instructions. • Relevant staff trained by the manufacturer in the *Kea*'s control system. • Installed GPS/RADAR plotters at all of *Kea*'s control panels. • Installed HD CCTV cameras for boarding areas and engine rooms. • Properly secured seating on all ferries. • Installed a separate indicator on the control panel alerting the master to the 'live' control panel, to ensure transfer is unequivocally established. • Modified the audible alarms that sound continuously until control assumed at the relevant control position.

	• Modified system software to allow the forced override function to be requested from any control panel. • Implemented new web-based Safety Management Software. • Improved monitoring of wear on critical components of *Kea's* control heads. • Masters required to complete full task book on all vessel systems. • Operating Procedures require Master sign off as read and understood. • Safety Tool Box talks conducted at regular intervals and recorded.
Recommendations (number and précis) ***"What needs to change to reduce the likelihood of a recurrence?"***	1 recommendation was made to Maritime NZ: • That it issues guidance and advice to operators and surveyors about the need to take a risk-based approach when determining the level of surveyor oversight required for changes to critical systems, regardless of whether or not the changes are considered major modifications.
Response	Maritime NZ partially accepted the recommendation. It agreed in principle with the recommendation, but advised that, because of the way that Maritime Rules Parts 44 and 19 are constructed, the issuance of such guidance may not achieve the intended effect. That is because they do not define 'critical systems' and they only require surveyor oversight and approval in the event of a major repair or a major modification. Maritime NZ considered that the more enduring way of achieving the objective is to review the legal framework to support a risk-based approach to surveyor oversight. This would require amendments to Rule Parts 19 and 44; in particular, the addition of a definition of 'critical systems' and clarity as to the point at which surveyor oversight is required in the process of critical system changes. Maritime NZ stated it had a programme of work on its regulatory programme which is well suited to consider this matter at some depth and may result in a proposal to change the rules, subject to Ministerial agreement. If changes to the rules are required, this process could take a couple of years to complete.

Rail inquiry *RO-2016-102 Train 140 passed Signal 10R at 'Stop' Mission Bush Branch line, Paerata, 25 October 2016*

Event type	**Signal passed**
Safety issues identified	4 safety issues were identified: • The setback movement was not planned or carried out according to the operating rules and procedures. • The operator had not effectively communicated to staff the new procedure for recovering stalled trains at Paerata. • The train controller, the train driver and the pilot had different understandings of the limit for the setback authority and method of protecting the movement. • The train controller was performing a safety-critical role and was directly involved in the incident, yet was not asked to undergo a post-incident drug and alcohol test.
Findings (number) *Greater ≈ more complex*	7
Key lessons (number and précis) *"What did we identify that others*	2 key lessons were identified: • It is important that rail participants are familiar with and follow the approved rules and procedures, put in place to achieve safe railway operations.

should take heed of to avoid it happening to them?"	• It is important that all staff involved in a railway operation have a common understanding of how it will be carried out safely.
Safety actions (number and précis) *"What has been done while the inquiry's been underway that's removed the need for a relevant recommendation?"*	7 safety actions have been taken: • Instructions that trains stopping on the Mission Bush Branch between Paerata and Glenbrook must not setback/change direction. • Reduced maximum number of loaded coal wagons permitted to be hauled by a single DL-class locomotive on the Mission Bush line. • Mission Bush line pilots were issued with train control portable radios to ensure that they were included in and aware of setback arrangements. • Comprehensive site inductions at Paerata for all Mission Bush line staff undertaking piloting duties. • Driving techniques to reduce the likelihood of stalling established. • The NZ Transport Agency required the operator to develop a safety improvement plan to raise the standard of non-technical skills training to its 'at risk' staff. • The operator agreed and presented the NZ Transport Agency with an integrated non-technical skills training and development plan.
Recommendations (number and précis) *"What needs to change to reduce the likelihood of a recurrence?"*	2 recommendations were made to the Chief Executive of KiwiRail: • That KiwiRail reviews its change management processes to ensure that changes in policies, procedures and rules are communicated effectively to staff, and appropriate procedures measure compliance with the changes. • That KiwiRail reviews its post-incident drug and alcohol policy to ensure that all personnel directly involved in an accident and/or operating incident are asked to submit to testing.
Response	KiwiRail accepted these recommendations. The second recommendation was closed in March 2018.

Aviation inquiry *AO-2016-004 Guimbal Cabri G2, ZK-IIH, In-flight fire, near Rotorua Aerodrome, 15 April 2016*

Event type	**In-flight fire**
Safety issues identified	No safety issues were identified.
Findings (number) *Greater ≈ more complex*	6
Key lessons (number and précis) *"What did we identify that others should take heed of to avoid it happening to them?"*	1 key lesson was identified: • Maintenance personnel need to be vigilant for product anomalies when installing components onto aircraft, even when the components come from approved suppliers.
Safety actions (number and précis) *"What has been done while the inquiry's been underway that's removed the need for a relevant recommendation?"*	3 safety actions have been taken: • The Director of Civil Aviation issued an Airworthiness Notice that strongly recommended that operators/maintenance providers inspect all DENSO W24EMR-C spark plugs, whether installed in engines or held in stock, for defects. • European Aviation Safety Agency, as the airworthiness authority for the Guimbal Cabri helicopter, issued a Safety Information Bulletin recommending

	that operators of Cabri helicopters inspect DENSO W24EMR-C spark plugs for serviceability. • The manufacturer of the helicopter issued a Service Bulletin recommending that operators check all installed and new DENSO W24EMR-C spark plugs, and repeat the inspections at all installations thereafter.
Recommendations (number and précis) *"What needs to change to reduce the likelihood of a recurrence?"*	No recommendations were made. However, the Commission made reference to the prompt action taken by the pilot, which was commendable for the pilot's level of experience.

Maritime inquiry *MO-2016-205 Fatal fall from height on bulk carrier,* New Legend Pearl*, 3 November 2016*

Event type	**Fatal fall from height**
Safety issues identified	2 safety issues were identified. • The operator's risk assessment process did not prevent the crew member working at height with an inadequate fall-protection system. • Neither the safety management system nor the underlying safety culture on board met industry good practice.
Findings (number) *Greater ≈ more complex*	5
Key lessons (number and précis) *"What did we identify that others should take heed of to avoid it happening to them?"*	3 key lessons were identified: • Working at height is a risky activity and all crew should use suitable safety harnesses that are fit for the intended task. • Working at height is a risky activity that must be properly managed using a formal risk assessment methodology. • Attaching a safety harness by passing it through or around the securing point and back onto the lanyard is a dangerous practice that can result in inadvertent release unless the lanyard and hook are designed for that purpose.

Safety actions (number and précis)
"What has been done while the inquiry's been underway that's removed the need for a relevant recommendation?"
	2 safety actions have been taken:
	• The operator reviewed the safety management system. Following the review, the operator pledged the following measures:
	  ○ The accident would be reported to the company and crew and all vessels would be required to emphasise the harm caused by this accident.
	  ○ The company would strengthen the monitoring and management of vessels by regular crew safety inspections and crew safety awareness training in respect of 'safety first'.
	  ○ Supervision of masters' efforts to train their crews on the safety management system.
	  ○ Strengthening training in key operations and improving the professional qualities of the crew.
	• A circular informed the fleet of the accident and reminded all vessels to constantly attach great importance to the work safety of crews. During the vessel's first port call after the accident, the designated person ashore and the crew company manager addressed the crew and reiterated the importance of personal safety on board.

Recommendations (number and précis) *"What needs to change to reduce the likelihood of a recurrence?"*	1 recommendation was made to the general director of the Panama Maritime Authority (the flag state of the *New Legend Pearl*): • That he seeks improvements in the operator's implementation of its safety management system on board its vessels, including the underlying safety culture.
Response	The Panama Maritime Authority advised that it had required from the operator a brief summary of the actions taken by them to avoid similar accidents in the future highlighting safety culture improvement and evidence that such actions are being fully implemented.

Aviation inquiry *AO-2015-005 Unplanned interruption to national air traffic control services, 23 June 2015*

Event type	**Unplanned interruption to national air traffic control services**
Safety issues *"What contributed to the occurrence, or might contribute to another occurrence?"*	2 safety issues were identified. • The digital data network did not have the resilience necessary to support an air traffic control service. • The Civil Aviation Authority did not have the capability to independently determine if the Airways' aeronautical telecommunications network would perform as the rules required.
Findings (number) *Greater ≈ more complex*	11
Key lessons (number and précis) *"What did we identify that others should take heed of to avoid it happening to them?"*	2 key lessons were identified: • Effective risk management is a continuous process that applies to all aspects of an organisation's activities. From major projects to minor tasks, consideration must be given to the context of the activity within the organisation's purpose. • It is important that processes critical to the efficient and safe operation of a system are followed are well-defined.
Safety actions (number and précis) *"What has been done while the inquiry's been underway that's removed the need for a relevant recommendation?"*	9 safety actions have been taken: • Airways Corporation of NZ (Airways) resolved problems with running broadcast storm protocols in its new network equipment. • Network maintenance procedures were revised to manage risks to service delivery from network maintenance. • New team manager role created, responsible for the enterprise architecture and networks. • Training modules for the digital data network developed. • The network engineering drawing standards and approval process aligned with standards elsewhere in the organisation. • Airways commissioned an external review of the architecture and management of its digital data network. • A training module has been developed to focus network engineers on how their work could affect the organisation's ability to meet its service delivery obligations. • New staff have been engaged in the network team and it has been organised to support the future enterprise needs.

	• The Civil Aviation Authority acted to maintain organisational capabilities to appropriately identify and monitor risk that may be present within the aviation system as a result of ongoing and often rapid technological advances. This included updating the position description for the auditor role to include experience in air navigation and air traffic management technology.
Recommendations (number and précis) *"What needs to change to reduce the likelihood of a recurrence?"*	1 recommendation was made to Secretary for Transport: • To update and restructure the relevant Civil Aviation Rules (CAR Part 171) to include the wider scope of technology, software and navigation aids that are normal for a modern air navigation service and to make provision for the rule to cater for future changes in technology.
Response	The recommendation was accepted. The Ministry advised it would work with the Civil Aviation Authority to progress the rule changes.

Maritime inquiry *MO-2016-204 Bulk carrier*, Molly Manx, *grounding, Otago Harbour, 19 August 2016*

Event type	**Grounding**
Safety issues *"What contributed to the occurrence, or might contribute to another occurrence?"*	4 safety issues were identified. • The vessel's bridge team and the pilot had different understandings of the planned track and their respective roles in monitoring against the plan. • The International Maritime Organization (IMO) has set standards for passage planning that vessels must adhere to, but there is no corresponding requirement for the passage plans that port authorities create and use to meet those same standards. • The crew were not using the electronic chart display and information system (ECDIS) in the correct configuration required by the IMO and company standards when the grounding occurred. • The standard of bridge resource management on board the *Molly Manx* during the Otago pilotage did not meet good industry practice.
Findings (number) *Greater ≈ more complex*	6
Key lessons (number and précis) *"What did we identify that others should take heed of to avoid it happening to them?"*	3 key lessons were identified: • The vessel's bridge team and the pilot must agree, and have a common understanding of, the passage plan and monitoring against that plan. • Vessels' bridge teams must actively promote and use the concept of bridge resource management, including the incorporation of pilots into the bridge teams, to manage voyages properly. • A vessel's ECDIS is an important system for monitoring the progress of the vessel and warning the bridge team when things could go wrong. It is essential that it be configured correctly for the phase of navigation and the proximity to navigation hazards.
Safety actions (number and précis) *"What has been done while the inquiry's been underway that's removed the need for a relevant recommendation?"*	5 safety actions have been taken: • The operator briefed the master about the incident citing the importance of taking overriding action well in time when in doubt as to a pilot's advice. • The operator promulgated the findings of this incident to all company-managed ships and to company training centres by a 'One of our ships' report so as to create better awareness. • The port authority has, or will, issue all pilots with their own PPU (portable pilotage units).

	• The port authority is to place a virtual starboard-hand beacon over the shoal where the *Molly Manx* ran aground. • The port authority is to reduce the maximum size of bulk vessel to be allowed to navigate in the Upper Harbour from 190 metres LOA (length overall) to 180 metres.
Recommendations (number and précis) *"What needs to change to reduce the likelihood of a recurrence?"*	3 recommendations were made to the Director of Maritime NZ: • That he uses the Port and Harbour Marine Safety Code and its associated governance arrangements, or other appropriate mechanism, to ensure port authorities publish passage plans for their respective pilotage districts that meet port-specific requirements and international guidelines. • That he encourages responsible harbour authorities to produce their passage plans in a format capable of being directly uploaded into a vessel's ECDIS. • That he provides a website where harbour authorities can make their passage plans available for use by shipping companies and vessel masters in planning their voyages.
Response	Maritime NZ did not consider it had the statutory powers to implement the first recommendation, but would convey the information to Port operators and Regional Councils who are parties to the code, for their consideration. Maritime NZ advised it would convey the second recommendation to Port operators and Regional Councils through the mechanism of the Port and Harbour Marine Safety Code. Maritime NZ partly accepted the third recommendation. It advised it would investigate through the mechanism of the Port and Harbour Marine Safety Code, providing a facility on its internet site for Port operators and Regional Councils who wish to make passage plans available for shipping companies and vessel masters to access prior to planning their voyages. However, it stated that the statutory framework within which Maritime NZ operates limits its powers to go beyond encouraging Port operators and Regional Councils to take specific actions.

Aviation inquiry *AO-2014-005 Eurocopter AS350-B2 (ZK-HYO), collision with terrain during heli-skiing flight, Mount Alta, near Mount Aspiring National Park, 16 August 2014*

Event type	**Collision with terrain**
Safety issues *"What contributed to the occurrence, or might contribute to another occurrence?"*	3 safety issues were identified. • The operator's procedures did not require pilots to routinely calculate the performance capabilities of their helicopters for the intended flights. • Pilots risked not knowing an aircraft's capability when using standard passenger weights, and so risked operating close to the limits of their aircraft's performance. • Some New Zealand helicopter pilots might have a culture of operating their aircraft beyond the manufacturers' published and placarded limits, with the possibility that such a culture has become normalised.
Findings (number) *Greater ≈ more complex*	11
Key lessons (number and précis) *"What did we identify that others should take heed of to avoid it happening to them?"*	5 key lessons were identified: • Flying in mountainous terrain places additional demands on a pilot's skills and an aircraft's performance. Operators' safety management systems must cover the additional risks associated with flying in such an environment.

	• The use of 'standard' or 'assessed' passenger weights is not a licence to exceed an aircraft's permissible weight and balance parameters.
	• It is important for operators to keep comprehensive, formal records of all pilot training.
	• Seatbelts are effective in preventing or minimising injury only if they are fastened and properly adjusted.
	• Vortex ring state is a known hazard for helicopters. To avoid it, pilots must:
	  ○ remain alert to the conditions conducive to the vortex ring state forming
	  ○ closely monitor the airspeed and rate of descent during the final approach
	  ○ begin recovery action at the first indication of vortex ring state.

Safety actions (number and précis) *"What has been done while the inquiry's been underway that's removed the need for a relevant recommendation?"*	3 safety actions have been taken: • The operator issued a notice to all staff reminding them about the fit of passengers' seatbelts; and that harnesses, where fitted, must be worn. • The operator changed its standard pilot weight and amended procedures to require pilots to weigh passengers on scenic flights where possible. • The Civil Aviation Authority issued emergency airworthiness directive concerning operating limitations for AS350 helicopters fitted with two-place front passenger seats, and AS355 helicopters. The directives required operators to ensure helicopters are within their weight and balance limits by calculating their longitudinal and lateral centre-of-gravity positions, and completing weight and balance data forms.
Recommendations (number and précis) *"What needs to change to reduce the likelihood of a recurrence?"*	3 recommendations were made to the Director of Civil Aviation: • That he uses the key lessons from this report to remind aircraft operators and pilots of the importance of ensuring that aircraft occupants fasten and properly adjust their seatbelts at all times. • That he uses the key lessons from this report to remind aircraft operators and pilots of helicopter performance and environmental conditions that can lead to vortex ring state, and of the need to be alert to the potential for it to occur, even in apparently benign conditions. • The he includes the safety issue of helicopter operational culture in the Civil Aviation Authority's current 'sector risk profile' review.
Response	All three recommendations were accepted and the first two were closed in June 2018.

Aviation inquiry *AO-2015-003: Robinson R44, Main rotor blade failure, Waikaia, Southland, 23 January 2015*

Event type	**Main rotor blade failure**
Safety issues *"What contributed to the occurrence, or might contribute to another occurrence?"*	2 safety issues were identified: • There may be a culture in New Zealand of some pilots operating their aircraft outside the manufacturers' published and placarded 'never exceed' limitations. Should this situation exist, there is a possibility that such a culture has become normalised. • Aircraft design organisations do not currently have to consider whether proposed major modifications to aircraft will significantly alter the use of the aircraft or adversely affect the service life of any components.
Findings (number) *Greater ≈ more complex*	6

Key lessons (number and précis) *"What did we identify that others should take heed of to avoid it happening to them?"*	4 key lessons were identified: • Metal fatigue occurs continuously in dynamic components. A fatigue crack can lengthen very rapidly and the component lose its structural strength. If an unusual or severe vibration develops in flight, pilots should land immediately. • The key to minimising stress in dynamic components is to fly conservatively, especially when operating close to the flight manual weight, speed and power limits. Operating an aircraft outside the flight manual limitations significantly erodes the safety margins factored into the service lives of components and can quickly lead to an early catastrophic failure. • Aggressive and unusual helicopter manoeuvres can prolong the period spent in the 'avoid curve', where a safe autorotation may not be possible in the event of an engine failure. Operators should require their pilots to fly in accordance with established industry guidelines and to continually demonstrate their commitment to a strong safety culture. • Operators and maintainers of aircraft that are subjected to cycles or flight profiles that are significantly different from those envisaged by the manufacturers when the aircraft were certificated should consider implementing reduced intervals for component inspections and earlier component replacement times.
Safety actions (number and précis) *"What has been done while the inquiry's been underway that's removed the need for a relevant recommendation?"*	4 safety actions have been taken: • The manufacturer introduced a modification for main rotor blades in service. • In New Zealand, the Civil Aviation Authority mandated the modification via an airworthiness directive. It also sent a letter to all R44 helicopters operators advising them of the airworthiness directive and requesting reports of any incidents or defects. • Robinson implemented design changes to new main rotor blades for R44 and R66 helicopters. The changes are to improve safety margins by reducing stress concentrations and increasing fatigue tolerance. • The Federal Aviation Administration (the United States civil aviation regulator) issued an airworthiness directive that mandated the modification for in-service blades in the United States.
Recommendations (number and précis) *"What needs to change to reduce the likelihood of a recurrence?"*	1 recommendation was made to the Director of Civil Aviation: • That he consults with the original equipment manufacturer when considering a modification or supplemental type certificate which, if approved, could result in any aircraft being used in a way that is significantly different from that which the manufacturer originally modelled and used as the basis for determining component fatigue lives and the aircraft maintenance programme.
Response	The recommendation was accepted on the basis that the Civil Aviation Authority would seek a manufacturer's advice on the utilisation of an aircraft if it is considered that a modification or supplemental type certificate may place the aircraft's operations outside of that originally intended. The recommendation was closed in April 2018.

Maritime inquiry *MO-2016-201: Restricted limits passenger vessel the* Peejay V*, fire and sinking, 18 January 2016*

Event type	**Fire and sinking**
Safety issues *"What contributed to the occurrence, or might contribute to another occurrence?"*	3 safety issues were identified: • The Maritime Rules did not require the *PeeJay V* to have fire detection or automatic fire alarms installed even though it could carry up to 90 passengers and operate up to 12 nm from the coast. • The CO2 fixed fire-fighting system installed in the engine room could not be fully effective in extinguishing the fire because the space it was protecting could not be fully closed down. • The builder and operators of the vessel did not fully appreciate the principles of how the CO2 fixed fire-fighting system operated.
Findings (number) *Greater ≈ more complex*	5
Key lessons (number and précis) *"What did we identify that others should take heed of to avoid it happening to them?"*	3 key lessons were identified: • Early detection of a fire on board a vessel is critical to a successful fire-fighting response and for the early preparation of life-saving apparel and equipment. • Crew must be fully familiar with and trained in the use of fire-fighting systems on board, otherwise the systems might not be of any use in fighting a fire. • Even if a fixed Co2 fire-fighting apparatus is fully functional, it will only be effective in fighting a fire if the design of the space it is protecting can be fully closed off.
Safety actions (number and précis) *"What has been done while the inquiry's been underway that's removed the need for a relevant recommendation?"*	1 safety action has been taken: • The owner of the *PeeJay V* operated another vessel with a similar arrangement for the forced draft fan into the engine room. The owner installed a closing mechanism so the fire flap on that forced draft fan could be closed remotely without having to enter the vessel.
Recommendations (number and précis) *"What needs to change to reduce the likelihood of a recurrence?"*	1 recommendation was made to the Director of Maritime NZ: • That he promotes the need for people and organisations involved in the design, installation and use of any fixed fire-fighting systems to fully document and understand the principles and operation of those systems.
Response	Maritime NZ accepted the recommendation and advised it would communicate directly with surveyors and other relevant persons to promote this need.

Rail inquiry *RO-2016-101: Signal passed at danger leading to near collision, Wellington Railway Station, 28 May 2016*

Event type	**Signal passed at danger**
Safety issues *"What contributed to the occurrence, or might contribute to another occurrence?"*	3 safety issues were identified: • There is a heightened risk of trains colliding within the approaches to Wellington Station because limited space makes the track layout congested. • There are a number of reasonable measures that had not been taken to further reduce the risk of trains colliding on the approaches to Wellington Station, such as: providing better recognition of signals; standard procedures for signalling trains through the area; and better communication between train drivers and persons controlling the trains. • The standard of non-technical skills (NTS), formerly known as Crew Resource Management, between the driver, the Train Examiner Operations and the signaller were ineffective.
Findings (number) *Greater ≈ more complex*	5
Key lessons (number and précis) *"What did we identify that others should take heed of to avoid it happening to them?"*	2 key lessons were identified: • All safety-critical systems should have checks and defences designed into them that prevent human error from resulting in accidents. • There should be sufficient clear and concise communication between persons responsible for controlling trains and train drivers, so that all parties are aware of the situation and alert to any threats to safe train operations.
Safety actions (number and précis) *"What has been done while the inquiry's been underway that's removed the need for a relevant recommendation?"*	4 safety actions have been taken: • KiwiRail held a Signal's Sighting Committee review of signals in the area controlled by the Wellington Signalbox. • Transdev Wellington undertook some retraining of the relay driver • Transdev Wellington added the relay driver to the 'at-risk register' for increased frequency of safety observations and supervision. • Transdev Wellington reminded all staff of the rules about who can be in the cab.
Recommendations (number and précis) *"What needs to change to reduce the likelihood of a recurrence?"*	2 recommendations were made to the Chief Executive of KiwiRail: • That the Chief Executive of KiwiRail liaise with Greater Wellington Regional Council to develop a long-term strategy for the metropolitan rail system, with a view to identifying and addressing the current safety issues with the track and signalling infrastructure in the Wellington Station area. • That the Chief Executive of KiwiRail conduct a review of current arrangements and take any opportunities it can to further reduce the risk of train operations in the area until a more suitable longer-term solution can be made.
Response	KiwiRail accepted both recommendations.

Aviation inquiry *AO-2016-006: Eurocopter AS350-B2, ZK-HYY, Collision with terrain during scenic flight, Mount Sale, near Arrowtown, 12 September 2016*

Event type	**Collision with terrain**
Safety issues *"What contributed to the occurrence, or might contribute to another occurrence?"*	1 safety issue was identified: • The operator had had four serious landing accidents in three years. While there were some similarities in the circumstances, the factors for most of these accidents were not determined conclusively by the Commission's inquiries or by the operator's internal investigations.
Findings (number) *Greater ≈ more complex*	8
Key lessons (number and précis) *"What did we identify that others should take heed of to avoid it happening to them?"*	2 key lessons were identified: • Human factors can have both positive and negative effects on situational awareness. It is important for pilots to remain vigilant for changes in environmental conditions. • The loss of the emergency locator transmitter antenna during the break-up sequence demonstrated once again that an alternative means of independent, real-time flight following would be beneficial in respect of search and rescue. It is prudent to use a flight-following service or facility where possible.
Safety actions (number and précis) *"What has been done while the inquiry's been underway that's removed the need for a relevant recommendation?"*	1 safety action has been taken: • The Helicopter Line advised that online human factors training had been recently undertaken for operational personnel. Further training was facilitated in early 2017 by an external consultant, who developed and delivered a programme tailored to the operation.
Recommendations (number and précis) *"What needs to change to reduce the likelihood of a recurrence?"*	1 recommendation was made to the Director of Civil Aviation: • To include the safety issue of helicopter operational culture in the Civil Aviation Authority's current 'sector risk profile' review. 1 recommendation was made to the Chief Executive of the Helicopter Line: • To review, in consultation with the Civil Aviation Authority, The Helicopter Line's safety management system audit process to ensure that its safety policy, safety assurance, risk management and promotion of safety are sound.
Response	Both recommendations were accepted. The Civil Aviation Authority advised that its Part 135 sector risk profile (SRP), first published in 2015, had already identified culture as a risk. In a revised version, published in June 2018,[61] the profile refers (p.23) to 'poor operator safety culture' and 'complacency towards changing safety management expectations' among the nine risk themes. This recommendation is now closed. The Helicopter Line advised it had opened discussion on this matter with Civil Aviation Authority and is implementing the review.

[61] The risk profile is available here on the Civil Aviation Authority's website: https://www.caa.govt.nz/assets/legacy/Safety_Reports/srp-part-135-2018.pdf

Maritime inquiry *MO-2017-201: Passenger vessel* L'Austral *contact with rock Snares Islands, 9 January 2017*

Event type	**Contact with rock**
Safety issues *"What contributed to the occurrence, or might contribute to another occurrence?"*	3 safety issues were identified: • The voyage planning for the time in the Snares Islands and the standard of bridge resource management on the bridge leading up to the contact did not meet the IMO (International Maritime Organization) standards or follow the guidelines published in other leading industry publications. • The operation of *L'Austral's* ECDIS (electronic chart display and information system) did not meet good practice as defined in the IMO guidance or the standards set out in the operator's safety management system. • The Department of Conservation had insufficient maritime expertise applied to assessing the risks to ships and the environment.
Findings (number) *Greater ≈ more complex*	9
Key lessons (number and précis) *"What did we identify that others should take heed of to avoid it happening to them?"*	3 key lessons were identified: • ECDIS is a valuable aid to navigation. However, mariners need to understand fully and be familiar with all aspects of the system, otherwise relying on the ECDIS as a primary means of navigation can contribute to, rather than prevent, accidents. • Every part of a ship's voyage must be planned, and all members of the bridge team be fully familiar with and agree to the plan. This is a cornerstone of good bridge resource management. • Good bridge resource management relies on a culture where challenge is welcomed and responded to, regardless of rank, personality or nationality.
Safety actions (number and précis) *"What has been done while the inquiry's been underway that's removed the need for a relevant recommendation?"*	3 safety actions have been taken: • A notice to mariners has been published by Land Information New Zealand alerting mariners to the existence of an obstruction off Alert Stack, until a full survey can be conducted. • The presumed location of the obstruction off Alert Stack has been added to all paper and electronic charts. • Land Information New Zealand have published two official electronic navigation charts that cover the Snares Islands.
Recommendations (number and précis) *"What needs to change to reduce the likelihood of a recurrence?"*	1 recommendation was made Director-General of the Department of Conservation: • That, given the potentially harsh and sensitive environment in the sub-Antarctic islands and the likelihood that shipping activity will increase in future, a suitably qualified person is appointed to manage the safety of navigation in the sub-Antarctic islands. 2 recommendations were made to the operator (the Directeur D'exploitation at Compagnie du Ponant): • To review the safety management system on board *L'Austral* and upgrade it to ensure that the standards of voyage planning, the standards of navigation and the level of bridge resource management met the requirements of the International Maritime Organization and followed the guidelines in leading industry publications. • To review the procedures for the setting up, training in and ongoing support for ECDIS systems on all of its ships, and ensure that all comply with mandatory requirements and that the ships' crews are fully conversant with good industry practice for the use of ECDIS.

Response	All recommendations were accepted. The Department of Conservation advised it intended to contract a qualified person to manage the safety of navigation in the Sub-antarctic Islands. Ponant advised it had reviewed its safety management and ECDIS systems and was in the process of training its personnel.

Maritime inquiry *MO-2016-202 Passenger ship,* Azamara Quest*, contact with Wheki Rock, Tory Channel, 27 January 2016*

Event type	**Contact with rock**
Safety issues *"What contributed to the occurrence, or might contribute to another occurrence?"*	3 safety issues were identified. • The standard of bridge resource management on board the *Azamara Quest* did not meet the requirements of the company's safety management system, or the standards in the various International Maritime Organization publications. • The port company allowing its pilots to use transits made on the pilot launch count towards the requirements of Port Marlborough's Pilot Training and Proficiency Plan created a risk of pilots not being sufficiently current to pilot large ships through Tory Channel. • Port Marlborough's port risk assessment and Marlborough District Council's harbour risk assessment could not be easily integrated, making it difficult to have one integrated risk assessment for the harbour.
Findings (number) *Greater ≈ more complex*	7
Key lessons (number and précis) *"What did we identify that others should take heed of to avoid it happening to them?"*	1 key lesson was identified: • Safe navigation in pilotage waters is a shared task of the bridge team and the pilot. This accident highlights the importance of a comprehensive pilot/master exchange of information and ensuring it is communicated to the rest of the bridge team.
Safety actions (number and précis) *"What has been done while the inquiry's been underway that's removed the need for a relevant recommendation?"*	14 safety actions have been taken: Port Marlborough has: • Reviewed its Pilot Training and Proficiency Plan (the Plan) taking into consideration Urgent Recommendation MO-2016-202 issued by the Commission. • Been working with Harbourmaster on ways to address the problematic interface between the two risk assessments prior to the *Azamara* incident. • The Harbourmaster has been reviewing the Harbour Risk Assessment in conjunction with a marine risk consultant. • The Harbourmaster is in the process of writing an MoU [memorandum of understanding] to document this approach for the future. • The Port has invested in a software platform, Mango, which has essentially become the basis of the Port's SMS [safety management system], allowing it to build a marine safety management system based on controlled and structured information. • The Harbourmaster has access to the Port SMS and has been invited to audit the system. The next stage is to provide the Harbourmaster with remote log-in access; this will be completed shortly. • The introduction of Mango has also facilitated improvements to monthly reporting. Pilot currency and training records are now easily accessible and

	are reported on a monthly basis to senior management, the Port's Board of Directors and the Harbourmaster. The Marlborough District Council: • The harbour master has asked a marine risk consultant to put together a proposal to carry out a risk assessment of the operational risks that relate to the provision of pilotage services. • Where specific risk assessments are undertaken to assess a particular ship and/or transit PMNZ [Port Marlborough] and Marlborough District Council will follow a predefined and agreed process following the MNZ guidelines on Risk Assessment. • Revision of the Marlborough District Council Harbour Risk Assessment (underway). • Revision of the Marlborough Navigation Safety Bylaw (underway). • Revocation of all Harbourmaster directions and issuance of a new Harbourmaster directions to address shipping risk in Marlborough. • Revision of the Pilot Exemption Training Plan (underway). • Full review of the Marlborough District Council Maritime SMS so as to capture all of the above changes (aim to complete this year).
Recommendations (number and précis) *"What needs to change to reduce the likelihood of a recurrence?"*	1 recommendation was made to the Chief Executive of Marlborough District Council: • Before allowing cruise ships to use Tory Channel in future, to review its harbour risk assessment for the safe navigation of ships through Tory Channel, and in doing so consider the safe navigation of cruise ships through Tory Channel as a separate risk. 1 recommendation was made to the Director of Maritime NZ: • To review Port Marlborough's Port Safety Management System and ensure that it has appropriate procedures in place to meet the requirements of its Pilot Training and Proficiency Plan and that the plan meets the intent of Maritime Rules Part 90: Pilotage. *These were urgent recommendations issued in August 2016.*
Response	The Marlborough District Council advised it had noted the recommendation but sought clarification of its intent. The Council agreed that the generic risk controls it had already identified do not specifically address cruise ships, and that this is a shortcoming of the existing risk assessment that will be addressed, but it considered the risks/hazards are already documented. Maritime NZ accepted the recommendation and advised it was working with Marlborough District Council to ensure clarity in relation to pilot currency.

Rail inquiry *MO-2017-102: Signalling irregularity, Wellington Railway Station, 3 April 2017*

Event type	**Signalling irregularity**
Safety issues *"What contributed to the occurrence, or might contribute to another occurrence?"*	2 safety issues were identified. • The process for upgrading the signal box display had not ensured that the mimic screen matched the physical track layout, and had not detected the absence of an interlock to prevent the signallers setting the points to a configuration over which it was not possible for rail traffic to travel. • The signallers lacked some familiarity with the physical layout and equipment capabilities in the Wellington yard that they were controlling.
Findings (number) *Greater ≈ more complex*	6
Key lessons (number and précis) *"What did we identify that others should take heed of to avoid it happening to them?"*	2 key lessons were identified: • When changes are made to safety-critical systems, the new systems should be fully tested for correct functionality, and the users of the systems should be trained in and familiar with them. • Personnel controlling the movement of rail traffic should follow procedures rather than make assumptions regarding the status of signalling equipment.
Safety actions (number and précis) *"What has been done while the inquiry's been underway that's removed the need for a relevant recommendation?"*	3 safety actions have been taken. KiwiRail has: • corrected the mimic display within 24 hours of the event. • installed in the Wellington signal box a method of interlocking points levers to prevent a reoccurrence • put in place enhanced auditing procedures for signal box personnel consistent with those for train controllers
Recommendations (number and précis) *"What needs to change to reduce the likelihood of a recurrence?"*	2 recommendations were made to the Chief Executive of KiwiRail: • To review KiwiRail's change management processes for modifying existing and building new safety-critical systems, and ensure that these change management processes include a full failure mode effect analysis and require functional testing before the new or modified systems are put into service. • To review KiwiRail's system for training and ongoing performance monitoring for signal box operators to ensure that they are fully familiar with the capabilities of the equipment and the layout of the yards they are controlling.
Response	KiwiRail advised that, in response to the first recommendation, it would enhance its process for scoping, design and testing of significant changes to safety significant control systems. In response to the second recommendation KiwiRail confirmed that it had reviewed the system for training and ongoing performance monitoring for the signal box operators and a programme of changes was underway.

Aviation inquiry *AO-2017-001: Eurocopter AS350 BA, ZK-HKW, Collision with terrain, Port Hills, Christchurch, 14 February 2017*

Event type	**Collision with terrain**
Safety issues	2 safety issues were identified.

"What contributed to the occurrence, or might contribute to another occurrence?"	• There may not be a good awareness within the helicopter industry of the additional risks involved with underslung load operations, particularly with the use of monsoon buckets during firefighting operations. • The operator did not have adequate systems available for the pilot to determine the actual all-up weight and balance of the helicopter for the firefighting operation, or to ensure that incidents such as the previous loss of a window were recorded, notified to the Civil Aviation Authority and investigated.
Findings (number) *Greater ≈ more complex*	5
Key lessons (number and précis) *"What did we identify that others should take heed of to avoid it happening to them?"*	4 key lessons were identified: • Flight in turbulent conditions requires care in order for the pilot to avoid exceeding an aircraft or equipment speed limitation. • It is important that operators and pilots understand the reasons for and observe the specific limitations applicable to each aircraft that they operate, as variations often exist between different variants of the same aircraft type. • All operational incidents should be recorded and investigated by the operator so that the causes can be identified and corrective or preventive actions taken. • Performance-impairing substances such as recreational drugs pose a serious risk to aviation safety. Their short- and long-term effects may be unpredictable and result in pilots being impaired when flying their aircraft.
Safety actions (number and précis) *"What has been done while the inquiry's been underway that's removed the need for a relevant recommendation?"*	2 safety actions have been taken. • The manufacturer, Airbus Helicopters, issued (and subsequently revised) Safety Information Notice No. 3170-S-00, on safe operations with underslung loads. • The head ranger who was acting as a deputy principal rural fire officer for the Christchurch City Council Rural Fire Authority advised: 'As part of our refresher training we will be highlighting the need to track and record these sorts of incidents [that occur during firefighting] and how to promulgate them to the correct people for the purposes of intervention or lessons learnt'.

Recommendations (number and précis)
"What needs to change to reduce the likelihood of a recurrence?"
	1 urgent recommendation was made to the Director of Civil Aviation in April 2017:
	• as a matter of urgency, use the interim report, a service letter from Airbus (Service Letter SL2527-25-05) and any other pertinent material available to disseminate to industry the lessons learned from accidents involving sling loads, in particular the use of monsoon buckets.
	1 recommendation was made to the chief executive of Way To Go Heliservices:
	• to review the company's internal quality assurance system to ensure that:
	  ○ there are robust systems in place for establishing the actual weight and balance of all company aircraft for all operations
	  ○ incidents and accidents are recorded, notified to the Civil Aviation Authority and investigated, and corrective actions are taken as appropriate
	  ○ pilots are fully aware of and observe the operating limitations of all the aircraft types and variants that they fly.

Response	Both recommendations were accepted. The recommendation to the Civil Aviation Authority was closed in May 2018.

Maritime inquiry *MO-2016-206: Capsize and foundering of the charter fishing vessel* Francie *with the loss of eight lives, Kaipara Harbour bar, 26 November 2016*

Event type	**Capsize and foundering**
Safety issues *"What contributed to the occurrence, or might contribute to another occurrence?"*	3 safety issues were identified. • A dedicated, formal process within Maritime NZ (MNZ) is needed for people to report their safety and security concerns. • Maritime rules specifying the types of lifejacket to be carried on commercial vessels are based only on how far the vessels may travel from the coast. They do consider factors making higher-specification lifejackets more appropriate. • It is possible people might not fully understand the design and capability of the various types of lifejacket available, or of the importance of wearing a lifejacket of the correct size and type.
Findings (number) *Greater ≈ more complex*	9
Key lessons (number and précis) *"What did we identify that others should take heed of to avoid it happening to them?"*	5 key lessons were identified: • Extreme caution must be exercised when crossing bars because sea conditions can change for the worse in a very short time. • Wearing a lifejacket significantly improves the chances of survival if a person unexpectedly finds themselves in the water. • When a person wearing a lifejacket unexpectedly finds themselves in the water, their chances of surviving are significantly improved if the lifejacket is of the appropriate type for the conditions and size of the person, and is fitted with a crotch strap. • The MNZ website has useful information about selecting the most suitable lifejacket, and how and when it should be worn. • Anyone concerned about the safety of any maritime activity should report it. This could help prevent accidents and save lives.
Safety actions (number and précis) *"What has been done while the inquiry's been underway that's removed the need for a relevant recommendation?"*	4 safety actions have been taken. • MNZ provides advice and guidance for commercial and recreational skippers on crossing bars, wearing lifejackets, and being a safe skipper. • MNZ provided funding for, and advertises on, MetService's marine weather app. • MNZ runs a lifejacket campaign in print and digital media. • Shortly after the *Francie* accident, MNZ officers engaged personally with the eight commercial operators known to cross the Kaipara Harbour bar, and discussed their procedures and processes to ensure they met best practice.
Recommendations (number and précis) *"What needs to change to reduce the likelihood of a recurrence?"*	4 recommendations were made to the Director of Maritime NZ: • To develop, implement and advertise a process where members of the public and the maritime community can report on maritime-safety-related concerns. • To review the current requirements for the carriage of lifejackets on commercial restricted-limit vessels, and use an appropriate mechanism to ensure that the required lifejackets are of an appropriate type for the type and place of operation. • To use an appropriate mechanism to make it mandatory for crotch straps to be fitted to lifejackets required on board commercial vessels that operate out of bar harbours and off exposed coastlines. • To continue to emphasise to recreational boat users the benefits of having crotch straps fitted to their lifejackets.

Response	Maritime NZ advised it already has a system in place to receive, record and act upon reports relating to maritime-safety-related concerns from various public sources. It noted that without the appropriate legal provisions Maritime NZ's ability to operate a confidential reporting process similar to that operated by the Civil Aviation Authority is constrained. However, it is committed to continuing to implement and advertise its existing process where members of the public and the maritime community can submit reports on maritime-safety-related concerns. We will actively promote the availability of this reporting process and look for opportunities to improve it where possible. Maritime NZ confirmed it would undertake a review of the current requirements for the carriage of lifejackets on commercial restricted-limit vessels, to ensure that these produce the best safety outcomes. The work would have to be prioritised against other work streams. Maritime NZ partially accepted the third recommendation. It stated it would undertake a review of the current requirements for the carriage of lifejackets on commercial restricted-limits vessels. The review would include a cost-benefit analysis, which would determine whether any further action would be taken. It accepted the fourth recommendation.

Aviation inquiry Interim report AO-2017-004: Forced landing into Porirua Harbour (Pauatahanui Arm), MBB BK117A-3 Helicopter, ZK-IED, 2 May 2017

Event type	**Forced landing**
Safety issues *"What contributed to the occurrence, or might contribute to another occurrence?"*	1 safety issue was identified. • Other aircraft previously operated by Helipro could have historical maintenance issues that could compromise aviation safety.
Findings (number) *Greater ≈ more complex*	N/A
Key lessons (number and précis) *"What did we identify that others should take heed of to avoid it happening to them?"*	N/A
Safety actions (number and précis) *"What has been done while the inquiry's been underway that's removed the need for a relevant recommendation?"*	1 safety action has been taken: • The Civil Aviation Authority issued a Continuing Airworthiness Notice to notify owners and operators of possible significant anomalies with the maintenance and engineering practices relating to certain aircraft.
Recommendations (number and précis) *"What needs to change to reduce the likelihood of a recurrence?"*	Nil

Aviation inquiry Interim report AO-2017-009: Boeing 787-9, registration ZK-NZE, Trent 1000-J2 engine failure near Auckland, 5 December 2017; and AO-2017-010: Boeing 787-9, registration ZK-NZF, Trent 1000-J2 engine failure, near Auckland, 6 December 2017

Event type	**Engine failures**
Safety issues *"What contributed to the occurrence, or might contribute to another occurrence?"*	2 safety issues were identified. • The manufacturer's model for predicting when a blade will fail is unreliable without operator-specific 'offsets' (adjustment for reduced life limits). The model cannot ensure that an engine with unmodified IPT (intermediate-pressure turbine) blades will be removed from service well before a blade fails. • Should an engine need to be shut down in flight, the remaining engine must be operated at a higher thrust level. If the remaining engine has unmodified IPT blades, there is an increased risk of that engine failing.
Findings (number) *Greater ≈ more complex*	N/A
Key lessons (number and précis) *"What did we identify that others should take heed of to avoid it happening to them?"*	N/A
Safety actions (number and précis) *"What has been done while the inquiry's been underway that's removed the need for a relevant recommendation?"*	5 safety actions have been taken: • At the time of the two incidents, no offset was applied to the CFL model predictions for the operator's engines because there was insufficient blade sample data. In response to the two incidents, the manufacturer introduced an offset for the operator's fleet and for other operators for which there was insufficient sample data. • In addition, EASA (the European Aviation Safety Authority) issued an emergency airworthiness directive requiring the 'de-pairing' of high-life engines, independently of the model predictions, to further reduce the risk of a double in-flight engine shutdown. • EASA subjected the model and the mandatory de-pairing of engines to ongoing review 'until full confidence in the … model is gained". • EASA advised that its monitoring of operations where twin-engined turbine powered planes fly a route where an alternative aerodrome is more than an hour away was being reviewed periodically with the engine manufacturer, with a greater focus following the two recent events. • The US Federal Aviation Administration (FAA) issued airworthiness directive (primarily in response to the different earlier issue arising from cracking in the compressor blades near the front of the engine) stating that the single-engine diversion time must not exceed 140 minutes. That action, in effect, also addressed the safety issue the Commission raised – of a potential dual in-flight engine shut-down for an aeroplane equipped with engines that have unmodified IPT blades.
Recommendations (number and précis) *"What needs to change to reduce the likelihood of a recurrence?"*	Nil

About our Kōwhaiwhai

The corporate and modal Kōwhaiwhai (Māori scroll designs) used on this website were commissioned from Sandy Rodgers (Ngati Raukawa, Tuwharetoa, MacDougal). The following explanations of the naming and design of the Kowhaiwhai are in her words.

Corporate: Te Ara Haumaru — The safe and risk-free path

In the process of naming this Kōwhaiwhai I thought carefully about the Transport Accident Investigation Commission's purpose and this image came to mind. The commission is a vehicle or vessel for seeking the knowledge to understand the reasons as to why transport accident tragedies occur and how to prevent them in the future. I saw it as a 'waka whai mārama (i te ara haumaru)'. 'Waka whai mārama' is 'a vessel (vehicle) in pursuit of understanding'. Waka in modern times means 'a form of transportation' a vehicle i.e. canoe, boat, car or train. Here, I have used 'waka' in a metaphoric sense to convey the principal function of the Transport Accident Investigation Commission. Mārama is derived from 'Te ao mārama' — The world of light. This refers to the separation of Rangitāne (Sky Father) and Papatūānuku (Earth Mother) by their son Tāne Māhuta (God of man and forests and everything that dwells within) which brought light and thus awareness into the world. 'Te ara' is 'the path' and 'haumaru' is 'safe or risk free'. So I saw the commission as a vessel for investigation in the pursuit of understanding in order to guide people down a safe and risk free path.

Within this Kōwhaiwhai I have used the eye motif to represent looking towards the future and watching the path for obstructions. There is an encased double koru design which is the mother and child. This is a symbol of protection, safety and guidance. The triple koru motif represents the three kete of knowledge of which Tāne Māhuta collected from the highest of the heavens in order to pass on their wisdom to mankind. The continual wave that passes through the entire design is the perpetual line of influence. The succession of humps represents the individual inquiries as they come and go.

I acknowledge Tāne Māhuta in the creation of this Kōwhaiwhai.

Aviation: Ngā hau e whā - The four winds

'Ngā hau e whā' is a term which is often used in the Māori language when talking about people coming together from the 'four corners' of Aotearoa. Literally translated it means 'the four winds' of which I imagine aircraft navigating through.

The design represents the sky, the clouds, the winds and our movement through them. There is a manu (bird) form soaring through the sky which represents the various aircraft that move through Aotearoa's 'long white cloud'. The letter 'A' is also present in the design which literally stands for the word 'Aviation', the mode of transport of which this design was created to represent.

I acknowledge Ranginui (Sky father) and Tāwhirimātea (God of wind) in the creation of this Kōwhaiwhai.

Rail: Rerewhenua - Flowing across the land

'Rere' is to flow or fly. 'Whenua' is the land. I see the movement of trains across Aotearoa as a smooth, fluid movement passing over the land.

The design represents the actual rail tracks over which the trains are travelling. The koru forms represent the earth, land and flora in which the train will pass over/through. The letter 'R' is also present in the design which literally stands for the word 'Rail', the mode of transport of which this design was created to represent.

I acknowledge Papatūānuku (Earth Mother) and Tāne Mahuta (God of man and forests and everything that dwells within) in the creation of this Kōwhaiwhai.

Marine: Ara Wai — Waterways

'Ara Wai' represents the various bodies of water within Aotearoa of which the many different types of ships will navigate their way through.

The sections of waves that flow across the entire design represent the different bodies of water. The 'V' shape is the prow of a ship as it passes through the water creating the wake as it moves. The letter 'M' is also present in the design which literally stands for the word 'Marine', the mode of transport of which this design was created to represent.

I acknowledge Tangaroa (God of the sea) in the creation of this Kōwhaiwhai.

TAIC Annual Report 2018

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