Australian Government
Australian Transport Safety Bureau

Safety issue investigation into *Queensland Coastal Pilotage*

Investigation

ATSB Transport Safety Report
Marine Safety Issue Investigation
282-MI-2010-011
Final

Australian Government

Australian Transport Safety Bureau

ATSB TRANSPORT SAFETY REPORT

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MI-2010-011
No. 282
Final

Independent safety issue investigation into

Queensland Coastal Pilotage

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Abstract

On 16 December 2010, the ATSB released the findings of its investigation of the 2009 grounding of the piloted tanker *Atlantic Blue* in the Torres Strait. The Australian Maritime Safety Authority (AMSA) indicated that it was concerned that these findings might point to broader systemic issues affecting the safety of coastal pilotage operations. Notably, AMSA advised that it felt the ATSB was ideally placed to investigate these issues given the ATSB's independence and investigative powers and that it would be pleased to see the ATSB investigate this matter. The findings of previous ATSB investigations and a number of coastal pilotage reviews also indicated that there may be safety issues. Consequently, the ATSB initiated a systemic safety issue investigation into Queensland coastal pilotage.

The ATSB obtained information for the investigation through a survey of all 82 licensed coastal pilots and submissions from 15 stakeholders, including the two main pilotage providers. Further evidence was obtained by interviewing 22 pilots and meeting all three providers, AMSA and other key stakeholders. Other material taken into account by the investigation included past and present issues of Marine Orders Part 54 (MO 54), the regulatory instrument governing coastal pilotage, as well as previous reviews of the coastal pilotage regime.

The report identifies that under successive issues of MO 54, no organisation(s), including the pilotage providers, has been made clearly responsible and held accountable for managing all the safety risks associated with pilotage operations. This resulted in the effective devolution of responsibility for managing the most safety critical aspects of pilotage to the individual pilots. The report also identifies systemic issues with the potential to affect future safety relating to pilot training, fatigue management, risk event reporting, check pilotage and the utilisation of coastal vessel traffic services. Action has been taken by AMSA to address these safety issues. The ATSB has issued three recommendations to AMSA and two recommendations to each provider to take action to fully address four safety issues.

THE AUSTRALIAN TRANSPORT SAFETY BUREAU

The Australian Transport Safety Bureau (ATSB) is an independent Commonwealth Government statutory agency. The Bureau is governed by a Commission and is entirely separate from transport regulators, policy makers and service providers. The ATSB's function is to improve safety and public confidence in the aviation, marine and rail modes of transport through excellence in: independent investigation of transport accidents and other safety occurrences; safety data recording, analysis and research; fostering safety awareness, knowledge and action.

The ATSB is responsible for investigating accidents and other transport safety matters involving civil aviation, marine and rail operations in Australia that fall within Commonwealth jurisdiction, as well as participating in overseas investigations involving Australian registered aircraft and ships. A primary concern is the safety of commercial transport, with particular regard to fare-paying passenger operations.

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

Purpose of safety investigations

The object of a safety investigation is to identify and reduce safety-related risk. ATSB investigations determine and communicate the safety factors related to the transport safety matter being investigated. The terms the ATSB uses to refer to key safety and risk concepts are set out in the next section: Terminology Used in this Report.

It is not a function of the ATSB to apportion blame or determine liability. At the same time, an investigation report must include factual material of sufficient weight to support the analysis and findings. At all times the ATSB endeavours to balance the use of material that could imply adverse comment with the need to properly explain what happened, and why, in a fair and unbiased manner.

Developing safety action

Central to the ATSB's investigation of transport safety matters is the early identification of safety issues in the transport environment. The ATSB prefers to encourage the relevant organisation(s) to initiate proactive safety action that addresses safety issues. Nevertheless, the ATSB may use its power to make a formal safety recommendation either during or at the end of an investigation, depending on the level of risk associated with a safety issue and the extent of corrective action undertaken by the relevant organisation.

When safety recommendations are issued, they focus on clearly describing the safety issue of concern, rather than providing instructions or opinions on a preferred method of corrective action. As with equivalent overseas organisations, the ATSB has no power to enforce the implementation of its recommendations. It is a matter for the body to which an ATSB recommendation is directed to assess the costs and benefits of any particular means of addressing a safety issue.

When the ATSB issues a safety recommendation to a person, organisation or agency, they must provide a written response within 90 days. That response must indicate whether they accept the recommendation, any reasons for not accepting part or all of the recommendation, and details of any proposed safety action to give effect to the recommendation.

The ATSB can also issue safety advisory notices suggesting that an organisation or an industry sector consider a safety issue and take action where it believes appropriate, or to raise general awareness of important safety information in the industry. There is no requirement for a formal response to an advisory notice, although the ATSB will publish any response it receives.

TERMINOLOGY USED IN THIS REPORT

Occurrence: accident or incident.

Safety issue investigation: An investigation focusing on an aspect of the transport system that has been associated with potential concern (rather than focussing on a specific accident or incident). It examines the adequacy of the existing risk controls related to the topic of interest, and the reasons why the controls may or may not be appropriate.

Safety factor: an event or condition that increases safety risk. In other words, it is something that, if it occurred in the future, would increase the likelihood of an occurrence, and/or the severity of the adverse consequences associated with an occurrence. Safety factors include the occurrence events (e.g. engine failure, signal passed at danger, grounding), individual actions (e.g. errors and violations), local conditions, current risk controls and organisational influences.

Other key finding: any finding, other than that associated with safety factors, considered important to include in an investigation report. Such findings may resolve ambiguity or controversy, describe possible scenarios or safety factors when firm safety factor findings were not able to be made, or note events or conditions which 'saved the day' or played an important role in reducing the risk associated with an occurrence.

Organisational influences: The conditions that establish, maintain or otherwise influence the effectiveness of an organisation's risk controls.

Safety issue: a safety factor that (a) can reasonably be regarded as having the potential to adversely affect the safety of future operations, and (b) is a characteristic of an organisation or a system, rather than a characteristic of a specific individual, or characteristic of an operational environment at a specific point in time.

Risk level: The ATSB's assessment of the risk level associated with a safety issue is noted in the Findings section of the investigation report. It reflects the risk level as it existed at the time of the occurrence. That risk level may subsequently have been reduced as a result of safety actions taken by individuals or organisations during the course of an investigation.

Safety issues are broadly classified in terms of their level of risk as follows:

- **Critical** safety issue: associated with an intolerable level of risk and generally leading to the immediate issue of a safety recommendation unless corrective safety action has already been taken.
- **Significant** safety issue: associated with a risk level regarded as acceptable only if it is kept as low as reasonably practicable. The ATSB may issue a safety recommendation or a safety advisory notice if it assesses that further safety action may be practicable.
- **Minor** safety issue: associated with a broadly acceptable level of risk, although the ATSB may sometimes issue a safety advisory notice.

Safety action: the steps taken or proposed to be taken by a person, organisation or agency in response to a safety issue.

EXECUTIVE SUMMARY

Background

On 16 December 2010, the ATSB released the final report of its safety investigation into the February 2009 grounding of the piloted tanker *Atlantic Blue* in the Torres Strait. The report identified deficiencies in the safety management of Queensland coastal pilotage operations, similar to the safety issues identified by the ATSB in previous safety investigations. In response to the ATSB's findings, the Australian Maritime Safety Authority (AMSA), in its capacity as the coastal pilotage safety regulator, indicated its concern that there might be systemic issues affecting the safety of coastal pilotage operations, arising in particular, from the impact of commercial competitive pressures. Furthermore, AMSA felt that, given the ATSB's independence and investigative powers, the ATSB was ideally placed to investigate these issues and indicated that it would be pleased to see the ATSB investigate this matter. Consequently, the ATSB initiated a systemic safety issue investigation into Queensland coastal pilotage.

Queensland coastal pilotage

In 1991, Australia introduced a system of compulsory coastal pilotage to protect the sensitive Great Barrier Reef (GBR) environment which lies in Queensland's coastal waters. The GBR and Torres Strait are both recognised as particularly sensitive sea areas (PSSA).[1] To protect these PSSAs, Australia requires large ships[2] to use the services of an AMSA licensed coastal pilot[3] when navigating the Torres Strait, the Inner Route of the GBR north of Cairns (Inner Route), the Hydrographers Passage off Mackay, and the Whitsunday Islands area.

The coastal waters of Queensland are the only area in Australia where coastal pilotage takes place. All coastal pilotages are undertaken by a single pilot. Depending on a ship's speed, an Inner Route transit takes between 25 and 40 hours, making it the longest single-handed pilotage in the world. Transits of the Torres Strait and the Hydrographers Passage, the two other main routes, take 8 to 10 hours and 5 to 7 hours, respectively.

In July 1993, when AMSA took over responsibility for coastal pilotage from the Queensland Government, an annual average of about 2,300 piloted ships transited the three main pilotage routes. In 2010, more than 4,700 piloted ships transited these routes. Piloted traffic in the region has, therefore, doubled in less than 20 years as the economies of Queensland and Australia have expanded. Shipping traffic in the region is forecast to increase at a greater rate with traffic in the

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[1] An area of the marine environment that needs special protection through action by the International Maritime Organization (IMO) because of its significance for recognised ecological, socio-economic or scientific attributes where such attributes may be vulnerable to damage by international shipping activities.

[2] All ships of 70 m or more in length and all types of loaded tankers, irrespective of size.

[3] A marine pilot's local area knowledge and skills allow safer navigation of the area. In conducting a pilotage, the pilot effectively has control of the ship's navigation but legally only provides relevant advice to its master who remains responsible and always in command of the ship. The pilot is not a member of the ship's crew and is employed to provide services in a specific area.

southern part of the GBR expected to double over the 10 years to 2020.[4] A proportion of that increased traffic will transit the compulsory coastal pilotage areas and piloted traffic in the region will probably increase at a faster rate than seen since 1993.

Since July 1993, there have been five collisions and nine groundings (including the grounding of *Atlantic Blue*) during a coastal pilotage. All of those incidents were mainly the result of the inadequate management of the pilotage or navigation and not due to extraordinary circumstances beyond the control of the pilot or crew. None of the incidents resulted in serious pollution or loss of life and damage to the ships involved was limited (i.e. these incidents were not classified as 'very serious casualties'[5]).

Any serious shipping incident in the GBR or Torres Strait can have potentially severe and unacceptable consequences in these environmentally sensitive areas. In 2012, a United Nations report focused the attention of the international and Australian community on risks to the GBR environment.[6] The report documented 'extreme concern' over increased developments, including ports and infrastructure, in and around the GBR. Recommendations included that Australia sustain and increase efforts and resources to conserve the GBR environment, and that new developments outside existing long-established major port areas not be permitted.

Coastal pilotage is a critical defence against a shipping incident about which other defences within the broader safety system to protect the GBR and Torres Strait are centred. Other measures, such as vessel traffic services and a comprehensive system of navigational aids, complement and assist with the coastal pilotage task. Coastal pilots oversee the passage of large cargo or passenger ships along the long and navigationally challenging shipping routes in areas which are prone to strong winds and tides. The ships are often constrained by their draught[7] and the proximity of shoal waters means there is little margin for navigational error. Coastal pilots have a key role in mitigating a critical risk to Australia's most sensitive marine environment and therefore it is essential that the service provided by this small cadre of specialist coastal navigators is as safe and effective as it can be.

ATSB investigation

The ATSB safety issue investigation into Queensland coastal pilotage included a 92 question survey of all 82 licensed coastal pilots in January 2011. The survey questions were based on confidential, de-identified, pilot-reported safety concerns supplied by AMSA, matters identified in past reviews, various aspects of safety management and other relevant issues. Collectively, the pilots' survey responses were a principal source of evidence for the investigation.

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4 AMSA web page <www.amsa.gov.au/Shipping_Safety/REEFVTS/ExtendingREEFVTS.asp> (27 July 2011).

5 The IMO defines 'very serious casualties' as those that involve total loss of the ship, loss of life or severe pollution. 'Serious casualties' are those that do not qualify as 'very serious casualties' and involve incidents such as a collision, grounding, contact, fire or explosion, and result in rendering the ship unfit to proceed, pollution and/or breakdown necessitating towage or shore assistance.

6 United Nations Educational, Scientific and Cultural Organization (UNESCO), World Heritage Committee, 36th session, *Mission Report - Great Barrier Reef (N154),* Paris, 14 June 2012.

7 Draught is the measure of how deep a ship is floating in water and is the vertical distance between its keel and the waterline.

Following the survey, 22 pilots were interviewed by the investigation team. The ATSB held meetings with all key stakeholders, including AMSA and the three private companies authorised by AMSA as 'pilotage providers' who assign licensed pilots to ships. The ATSB also obtained pilotage related records from AMSA and the pilotage providers. Fifteen stakeholders made submissions at the outset of the investigation.

A draft investigation report, identifying the safety issues, was prepared using the evidence collected and, in December 2011, was provided to all stakeholders for comment. Eighty-nine submissions on the draft report were received from pilots and organisational stakeholders. Additional evidence and information in the submissions was used to finalise the investigation report.

Coastal pilotage services

There are three providers of coastal pilotage services operating in direct competition with each other. The two larger pilotage providers, Australian Reef Pilots and Torres Pilots, service all of the pilotage areas and, between them, have 95 per cent of the market share. Both of these companies were formed in 1993 from the former Queensland Government regulated monopoly pilot service when economic regulation was discontinued, thus allowing competition in coastal pilotage. Hydro Pilots, the smallest provider, was established in 1996 and services only the Hydrographers Passage.

At the time of the ATSB survey, all coastal pilots were self-employed and exclusively contracted to either Australian Reef Pilots or Torres Pilots with the exception of two pilots contracted to Hydro Pilots. The three pilotage providers compete with each other for pilot bookings from ship owners or their agents. The providers assign their contractor pilots to booked ships and arrange pilot transfers using boats or helicopters.[8] Hence, the actual pilotage service on any ship is provided by an individual contractor pilot.

Marine Orders Part 54

From 1993 onward, the regulatory framework for the safety of coastal pilotage operations has been contained in five successive issues of Marine Orders Part 54 (MO 54), regulations formed under the Commonwealth's *Navigation Act 1912* and administered by AMSA.

In 2001, issue 3 of MO 54 introduced the requirement for a pilotage provider to implement a safety management system (SMS) for its operations and areas of responsibility. A provider was defined as 'a person who assigns or allocates a pilot' to a ship's transit, consistent with their existing role and functions (to manage pilot bookings, assign pilots and arrange pilot transfers). Consequently, provider SMSs pertained only to their operations, primarily assigning pilots to ships and pilot transfer services. The SMSs did not contain any specific content directly related to the actual pilotage task (e.g. standard operating procedures).

Also under MO 54 (issue 3), the responsibility for the safe conduct of a pilotage was specifically assigned to an individual pilot, consistent with the existing roles of pilots and providers. This reinforced the situation where each pilot had a unique piloting system including procedures and passage plans. While similar, no two

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[8] Each provider operates its own transfer service which the provider's pilots must use.

pilots' systems were the same. Since 2003, the adequacy of these different piloting systems, and the competency of pilots, has been assessed by their peers who are AMSA-licensed 'check pilots'.

In 2006, issue 4 of MO 54 superseded issue 3 but largely retained the features described above. In December 2010, when the ATSB initiated this investigation, issue 4 of MO 54 was in force. Its provisions have largely shaped coastal pilotage operations until the time of the investigation and the survey in 2011 and hence, issue 4 directly relates to the subjects discussed in the investigation report.

On 1 July 2011, more than 6 months after the ATSB investigation started, issue 5 of MO 54 came into force. While issue 5 has a number of revised provisions relating to important areas such as SMSs and pilot boat standards, it still does not clearly assign the responsibility for the overall management of safety risks associated with pilotage to any organisation(s). Issue 5 was to be reviewed from 1 July 2012 (i.e. 12 months after its implementation).

The safety management of coastal pilotage differs from the modern, systems-based approach used in many Australian ports, where an SMS has been introduced to cover all safety aspects of pilotage operations. These SMSs have been implemented by the organisation responsible for the day-to-day management of pilotage in the port, i.e. a 'pilot organisation'. Their objective is to reduce all of the identified safety risks associated with the port's pilotage operations to as low as reasonably practicable and support pilots in the performance of their safety critical task. Consequently, the SMSs aim to provide risk-analysed, best-practice procedures, including standard passage plans for their port/pilotage areas, i.e. a 'pilotage SMS'. The adequacy of these port pilotage SMSs is currently assessed through internal and external audits, in some cases by safety regulators, and reviews of the SMSs are regularly undertaken for continuous improvement.

However, in coastal pilotage, it is the individual pilots and check pilots, rather than the providers contracting them, who have responsibility for the safe management of pilotage operations. The providers mainly manage the bookings and logistics of pilotage services and there is no pilot organisation(s) identifying or managing all the safety risks associated with the actual pilotage task. The absence of a pilot organisation(s) defines the culture within the coastal pilotage sector, including working relationships, and impacts all pilotage related operations.

Standard passage plans

When this investigation was initiated, there were no standard passage plans or standard procedures for the various pilotages in the GBR and Torres Strait region. Hence, ship's crews could not effectively prepare for a pilotage as the passage plan prepared by the crew in advance often had to be changed to reflect the individual plan of a pilot after he boarded. The same pilotage using a different pilot can also vary significantly. Each pilot employs different practices in the overall conduct of the pilotage and may provide different guidance, take different rest breaks during the long pilotages and have differing expectations of the crew.

In July 2011, AMSA posted an industry passage plan (IPP) model on its website to address the issue of non-standard passage plans. Issue 5 of MO 54 requires that all pilots must prepare detailed passage plans that use the IPP model and carry hard and electronic copies of the model plan. Ships can also request pilotage providers for the latest edition of the IPP or download an electronic copy via the internet.

Coastal pilot working arrangements

Coastal pilots are remunerated a set amount (depending on the pilotage area/route) for each discrete pilotage they perform, regardless of the time they are away from home on duty. They have no paid leave or other entitlements. Hence, the greater the number of pilotages performed by a pilot, the more the pilot will earn. Faster ships, higher paying pilotage routes and minimal periods between consecutive pilotages offer a better financial return for a pilot's time. This remuneration framework has the potential to create a strong incentive to complete a pilotage quickly rather than as safely as possible. In the survey, half of the pilots asserted that financial disadvantage conflicts with the importance they aim to give to safety, largely because they are actively competing for work with other pilots contracted to the same provider.

A pilot's fee for a pilotage is decided and set by the pilotage provider, with no input from the pilot. There is no set hourly or daily wage rate for coastal pilots (through regulation or otherwise). The majority of pilots have indicated they would prefer to be employees rather than contractors for the certainty and security of income and conditions. In general, the survey and submissions indicated a high level of discontent amongst pilots. At the time of the survey, five licensed pilots had effectively been dismissed by their provider by not being allocated work or offered a valid contract. In the 12 months following the survey, a further eight pilots left coastal pilotage for other employment and at least five others retired.

Pilot recruitment and training

Trainee pilots are recruited by the pilotage providers if they meet AMSA's requirements for a trainee pilot licence. These requirements include qualifications as a ship's master and recent seagoing experience. However, experience in the GBR or Torres Strait regions (local area experience) has not been a requirement since 1993, and most trainee pilots recruited after 2000 had little or no local area experience when they started.

Once issued with a trainee pilot licence, trainees fund most of their own training and receive reduced or no remuneration during that time. The providers see their role as merely providing a trainee pilot with the opportunity to complete the AMSA training program. The program is based on 'self-learning' by observing different pilots and generally requires a trainee to complete at least four transits of a pilotage area with a check pilot. At least one of the four transits must be fully assessed in accordance with the check pilot system.

In the absence of a pilotage SMS, including standard procedures and passage plans, a trainee pilot tends to develop a piloting system similar to but not necessarily the same as those he has observed. Initial training is not augmented with bridge simulator courses focused on coastal pilotage and there is no training in the use of electronic charting or equivalent systems.

Trainee pilots usually obtain a restricted licence in a couple of months (generally after completing a few more transits than the minimum of four). They can then pilot independently and earn an income. During the year or so that it usually takes them to obtain a full licence (without ship type or draught restrictions), new pilots gain more local area experience and develop their skills and individual piloting systems. For a new pilot with little or no previous local area experience, it is the transits undertaken in the first couple of years of piloting which provide the experience,

knowledge and skill necessary for a local knowledge expert to operate confidently in a range of conditions and areas, particularly in confined passages.

Ongoing training consists of a mandatory course (usually 3 to 5 days) approved by AMSA for coastal pilot professional development once every 4 years. Both main pilotage providers pay the course fee for mandatory professional development courses for their contracted pilots while the pilots cover other costs, such as their travel and accommodation.

Pilot fatigue

The long coastal pilotages, particularly in the Inner Route, mean that pilot fatigue is a significant risk. A fatigue management plan has been implemented by AMSA based on mandatory rest periods before pilotage and between tours of duty, and minimum 'leave' periods. Pilots are expected to self-manage their fatigue during the actual pilotage where AMSA acknowledges that they need to rest, particularly during the long Inner Route pilotage.

The fatigue management plan does not prescribe the use of any method for predicting potential fatigue levels (best and worst case scenarios) nor is there measurement or assessment of actual levels of fatigue or the amount and quality of sleep that a pilot is able to have. Conditions during a pilotage, such as weather, traffic and the ship's crew or equipment, may not allow the pilot to get the expected rest. In addition, a pilot's travel and transfer time before boarding a ship have sometimes been included in the mandated rest periods, contrary to fatigue plan requirements.

The ATSB survey, pilot interviews and submissions indicated that pilot transfer services are a major source of discontent amongst most pilots because of long waiting times due to the scheduling of pilot boat or helicopter transfers and/or the condition of pilot boats.[9] Transfers in the Torres Strait and Hydrographers Passage involve long distances and are influenced by factors such as the weather and transfer scheduling. In these areas, transfer times of 2 hours are common and, at times, can be much more. Scheduling transfers to carry more than one pilot minimises the provider's costs but may also lead to additional waiting time for pilots. The survey suggested that travel and transfer time significantly affect the adequacy of a pilot's rest before a pilotage.

The check pilot system

In the absence of a pilotage SMS promulgating uniform practices and procedures, AMSA's check pilot system is relied on to assure safe pilotage standards (instead of a holistic SMS that includes a check pilot system). The AMSA system combines a pilot competency assessment, the usual function of a check pilot system, with an audit of the individual pilot's system of pilotage against certain AMSA-defined criteria. With so many different piloting systems, including the check pilot's own system, it is difficult for a check pilot to make objective and consistent assessments. Furthermore, AMSA's guidance states that an assessment is only the check pilot's opinion, not an indication of the assessed pilot's competence or capability.

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[9] In recent years, AMSA audits have indicated that the boats have generally met AMSA's safety standards.

Although check pilots are effectively acting as AMSA's delegates in the process, they are remunerated by the provider to assess contracted pilots. Assessing a pilot as 'overall unsatisfactory' (i.e. fail) can severely affect the failed pilot's livelihood and disrupt the provider's operations.

In case of an overall unsatisfactory assessment of an individual pilot, AMSA has a formal process to review the check pilot's assessment. However, in the 550 check pilot assessments conducted until 2011, an AMSA review had never taken place because no pilot had been assessed as 'overall unsatisfactory'. Analysis of these assessments by the ATSB showed that there can be a significant number of unsatisfactory findings with respect to different criteria without an 'overall unsatisfactory' rating. Furthermore, while a wealth of information has been gathered through the assessments, it has not been used by anyone to continuously improve pilotage practices or analyse the training needs of coastal pilots.

Risk event and incident reporting

Reporting of risk events, near misses and incidents is critical to understanding and mitigating the risks to the safety of navigation in the GBR and Torres Strait. The survey of pilots showed that the number of grounding or collision risk events which they claimed to have experienced was about 10 times the number of reports of such events in records held by AMSA and the providers. The main reasons given by pilots for under-reporting risk events are personal disadvantage, lack of corrective action and financial or organisational pressure; all these reasons largely related to their providers.

Another concern is the claimed incidence of collision risk events between piloted ships. The survey indicated that such high risk events occurred about once a month and usually involved the pilots of competing pilotage providers. A number of the pilots' comments indicated that a lack of understanding each other's intentions and/or communication was a factor in these cases due to an underlying reluctance to contact a pilot from a competing provider. This may be attributed to the fact that some pilots consider other pilots, including those contracted to their own provider, as competitors.

Great Barrier Reef and Torres Strait Vessel Traffic Service (REEFVTS)

The comments of pilots (in the survey, at interview and in submission) indicated that, in general, they were not aware of the capability and limitations of REEFVTS to monitor shipping and issue warnings to help avoid a serious incident. The service's potential to support pilotage can be fully realised only when pilots better understand its systems and by improvements to the automated warning systems to ensure that they are optimally set up for the early detection of hazardous situations in all areas, particularly those areas in the Inner Route where pilots usually leave the bridge to rest.

Coastal pilotage in a system of safety

In recognition of the potentially severe and unacceptable environmental consequences of a serious shipping incident in the Torres Strait or GBR, Australia has a number of defences in the broader system of safety to protect the region. Coastal pilotage is the final layer in defences that include REEFVTS, enhanced ship routing and modern navigational aids, through which AMSA has enhanced the safety of navigation in the area.

However, while coastal pilotage is a critical defence, its safety management has lacked a pilot organisation responsible for managing all the risks associated with pilotage operations on a day-to-day basis. This safety issue is central to other issues and impacts all pilotage operations and related activities. The defence that a pilot provides against an incident can be much more effective when supported by a systems-based approach to managing risk through a pilot organisation's SMS.

In the absence of organisational responsibility for the actual task of pilotage, the organisational influences of current pilotage providers affect all their business activities related to pilotage services. The contractual working arrangements of pilots and generally poor working relationships with their providers are a result of these organisational influences. A particular feature that promotes competition between pilots is their 'per job' (instead of time based) system of remuneration.

The sole objective of compulsory coastal pilotage is to provide assurance that the risk of a shipping accident in the GBR and Torres Strait PSSAs is reduced to as low as reasonably practicable or ALARP. This can only be effectively achieved by a pilot organisation(s) that actively and systematically manages all foreseeable safety risks in providing pilotage services with an appropriate level of guidance and oversight by the safety regulator. Further, the implementation of an effective safety management system in coastal pilotage can only be achieved by an organisation which promotes and fosters an effective organisational and industry safety culture with a business imperative to provide the safest possible coastal pilotage service.

Submissions to the draft investigation report

Eighty-nine stakeholders, including 71 pilots made submissions on the draft investigation report. Fifty-one pilots indicated support for the draft report/findings, two pilots opposed it and 18 submitted no comment without indicating whether or not they agreed with the report/findings. The submission from AMSA included safety action to address the safety issues identified in the report. The pilotage providers were opposed to the draft report and its findings and, effectively, did not propose any safety action. A number of stakeholders were positive that safety issues had been identified, a few made no significant comment and one organisation opposed some of the investigation's findings.

The submissions served to highlight that addressing any safety issues in this fragmented pilotage sector is complicated.

ATSB investigation findings

The following summarise the safety issues identified by the ATSB:

- Successive issues of MO 54 have not assigned the responsibility for the overall management of the safety risks associated with pilotage operations, including the task of pilotage itself, to pilotage providers or any other organisation(s). Therefore, no organisation has taken on the role of managing risk during pilotage on a day-to-day basis and developed a safety management system that addresses safety risks associated with all operations, including those during pilotage. Instead, each coastal pilot has his own piloting system and passage plans, and ship crews could not always obtain a passage plan before the pilot boarded. These multiple piloting systems increase the potential for less than optimal pilotage practices and are outside the scope of AMSA audits of provider safety management systems. The individual systems of pilots are only assessed by their peers under AMSA's delegated check pilot system.

- The effectiveness of the check pilot system is limited by the absence of standards against which to make objective assessments. The system is impacted by conflicts of interest as a result of complex working relationships and check pilots assessing peers on behalf of AMSA where an 'overall unsatisfactory' assessment (i.e. fail) could disadvantage the assessed pilot, the check pilot or the pilotage provider remunerating him. In addition, there is no formal review of assessments to help achieve continuous improvement and inform corrective action, unless a pilot is assessed as 'overall unsatisfactory' (which has never occurred).
- The effectiveness of the pilot training program is limited by the absence of a pilotage safety management system, electronic charting systems training and the use of bridge simulators to augment shipboard transits for initial training. The mainly self-funded trainee pilots are also motivated to complete the training program quickly so they can pilot independently and earn to their potential. New pilots with little or no local area experience undertaking the program probably gain the experience, knowledge and skill appropriate for a local knowledge expert to operate in a range of conditions only after a couple of years of piloting.
- The effectiveness of the fatigue management plan depends mainly on a self-managed approach and individual pilots face potentially conflicting priorities related to the impact on their earnings. The plan relies on the self-reporting of rest periods and evidence indicates that pilot travel and transfer times have sometimes been included (incorrectly) in rest periods. During long Inner Route pilotages, pilots may not be able to manage their anticipated rest adequately due to constraints imposed by weather, traffic or other circumstances. The plan's effectiveness is further limited as it does not take into account variations in sleep patterns due to irregular working hours, the actual sleep a pilot achieves and the effect of multiple consecutive pilotages.
- The apparent level of under-reporting of risk events, including near miss groundings and collisions, means valuable opportunities for improved risk management are being lost because many pilots believe they may be personally disadvantaged by reporting. Ad hoc, informal reports made by pilots in the past were not recorded or analysed by AMSA.
- The potential for REEFVTS to support pilotage is under-utilised because many pilots are not fully aware of the service's ship traffic monitoring capability and limitations, and its value as an additional 'bridge resource'. Safety enhancements can also be achieved by focusing on improvements to the service's automated warning systems to ensure that they are optimally set up for the early detection of hazardous situations in all areas, particularly those areas where pilots usually leave the bridge to rest.

The ATSB also found that, since the safety of pilotage operations is not the responsibility or the highest priority of pilotage providers, this is reflected in organisational influences that affect all their business activities related to pilotage services and pilots. The providers mainly operate a pilot booking and transfer service. The generally poor working relationships that pilots have with their providers are related to their contractual working arrangements and the 'per job' basis of remunerating pilots, which also promote competition between pilots. The areas impacted by these factors include fatigue management, the check pilot system and the incidence of risk events and their reporting.

Another key finding of the investigation is that the effectiveness of the broader system of safety protecting the GBR and Torres Strait PSSAs has been enhanced through a number of measures, including compulsory coastal pilotage, REEFVTS, ship routing and navigational aids. These are all measures attributable to AMSA's action with the assistance of other agencies such as Maritime Safety Queensland, the state's maritime regulator.

Safety action

Action has been taken or proposed by AMSA to address the safety issues identified. In addition to publishing the industry passage plan (IPP) model, significant action includes initiating the development of standard operating procedures for the task of conducting a pilotage. Following AMSA audits of the safety management systems of pilotage providers in January 2012, each provider has undertaken to develop such standard procedures for the pilots that they assign to ships.

In addition, a review of the provisions of MO 54, issue 5 by AMSA (from 1 July 2012) will seek to more clearly assign and articulate the responsibility of a pilotage provider for the overall management of safety risks associated with pilotage operations. In this respect, the *Navigation Act 2012* (received the Royal Assent on 13 September 2012) includes a significantly revised, much broader definition for a pilotage provider that is consistent with an organisation that can be assigned responsibility for the overall safety management of pilotage under MO 54.

In 2012, AMSA initiated reviews of the check pilot system and the pilot training program which should complement improvements expected through passage plans based on the IPP model and standard pilotage procedures. Workshops that focus on pilot training have been hosted by AMSA, a pilotage training steering committee has been formed, and AMSA is considering the use of bridge simulators and the independence of check pilots.

Improvements to pilot fatigue management being considered by AMSA include going beyond straight rostering and hours on/off, and encouraging providers to develop fatigue management plans. In addition, AMSA will investigate the merits of a requirement for two pilots to conduct pilotages in the Inner Route.

To improve risk event reporting, AMSA implemented an on-line reporting system in 2012 and is considering opportunities to encourage pilot feedback and reporting through an increasing use of electronic exchange of information. The REEFVTS annual review process and invigorated stakeholder interaction will be used to enhance the service in areas identified by the ATSB investigation.

The ATSB has issued three recommendations to AMSA to fully address the central safety issue related to assigning responsibility for the overall safety management of pilotage to an organisation(s), and the issues concerning pilot training and fatigue management. Action to address the central issue is essential and will impact on the effectiveness of all other safety action taken.

The ATSB has also issued two recommendations to each of the three pilotage providers to take safety action in relation to fatigue management and risk event reporting that will support and facilitate the action taken by AMSA to address those safety issues.

1 INTRODUCTION

1.1 Queensland coastal pilotage safety investigation

On 16 December 2010, the Australian Transport Safety Bureau (ATSB) initiated a systemic safety issue investigation into Queensland coastal pilotage operations. The following sections of the report provide the background and reasons why the ATSB considered a safety issue investigation was necessary, the scope of the investigation and the methodology used to investigate the issues. Queensland coastal pilotage is outlined in the section below to provide context to the following sections. Section 1.1.5 provides an overview of the subjects covered by the investigation and the structure of the report.

1.1.1 Queensland coastal pilotage

As an island nation, Australia and its economy are heavily reliant on seaborne trade and the shipping that carries the vast quantities of cargoes passing through its ports (over 942 million tonnes in the 2010-11 financial year). A significant quantity of the cargo is traded through ports along the east coast of Australia, many of them located in the north-eastern state of Queensland.[10] Therefore, access to Australia's eastern seaboard, particularly the ports in Queensland, is vital for the local and national economies. At the same time, the Great Barrier Reef (GBR) off the Queensland coast is a World Heritage site of high environmental importance.

Since the late nineteenth century, ships transiting the GBR region have been able to employ coastal pilots to safely navigate its waters.[11] In 1990, the GBR region was declared the world's first particularly sensitive sea area (PSSA).[12] Consequently, in 1991, Australia introduced compulsory coastal pilotage to improve navigational safety in Queensland waters and better protect the GBR environment. Since July 1993, the Australian Maritime Safety Authority (AMSA) has been responsible for the safety regulation of coastal pilotage, including the licensing of pilots.

At the time of the investigation, all ships of 70 m or more in length and all types of loaded tankers, irrespective of size, were required to use the services of a licensed coastal pilot when navigating certain areas within the GBR and the Torres Strait PSSAs. A coastal pilot can be engaged only through an AMSA-authorised pilotage provider, a service provided by three private companies.

Coastal pilotage is significantly different from port or harbour pilotage because it involves long transits and coastal navigation through relatively open waters. It does not involve ship-handling to berth or un-berth ships, a critical part of port pilotage.

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[10] In the 2010-11 financial year, over 253 million tonnes passed through Queensland ports.

[11] A marine pilot's local area knowledge and skills allow safer navigation of the area. In conducting a pilotage, the pilot effectively has control of the ship's navigation but legally only provides relevant advice to its master who remains responsible and always in command of the ship. The pilot is not a member of the ship's crew and is employed to provide services in a specific area.

[12] An area of the marine environment that needs special protection through action by the International Maritime Organization (IMO) because of its significance for recognised ecological, socio-economic or scientific attributes where such attributes may be vulnerable to damage by international shipping activities.

The task and the skills of coastal pilots are, therefore, quite different to those of port or harbour pilots. All coastal pilots are required to be experienced mariners who have obtained a ship master's or an equivalent navigational qualification and have completed an AMSA pilot training program.

A shipping incident, particularly one that involves pollution, can have severe consequences in the pristine and sensitive GBR and Torres Strait environments. Therefore, it is imperative that coastal pilotage, which significantly reduces the risk of a 'serious or very serious'[13] shipping incident, is of the highest standard.

1.1.2 Background of the investigation

The ATSB investigation report into the 2009 grounding of the piloted tanker *Atlantic Blue* in the Torres Strait was published on 16 December 2010.[14] A principal finding of that investigation was that, despite having been subject to checks on six separate occasions under AMSA's check pilot system, deficiencies in the pilot's passage planning and bridge resource management[15] had not been identified and had remained unresolved.

In its response to that finding, AMSA advised the ATSB that it was concerned that systemic issues, which could impact on the safe operation of coastal pilots and the ability to fully develop a safety culture, may exist. Those concerns were based on numerous confidential and de-identified reports from pilots that had been submitted to AMSA. The reports raised various safety concerns with the existing structure for the provision of pilotage services, largely related to the impact that the contractual and financial relationships between pilots and pilotage providers were having on safety. Furthermore, AMSA felt that given the independence and investigative powers of the ATSB, it was ideally placed to investigate these issues, particularly the relevance of any competitive pressures to safe operations. At the same time, AMSA indicated that it would be pleased to see the ATSB investigate the matter.

While the ATSB recognised that some of the pilots' concerns could reflect no more than the usual discontent found in similar work environments, the number and nature of the reports suggested potentially significant safety issues. The reports related to a broad range of subjects, including pilot recruitment and training, procedures and passage planning, collision and grounding risk events, reporting of risk events, fatigue, check pilotage, pilot transfer and equipment issues, pilot working arrangements, intimidation by providers and animosity between pilots. Collectively, the reports indicated the absence of a safety management system for the pilotage task, and pilot working arrangements and pilot/provider working relationships that do not support safe operations. Together with AMSA's serious concerns and its view in relation to underlying safety issues, this suggested a deficient structure for the delivery of coastal pilotage services.

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[13] The IMO defines 'very serious casualties' as those that involve total loss of the ship, loss of life or severe pollution. 'Serious casualties' are those that do not qualify as 'very serious casualties' and involve incidents such as a collision, grounding, contact, fire or explosion, and result in rendering the ship unfit to proceed, pollution and/or breakdown necessitating towage or shore assistance.

[14] ATSB report number 262, Grounding of *Atlantic Blue*, Kirkcaldie Reef, 7 February 2009.

[15] Bridge resource management, or BRM, can be defined as the effective management and use of all appropriate resources, including personnel and equipment, by a ship's bridge team to complete its voyage safely and efficiently.

In addition, there were the findings of ATSB investigations into two previous groundings where a coastal pilot was on the navigation bridge of the ships involved.[16] The reports of those investigations included findings related to bridge resource management, and the effect of pilot working hours and experience on pilot performance. Following those incidents, AMSA had introduced safety measures, including a plan to manage pilot working hours, the check pilot system and enhancements to the pilot licensing process; all aimed at preventing similar incidents.

Since AMSA began regulating coastal pilotage safety in 1993, there have been at least 10 reviews, including eight initiated by AMSA, into pilotage safety and related matters. In general, within the scope of their terms of reference, the reviews did not find any serious, unresolved issues (section 2.6 refers). However, such a number of reviews in a relatively short period of time indicate either a system that may not be meeting the expectations of some stakeholders in the coastal pilotage sector and a general disquiet within it or the high priority that AMSA has attached to the sector. In either case, the number of reviews indicates the constant need to re-examine issues which should normally be addressed through the routine audit and review process of a safety management system without frequent external reviews.

The findings in ATSB reports, AMSA's concerns, past safety reviews and the pilot-reported concerns indicated that existing safety measures, and the pilotage safety management code[17] and check pilot system in particular, may not have managed the risks associated with ships transiting the GBR and Torres Strait to the desired and expected level. Cumulatively, these matters suggested potentially significant issues affecting the safety of pilotage operations. On the basis of these identified safety issues, the ATSB determined the need for a full investigation into the safety management of coastal pilotage.

1.1.3 Scope

The focus of this safety issue investigation was the safe management of pilotage operations including, in particular, the piloting procedures and practices of coastal pilots. This meant examining, amongst other things, the adequacy of existing safety management systems with respect to pilot training and assessment, professional development, pilot work and rest hours, piloting procedures and passage planning, collision avoidance and incident reporting.

Given the seriousness of the confidential, de-identified, pilot-reported safety and other concerns submitted to AMSA, determining the validity of these concerns, and the extent to which they might exist amongst all pilots, was a priority for the ATSB investigation. To the extent relevant and necessary, the investigation examined motivational factors directly related to the safety attitudes and practices of the pilots, including their working arrangements and relationships with pilotage providers. Another important area of focus was the effectiveness of the coastal pilotage regulations, including the check pilot system.

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[16] ATSB report number 147, Grounding of *New Reach*, Heath Reef, 14 January 1999; ATSB report number 182, Grounding of *Doric Chariot*, Piper Reef, 29 July 2002.

[17] AMSA's *Great Barrier Reef Pilotage Safety Management Code* (2001) renamed *Queensland Coastal Pilotage Safety Management Code* (2006).

1.1.4 Methodology

The investigation team comprised ATSB investigators with relevant experience in the maritime industry, including shipboard and coastal pilotage operations, and in transport safety investigation in the aviation, marine, and rail transport modes. Other team members included specialists in human factors and data analysis. In addition, an industry consultant who is a nationally and internationally recognised authority in marine safety investigation (and its pioneer in Australia) was contracted as an ATSB investigator and joined the team for this investigation.

In the coastal pilotage sector, each pilot is a separate entity with a discrete piloting system and, hence, an individual stakeholder. Organisational stakeholders include pilotage providers, regulators, industry organisations or bodies, and various other interests. In all, there are more than 100 significant stakeholders.

On 16 December 2010, the investigation began with a survey (referred to in the report either as the ATSB survey or the survey) of all 82 licensed coastal pilots. Under the provisions of the *Transport Safety Investigation Act 2003*, the pilots were provided with confidentiality of their individual survey responses, and required to complete the survey. The survey comprised 92 questions which were based on pilot demographics, the de-identified, confidential safety concern reports provided by AMSA, issues identified by past reviews and aspects of safety management.[18]

The ATSB survey was designed to establish whether failures in coastal pilotage safety management identified by a number of ATSB investigations in the past (Appendix B provides a summary) were more widespread and presented an unacceptable risk. The survey also aimed to determine whether the issues and concerns documented in the de-identified, confidential reports provided by AMSA, whether real or perceived, were confined to a limited few or were more widely held amongst pilots. Importantly, the objective was to provide all parties, including pilots, pilotage providers and AMSA a clear picture of the safety issues and the attitudes and views amongst pilots, thus presenting them with an opportunity to address those issues.

The ATSB also posted a fact and information sheet on its website inviting submissions from any interested parties. Thirty pilotage and maritime industry stakeholders, including all three coastal pilotage provider companies, were contacted directly and invited to make initial submissions.

By early February 2011, the ATSB had received submissions from 18 stakeholders, of which 15 (including those from the two larger pilotage providers) were substantial. Responses to the survey had also been received from all 82 pilots.

From February to April 2011, following a review of survey responses, submissions and other evidence, ATSB investigators interviewed 22 of the pilots to validate and augment the survey data. The investigation team checked and validated the data before it was coded, where necessary, and analysed. The survey data comprises essential evidence for this investigation as it contains information from all pilots and represents their collective views. The report contains many references to the survey and data, including charts, which are included in various sections of the report (Appendix A provides a summary of selected survey data).

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[18] A copy of the survey questionnaire is available on ATSB's website via the link below. <http://www.atsb.gov.au/media/3529225/coastal%20pilot%20survey%20questionnair-closed.pdf>

During the February to April period above, the investigators also held discussions with all three pilotage providers, AMSA, other key stakeholders and interested parties to collect further information. The evidence included documents and records obtained from AMSA and each of the providers. Amongst the records, those relating to check pilotage were particularly useful to the investigation.

During the course of the investigation, additional information was obtained from pilots, providers, AMSA and a number of other parties. The evidence indicated issues in a number of areas, and the survey responses confirmed that the concerns documented in the confidential, de-identified pilots' reports provided by AMSA were widespread. All the evidence was analysed, including the findings of past reviews and other relevant material, and used to prepare a draft investigation report.

In December 2011, the draft investigation report was provided to all stakeholders and interested parties and they were invited to make submissions. To assist the submissions process, the ATSB met and/or had discussions with a number of stakeholders, including the two larger pilotage providers, AMSA and some pilots.

By February 2012, submissions from 89 stakeholders, including 71 pilots, had been received. Fifty-one pilots indicated their support for the draft report/findings, two opposed it and 18 submitted 'nil comment' without indicating whether they agreed or disagreed with the report/findings. The AMSA submission included a number of safety actions to address the safety issues identified. Both of the larger providers were opposed to the draft report/findings. A number of stakeholders made positive comment in relation to the report/findings, a few made no significant comment and one organisation was opposed to some investigation findings.

All submissions received to the draft investigation report were carefully considered and necessary amendments were made to the investigation report to finalise it. All safety action advised by AMSA as of August 2012 has been included in the report.

1.1.5 Investigation report structure

The investigation report covers a wide range of subjects, all of which are directly or indirectly related to the safety of coastal pilotage operations. The following summary is intended to assist those readers who wish to focus on parts of the report that relate to a particular aspect of the investigation. However, readers will develop a better understanding of the subjects and issues covered in the report when they read its sections in the order in which they are laid out (refer to the contents page).

This section of the report (section 1) includes an outline of Queensland coastal pilotage to provide a context to the safety issue investigation, why it was undertaken and how it was conducted.

Section 2 of the report details general information to provide an understanding of the GBR and Torres Strait region and the measures employed to protect it, including coastal pilotage. A history of coastal pilotage is followed by a description of the existing pilotage and vessel traffic services. Summaries of certain past reviews into aspects of coastal pilotage that have been conducted since 1993 are also included.

Section 3 of the report discusses and analyses in detail the safety management of coastal pilotage operations. The fundamentals of safety management are described first to put into context the risks associated with coastal pilotage, followed by a description of the safety framework prescribed by the coastal pilotage regulations.

The remaining parts of the section discuss the management of pilotage related services in 2011, including the safety management systems of the pilotage providers, pilot recruitment, working arrangements, training and licensing.

The conduct of pilotages, fatigue management, the check pilot system and vessel traffic services are analysed next. A discussion on the subjects of working relationships in pilotage and the views of industry stakeholders follows before concluding with the fundamentals for enhancing safety in coastal pilotage.

Section 4 of the report comprises the findings of the investigation, including the safety issues identified. Section 5 (titled Safety Action) details the action that has been taken or proposed to address the safety issues identified in the report by the relevant organisations, and ATSB's recommendations.

The five appendices to the report provide background and other necessary information. This includes a summary of the ATSB survey responses, past incident information, extracts from the coastal pilotage regulations and relevant information about the check pilot system.

2 GENERAL INFORMATION

2.1 Queensland's coast

The state of Queensland occupies the northeast part of the Australian continent (Figure 1). Queensland's mainland coastline extends north from Coolangatta, located about 110 km south of Brisbane, to Cape York and then along the western side of the peninsula that is fronted by the Gulf of Carpentaria, a total distance of some 6,970 km. Queensland's east coast is dominated by the Great Barrier Reef.

Figure 1: Queensland's coast, coastal waters and shipping routes

2.2 The Great Barrier Reef and Torres Strait

The Great Barrier Reef (GBR) extends north from the Capricorn Channel in the vicinity of latitude 22.5ºS, about 100 miles[19] north of Gladstone, to the southeast part of the Torres Strait. The waters of the Torres Strait separate the Australian mainland from Papua New Guinea.

The GBR is the world's largest coral reef ecosystem with vast areas of reefs, shoals and numerous islands. Reefs and islands in the area form a natural breakwater at varied distances from the coastline. A number of openings or passages exist through the reefs and between islands. Many natural attributes of the Torres Strait, which adjoins the GBR, are similar to those of the GBR and essentially they are part of the same region.

Fast flowing tidal streams, strong trade winds, heavy rain squalls and occasional cyclones are features of the GBR and Torres Strait. The navigable channels in the GBR north of Cairns and through Torres Strait are particularly narrow, and water depths are relatively shallow. In combination, these natural conditions increase the risk of a shipping incident and make accurate and precise navigation a critical factor for the safe transit of ships and the protection of the unique GBR environment.

2.2.1 Shipping and traffic density

The shipping routes in the GBR and Torres Strait allow access to ports within the area via the shortest navigable passages between southeast Asia and Japan. In addition, these routes significantly reduce the passage distance to many other destinations on Australia's eastern seaboard, ports in New Zealand and further east. In this respect, the Torres Strait, linking the Arafura and Coral Seas, is a particularly important waterway.

In 2010, more than 4,700 piloted ships transited the GBR and Torres Strait en route to destinations in Australia and overseas. Since 1993, the number of piloted ships has approximately doubled from an annual average of about 2,300. Shipping traffic transiting the general GBR area is expected to continue increasing as a number of Queensland's ports increase export capacity. Major expansions are under way, or planned, for Gladstone, Port Alma, Hay Point, Abbot Point and Weipa. Shipping traffic in the southern part of the GBR area is expected to double over the 10 years to 2020.[20] A proportion of that increased traffic will transit the compulsory coastal pilotage areas and piloted traffic in the region will probably increase at a faster rate than seen since 1993.

Between July 1993 and February 2009, nine groundings and five collisions have occurred during a coastal pilotage (four collisions involved a fishing vessel). This equates to 14 such incidents and investigation reports have been published for all but one of them (Appendix B refers).[21] The findings of the investigations indicate that every incident was the result of inadequate management of the pilotage and/or the navigation of the ships involved, rather than circumstances beyond the control of the pilot or crew.

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[19] A nautical mile of 1,852 m.

[20] AMSA web page <www.amsa.gov.au/Shipping_Safety/REEFVTS/ExtendingREEFVTS.asp> (27 July 2011).

[21] The Marine Incident Investigation Unit (MIIU), which was integrated into the ATSB when it was established in 1999, investigated the incidents before that time.

2.2.2 Protective measures

The World Heritage listed GBR has long been recognised as an environmentally sensitive area. Since the establishment of the Great Barrier Reef Marine Park in 1975 (followed by inscription on the World Heritage List in 1981), measures to protect the area have been progressively implemented. The focus of all existing protective measures is centred on preventing environmental damage, particularly due to a shipping incident.

Coastal pilotage services in the GBR and Torres Strait, in one form or another, have been available and well used by most large ships since the late nineteenth century. In 1987, the International Maritime Organization (IMO) first recommended that ships of 100 m or more in length and all types of loaded tankers, irrespective of size, use coastal pilotage services when transiting the Torres Strait, the GBR area north of Cairns and the Hydrographers Passage off Mackay.

In 1990, the IMO declared the GBR as the first ever particularly sensitive sea area (PSSA) recognising that special measures were necessary to protect its unique and pristine environment from ship sourced pollution. In 1991, Australia introduced compulsory pilotage for ships of 70 m or more in length (and all type/size of loaded tankers) in the GBR area north of Cairns and the Hydrographers Passage, both of which lie inside the GBR PSSA. In 2006, the compulsory pilotage regime was extended to include the Torres Strait following its own recognition as a PSSA.

The regime of compulsory coastal pilotage has ensured that ships have engaged a pilot where required. Since pilotage in the Torres Strait was made compulsory in 2006, all ships required to use pilotage services to transit the strait have engaged pilots.[22] Elsewhere in the GBR, it has been very rare for a ship to not comply with compulsory coastal pilotage requirements.[23] A number of AMSA marine notices provide guidance to masters and owners of ships intending to transit the area.[24]

To complement coastal pilotage and other navigational safety measures, a coastal vessel traffic service known as the Great Barrier Reef and Torres Strait Vessel Traffic Service (REEFVTS) was introduced in 2004. The service combined the existing ship reporting system for the area (established in 1996) with electronic traffic monitoring and surveillance systems. The objective of REEFVTS is to reduce the risk of an incident and to provide a quick, effective response to an incident by accurately tracking and interacting with shipping.

In addition, the GBR region is covered with a comprehensive network of aids to navigation. These include traditional aids such as buoys, beacons and lighthouses and electronic aids, including the automatic identification system (AIS) for ships, radar beacons, real-time transmitting tide gauges, and accuracy and integrity enhancing services for shipboard global positioning system (GPS) units.

There are also ship routing measures comprising recommended tracks, preferred routes and two-way routes for most of the GBR and Torres Strait. These routing measures are shown on a comprehensive set of appropriately scaled paper and electronic navigational charts for the area. The charts are generally based on recent

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[22] More than 1,000 ships per year, on average.

[23] Since 2006, there has been one instance where a ship transited a compulsory pilotage area in the southern GBR without a pilot. Its master was prosecuted under Australian legislation and fined.

[24] AMSA Marine Notices 7/2009, 16/2006, 9/2006 and 8/2006.

and reliable survey data and include information in relation to the limits and/or boundaries of designated shipping areas, marine parks and prohibited zones.

While protecting the GBR environment has long been a priority, a United Nations report in 2012 re-focused the attention of the international and Australian community on the risks to its environment.[25] The report documented 'extreme concern' over increased developments, including ports and infrastructure, in and around the GBR. Recommendations included that Australia sustain and increase efforts and resources to conserve the GBR environment, and that new developments outside existing long-established major port areas not be permitted.

2.2.3 Shipping routes

The main shipping routes in the Torres Strait and GBR comprise the western approaches to the strait and the Prince of Wales (PoW) Channel, the Great North East Channel, the Inner Route of the GBR (Inner Route) and the Hydrographers Passage (Figure 1). The route through the Coral Sea, outside the GBR, is known as the Outer Route.

The Prince of Wales Channel is the only navigable channel in the Torres Strait for large ships. The channel allows ships with a maximum draught[26] of 12.2 m safe passage between the Arafura and Coral Seas. Its eastern entrance connects with both the Great North East Channel and the Inner Route. The Great North East Channel is used either by ships transiting the Torres Strait en route to or from destinations east of Australia or to call at Australian ports via the Outer Route.

The Inner Route is mainly used by ships en route to and from ports in Queensland and further south along the east coast of Australia. This route connects with the Prince of Wales Channel in the Torres Strait. The route's southern part leads through the Capricorn Channel. A number of passages (such as the Hydrographers, Palm and Grafton Passages) connect the Inner Route to the Coral Sea.

The Hydrographers Passage is used by most ships accessing ports in the Mackay area. Some large ships with draughts of about 18 m regularly use this passage. The Whitsunday Group of islands, located north of Mackay, includes anchorages and routes which are mainly used by passenger ships.

2.2.4 Compulsory pilotage area

As noted in section 1.1.1, pilotage is compulsory for all ships of 70 m or more in length and all types of loaded tankers, irrespective of size, when transiting the Torres Strait and certain parts of the GBR. Coastal pilots are generally also available for parts of the GBR where pilotage is not compulsory.

Torres Strait including the Great North East Channel

The Torres Strait compulsory pilotage area extends from the western entrance of the strait near Booby Island to Dalrymple Island in the Great North East Channel, near

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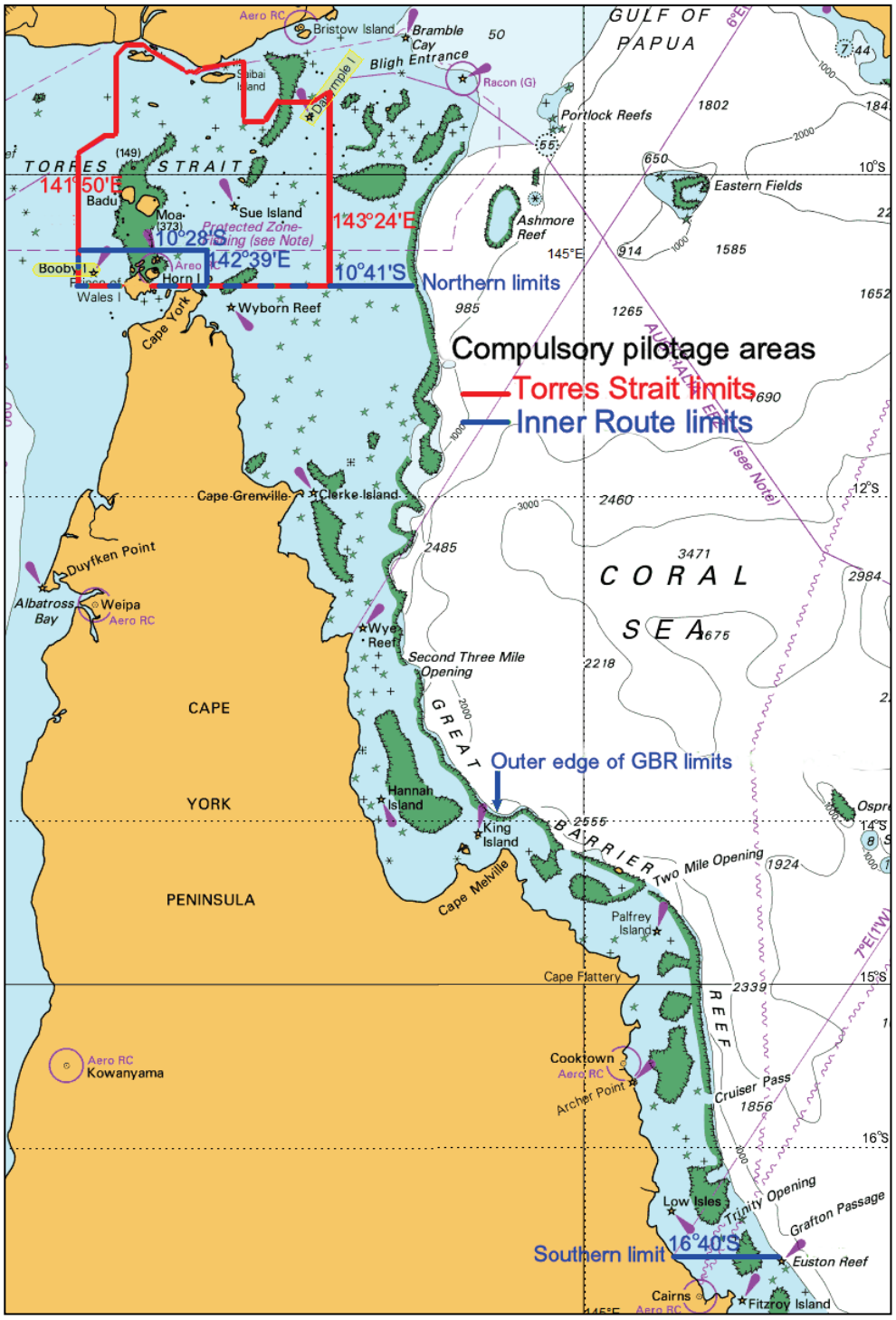
[25] United Nations Educational, Scientific and Cultural Organization (UNESCO), World Heritage Committee, 36th session, *Mission Report - Great Barrier Reef (N154),* Paris, 14 June 2012.

[26] Draught is the measure of how deep a ship is floating in water and is the vertical distance between its keel and the waterline.

its eastern entrance (Figure 2). The pilotage area covers the waters north of latitude 10º41'S, which lies along the tip of Cape York, and includes the islands in the Torres Strait, most of which are Australian territory.

Figure 2: Section of navigational chart Aus 4603 from Torres Strait to Cairns



The Great North East Channel compulsory pilotage area is part of the larger Torres Strait pilotage area. The Great North East Channel pilotage area has been separately defined, mainly for pilot licensing purposes. Essentially, the area comprises all the shipping routes and navigable waters of the Torres Strait, including the Prince of

Wales Channel. Hence, a transit of the Great North East Channel generally means a Torres Strait transit.

The distance along the shipping routes between the Booby Island and Dalrymple Island pilot boarding grounds is about 125 miles. Therefore, a Torres Strait transit usually takes between 8 and 10 hours, depending on the ship's speed.

Pilot transfers in the Torres Strait are carried out by pilot boats. The boats for Booby Island transfers are based at Thursday Island, located northwest of Cape York near Horn Island (Figure 2). Dalrymple Island transfers are carried out by boats based at Coconut or Yorke islands in the Great North East Channel.

Inner Route of the GBR

The Inner Route compulsory pilotage area comprises the waters between the mainland and the outer eastern edge of the GBR just north of Cairns to the Torres Strait (Figure 2). The pilotage area extends north from latitude 16º40'S to Cape York, where it partially overlaps the Torres Strait pilotage area, and is defined in this manner for pilot licensing purposes. Hence, the Prince of Wales Channel and the waters as far as the western entrance to the Torres Strait off Booby Island are part of both the Inner Route and Great North East Channel pilotage areas.

The distance along the shipping route between the pilot boarding grounds off Cairns and Booby Island is about 500 miles. The duration of the transit depends mainly on the ship's speed and tidal conditions and is usually between 25 and 40 hours. There are no places along the sparsely populated coastline which have been considered convenient for conducting a pilot transfer during the course of a transit. As a result, the Inner Route transit is the world's longest single-handed (one pilot) pilotage.

The charted shipping route in the non-compulsory pilotage section of the Inner Route south of Cairns continues for about 450 miles inside the GBR to the vicinity of Capricorn Channel (Figure 1). The large ports of Townsville and Mackay lie adjacent to the route while Gladstone and Brisbane are located further south.

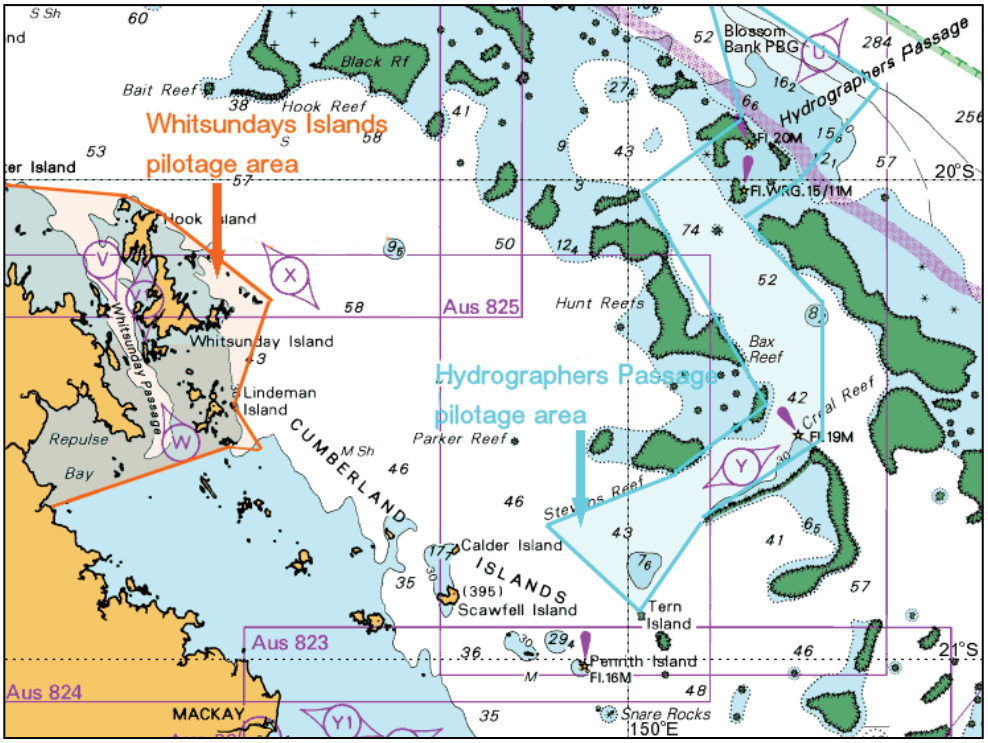
Pilot transfers in the Inner Route are generally carried out by pilot boats. There are two pilot boarding grounds located off Cairns, which are serviced by boats based there. Helicopters are also used off Cairns to transfer pilots to/from ships regularly transiting the area. The pilot boarding grounds located near the entrances to the Grafton and Palm Passages are seldom used.

Hydrographers Passage

The Hydrographers Passage provides a deep water shipping route northeast of Mackay between the Cumberland Islands and Blossom Bank pilot boarding ground (Figure 3). The distance along the route from Blossom Bank to the port limits of Mackay and the adjacent port of Hay Point is about 115 miles.

The compulsory pilotage area extends from Blossom Bank pilot boarding ground to the vicinity of Tern Island (located about 50 miles to seaward of Mackay). The distance along the shipping route between these two locations is about 80 miles and the pilotage usually takes 5 to 7 hours. Pilots of inbound ships end their duties off Tern Island but often remain on board until the ships are berthed or anchored inside port limits. Pilots normally board outbound ships at their berths and start piloting when approaching Tern Island.

Figure 3: Section of navigational chart Aus 4621 showing area off Mackay



Pilot transfers usually take place in the vicinity of Blossom Bank, Tern Island or anchorages off Hay Point. Transfers are generally conducted by helicopters operating from Mackay. Since December 2008, as an alternative to the high cost Blossom Bank helicopter transfers, one of the pilotage providers, Australian Reef Pilots, started conducting pilot transfers by pilot boat in eastern Papua New Guinea (PNG) waters. The boat operates from a floating base stationed off Torlesse Island in the Solomon Sea, all under the jurisdiction of the PNG National Maritime Safety Authority. This arrangement, according to the provider, provides a cost effective and safer alternative for pilot transfers.

Whitsundays pilotage areas

The Whitsundays compulsory pilotage area includes the waters of the Whitsunday Group of islands and those between these islands and the mainland. The area includes defined passenger ship anchorages.

Other areas

In addition to the mandatory use of a pilot in compulsory pilotage areas, ships will occasionally have pilots on board in other parts of the GBR. Often this occurs when a ship is proceeding between compulsory pilotage areas or when proceeding to/from a compulsory area, as is the case in the Hydrographers Passage area. Similarly, a passenger ship transiting the GBR may have a pilot on board for a long period of time. On occasion, a pilot will board a ship at Gladstone or Mackay for its transit of the Inner Route.

Hence, pilots can be on board ships for much longer periods of time than just the duration of the ship's transit through a compulsory pilotage area.

2.3 History of coastal pilotage services

Pilotage in the Torres Strait and GBR area has been carried out for more than 140 years. Knowledge of the history of coastal pilotage services is important because it provides a valuable insight into the current services and situation.

The first commercial pilotage between Queensland ports took place in 1872. The earliest full length commercial coastal pilotage was conducted in 1874, when a ship bound from Brisbane to Singapore was piloted through the Inner Route of the GBR and the Torres Strait.[27] Following that voyage, the number of ships being piloted through the area rapidly increased.

The early coastal pilots were not licensed pilots but ship's masters with a great deal of experience navigating the area. In those early years, shipping companies usually employed pilots exclusively for their own ships and referred to them as 'special' pilots. Many of the masters and mates of ships regularly transiting the area later became pilots themselves.

In 1884, the Marine Board of Queensland (the Board) introduced regulations governing the pilot service. These regulations dealt with issues including pilot licensing, the number of pilots, pilotage charges and pilot fees, the investigation of accidents and pilot misconduct. Initially, nine pilots were licensed. The service was then known as the 'Torres Strait and Inner Route Pilot Service', which indicates the Inner Route had already been named. It was not compulsory for ships to engage a licensed pilot but most ships did. Board appointed secretaries operated the service, allocating pilots to ships, collecting pilotage charges and paying pilots their fee.

Over time, the pilot service implemented a system of allocating pilotage 'jobs' on the basis of pilot earnings to achieve an equitable balance in their annual earnings. This was known as the 'turn' system and a pilot on lower earnings than other pilots (i.e. low on turn) could, depending on circumstances, be allocated a job earlier than a pilot with higher earnings. In addition, a first-in, first-out order generally applied to pilotage jobs. For example, a pilot landing ashore in the Torres Strait before another pilot would also board a ship there earlier than the other pilot. While the turn system and related arrangements of the pilot service applied to all pilots, each pilot was an individual entity within the single, Board-regulated service.

In 1914, the Board amended the regulations of the pilot service, now known as the 'Queensland Coast and Torres Strait Pilotage Service'. These regulations remained in place until 1958, when they were superseded as a result of changes to the governing Queensland legislation.

In 1951, the pilots and secretaries decided that the pilot service would also supply and conduct pilot transfer services on behalf of the Queensland Government. They established Torres Industries, a company of which they were all shareholders. Torres Industries owned, or subsequently acquired, many of the service's assets, including pilot launches and pilot houses, and began supplying pilot transfer services for the pilot service.[28] Over time, the service's secretaries divested their

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[27] In 1866-67, Queensland Government-chartered mail service ships transiting the GBR and Torres Strait were probably piloted by naval officers.

[28] Pilot transfers off Cairns were operated separately by the service's secretaries until Torres Industries acquired another pilot launch some years later and took over the transfer operation. Until about 1992, pilot transfers in the Great North East Channel were operated by PNG Harbours.

shareholdings in Torres Industries and succeeding secretaries did not take up company shares, leaving only the pilots as its shareholders. New pilots bought a shareholding in the company when joining the service and sold it on retirement.

In the following decades, the secretary-administered pilot service continued to provide pilotage services while the pilot-owned Torres Industries provided the Torres Strait and Cairns pilot transfers using its launches.[29] The pilot service was steeped in a century of tradition and being a pilot was considered an attractive, satisfying and, by all accounts, a well remunerated occupation. The actual task of pilotage over the years changed little other than as a result of improvements to navigational aids and charts.

In 1987, although most large ships employed a pilot in the GBR region as a matter of course, the IMO recommended that pilotage services be used in the Torres Strait, the Inner Route north of Cairns and the Hydrographers Passage. In 1991, when Australia introduced compulsory pilotage in the Inner Route and Hydrographers Passage (parts of the then recently declared GBR PSSA), about 90 per cent of ships transiting the Torres Strait and GBR were already engaging pilots. Hence, in the years immediately following the introduction of compulsory pilotage, there was an increase of only about 10 per cent in the number of ships (annual average) transiting the area with a pilot.

In 1992, the Queensland and Commonwealth Governments agreed that the transfer of responsibility for the now compulsory coastal pilotage to the Commonwealth would take place in 1993. The Commonwealth Government decided that safety aspects of coastal pilotage would be regulated by AMSA, the national agency regulating ships and maritime safety. It was decided that the commercial aspects of pilotage services would not be regulated because agencies such as the Prices Surveillance Authority had oversight of these matters. The events associated with the transfer of responsibility were a precursor to major change in the pilot service.

In the years preceding the transfer of responsibility for regulating pilotage from the Board to AMSA, the underlying discontent that existed between the pilots and the secretaries increased. According to a service secretary at the time, pilot discontent stemmed from a desire to operate and manage the pilot service and to this end they had, in 1991, requested the Board to remove the secretaries. Another view, from a pilot who experienced those events, is that many pilots were dissatisfied with the secretaries for not being able to negotiate higher pilotage charges and pilot fees with the Board. A few pilots like him, however, believed an increase to already high charges had not been possible due to an economic downturn. Regardless of the reasons for the discontent and those circumstances, they shaped events that occurred in 1993.

On 1 July 1993, AMSA became responsible for regulating coastal pilotage and introduced performance based regulation[30] with a focus on pilot licensing, standards and safety oversight. As intended, the economic regulation that had been exercised by the Board was discontinued. The commercial aspects of the provision of pilotage services, including conditions of service for individual pilots such as fees and the

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[29] Helicopter pilot transfers for the Hydrographers Passage were operated by a third party contracted to the service's secretaries who also managed a company that owned the pilot base in that area.

[30] Performance based regulation can be defined as regulation that specifies required outputs, rather than inputs and thus provides a degree of freedom to the regulated to determine how they will achieve compliance. (Deighton-Smith, R 2006 <http://govnetconference2006.anu.edu.au/papers_etc/deighton.pdf>)

number of pilot licences issued, were left to 'market forces'. This made it possible for any number of competing pilotage companies and pilots to operate.

Consequently, on 1 July 1993, when the Board-regulated pilot service monopoly ended, its former members (the pilots and the service secretaries) formed two companies and each began offering pilot services. Of the 44 pilots at the time, about 35 formed their own company, the Queensland Coast and Torres Pilots Association (QCTPA). Those pilots were at odds with the former service's secretaries and, as shareholders of Torres Industries, retained the company to provide pilot transfer services using its launches. The two former secretaries established the other company, the Queensland Coastal Pilotage Service (QCPS), became its directors and retained the remaining pilots, including two who had recently been licensed by the Board.[31] Significantly, QCPS retained the former pilot service's commercial information, such as business and client contacts.

The creation of the two competing pilotage companies, and the split between the pilots, caused a great deal of resentment and animosity between the companies and their pilots. Competition between the rival companies was fierce and aggressive. The effect of economic deregulation on pilotage charges and pilot earnings was dramatic. Pilotage rates for ships, now governed by market forces, immediately reduced by about 20 per cent. The recruiting of new pilots and re-licensing of some retired pilots took the number of pilots from 44 to 57 within a year of the split. Pilots estimate that their incomes halved and that they subsequently needed to perform 50 per cent more pilotages for those reduced earnings.

In 1993, not long after the split, the pilot shareholders of QCTPA and Torres Industries began legal proceedings against QCPS and its directors. They believed that the establishment of QCPS, and the actions of its directors in operating the company, were illegal and unfair because only their own company, QCTPA, was the rightful owner of the former pilot service's business and client contacts. Their claims against QCPS and its directors (the defendants) included breach of fiduciary[32] duties, misleading and deceptive conduct and the use of intellectual property, such as the addresses and logo of the former pilot service.

In 1995, the court ruled against the pilot shareholders of QCTPA and Torres Industries on all claims. The decision was appealed and the following year, the court dismissed the appeal, once again finding in favour of the defendants on all claims. The legal proceedings and the court decisions exacerbated the ill feeling between the two rival pilot companies.

In December 1995, QCTPA was restructured and renamed Australian Reef Pilots after members of the company's current (2012) management became shareholders. Meanwhile, to sustain its competition with Australian Reef Pilots, QCPS rapidly increased the number of its pilots. As QCPS expanded, only one of its two founding directors remained with the company. The company continued to operate under the other founding director and, a number of years later, was renamed Torres Pilots.

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[31] Three retired pilots and a couple of others who had been undecided joined QCPS shortly afterwards.

[32] A fiduciary is a person who acts for and on behalf of another in a particular matter in circumstances which give rise to a relationship of trust and confidence. A fiduciary duty is the highest standard of care at both equity and law.

In 1996, three pilots previously engaged by Torres Pilots established Hydro Pilots, a third pilotage company. Hydro Pilots operated exclusively in the Hydrographers Passage and the company's entrance into the market significantly reduced pilotage rates there. In general, the existence of three pilotage companies further increased competition in the coastal pilotage sector.

In summary, the history of resentment and animosity between Australian Reef Pilots and Torres Pilots, and many of the more senior pilots, has affected the coastal pilotage sector for almost two decades. Many pilots who have started after those defining events of 1993, including recent entrants, have indicated to the ATSB that those past issues and competition in general have had an adverse effect on them and on safety. Issues directly related to this subject are discussed in detail in section 3.9.

2.4 Pilotage services in 2011

As noted earlier, coastal pilotage safety is regulated by AMSA, which licenses pilots and authorises pilotage providers to operate pilotage services. In addition, AMSA maintains safety oversight in accordance with relevant legislation by implementing regulations, issuing guidance and monitoring compliance.

2.4.1 Legislation and regulations

The *Great Barrier Reef Marine Park Act 1975* (GBRMP Act) and the *Navigation Act 1912* (Navigation Act) were the two principal pieces of national legislation applicable to coastal pilotage when the investigation began. A set of regulations associated with each of these Acts make specific provisions for coastal pilotage.

Compulsory pilotage in the Inner Route, Whitsunday Islands and Hydrographers Passage was imposed under the GBRMP Act. All of these pilotage areas lie inside the GBR Region as defined in the Act. The GBR Region covers the same area as the GBR PSSA with a northern limit at latitude 10º 41'S off Cape York (Figure 1). Since the Torres Strait lies outside the GBR Region and, therefore, outside the jurisdiction of the GBRMP Act, pilotage in the Torres Strait PSSA was made compulsory under the Navigation Act.

The GBRMP Act and associated regulations[33] cover various aspects of the Marine Park and environmental protection in the GBR Region. With regard to pilotage, the Act and regulations mainly deal with defining pilotage areas and the requirements and penalties for a ship not engaging a pilot. The Act and regulations, being focused on environmental protection, do not specifically deal with pilotage operations.

Safety regulations for coastal pilotage are made by AMSA under the provisions of the Navigation Act. These regulatory instruments are known as Marine Orders[34] Part 54 (MO 54). The provisions of MO 54 relate to various safety aspects of pilotage, including the operations of pilotage providers and pilots, pilot licensing and the duties of pilots. Under MO 54, there is no limit on the number of pilotage providers or pilots. Therefore, in theory, there can be any number of pilotage providers and pilots. At the time of the ATSB survey in 2011, there were three pilotage providers and 82 licensed pilots.

Since MO 54 was first issued in 1993, its provisions have been revised a number of times to take into account changes such as compulsory pilotage in the Torres Strait or to incorporate safety initiatives like the check pilot system. Issue 4 of MO 54, in force from 6 October 2006, was superseded by issue 5 on 1 July 2011. However, as the provisions of the superseded issues of MO 54 have shaped pilotage operations until 2011, those provisions are particularly relevant for discussion in this report.

A number of important provisions in issues 3 and 4 of MO 54 were associated with the Queensland Coastal Pilotage Safety Management Code (the Code).[35] Introduced

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[33] Great Barrier Reef Marine Park Authority (GBRMPA), *Great Barrier Reef Marine Park Regulations 1983,* as amended.

[34] Marine Orders are legal instruments made by AMSA pursuant to powers under Commonwealth legislation. They are also described as regulatory instruments or legislative regulations.

[35] AMSA, *Marine Orders Part 54, Coastal Pilotage*, Issue 4, 2006, Appendix 1, *Queensland Coastal Pilotage Safety Management Code*.

under issue 3 of MO 54 in 2001, this mandatory Code was intended to facilitate the effective, efficient and safe management of pilotage services. One of its main objectives was to ensure that all pilotage operations were covered by a safety management system (SMS).

The content of the Code was, in many respects, similar to that of the International Safety Management (ISM) Code for ships. Once AMSA was satisfied that pilotage providers had implemented an SMS as required by the Code, each provider was issued with a document of compliance (DOC). The DOC allowed a provider to assign licensed pilots to ships and provide related services, such as pilot transfers.

The Code also introduced the check pilot system. By 2003, after AMSA had licensed a number of check pilots[36] to assess their peers on AMSA's behalf, the system was implemented. Check pilot assessments were made a condition for the issue and renewal of pilot licences.

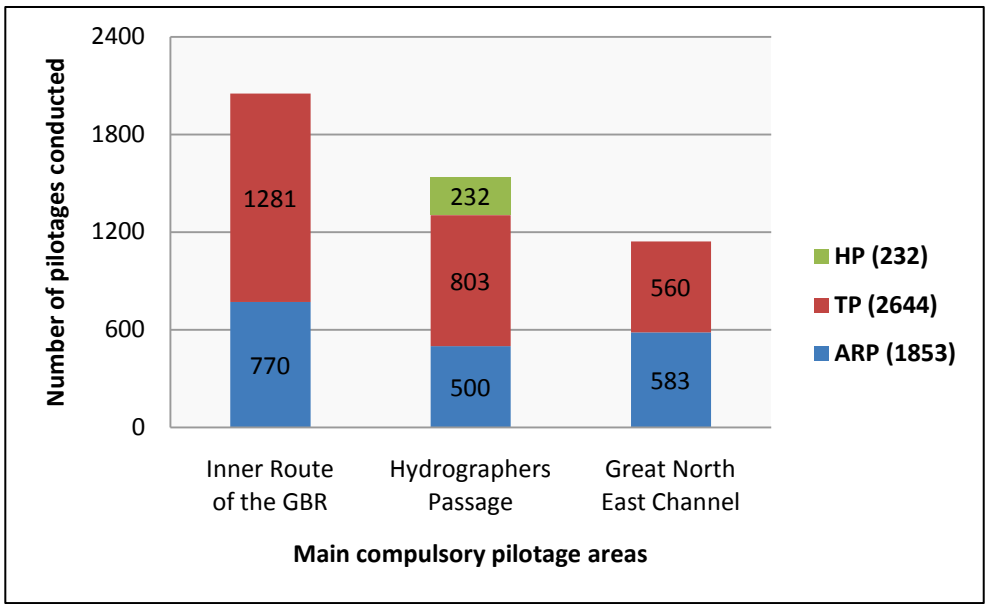
While the Code is not appended to issue 5 of MO 54, its principal elements, such as a provider's SMS and the check pilot system have been incorporated into a number of provisions in issue 5. The provisions of MO 54, including the former Code, are discussed in section 3.3. The check pilot system is discussed in section 3.7.

2.4.2 The pilotage providers

At the time of the investigation, three private companies, Australian Reef Pilots, Torres Pilots and Hydro Pilots, authorised by AMSA as pilotage providers to provide services, were operating in direct competition with each other.

Australian Reef Pilots (ARP) and Torres Pilots (TP) provide pilotage services in the three main pilotage areas of the Inner Route, the Torres Strait (the Great North East Channel) and the Hydrographers Passage. Hydro Pilots (HP) provides services only in the Hydrographers Passage. In 2010, all providers between them assigned pilots for 4,729 pilotages in the main pilotage areas as shown (Figure 4).

Figure 4: Pilotages conducted in 2010 in the main compulsory pilotage areas



[36] Experienced pilots who are licensed by AMSA to perform check pilot functions.

With 95 per cent of market share in the main pilotage areas between them, Torres Pilots (56 per cent) and Australian Reef Pilots (39 per cent) are the major providers servicing all the main pilotage areas. Pilotage services for passenger ships in the Whitsunday Islands area are provided exclusively by Australian Reef Pilots. The ATSB survey indicated that about 60 pilotages per year are conducted in the Whitsundays and about 50 of these involve anchoring passenger ships there.

Each pilotage provider has a head office located in or near Brisbane and each has established a pilot base and/or office in strategic locations for their pilot transfer operations. The Torres Strait and Cairns bases/offices of Australian Reef Pilots and Torres Pilots are particularly important for their operations. Hydro Pilots operates only from its base in Mackay. Table 1 below provides a summary of information related to provider operations (as of 2011).

Table 1: Information related to pilotage provider operations (as of 2011)

	Australian Reef Pilots	Hydro Pilots	Torres Pilots
Head office	Brisbane	Maroochydore	Brisbane
Pilot bases and/or offices	Thursday Island Yorke Island Torlesse Island Cairns, Mackay	Mackay	Thursday Island Coconut Island
Pilot houses and accommodation	Thursday Island Yorke Island Torlesse Island Cairns, Mackay	None	Thursday Island Coconut Island
Pilot boats and locations	Seven boats Thursday Island Yorke Island Torlesse Island Cairns	None	Six boats Thursday Island Coconut Island Cairns
Pilot helicopters	Not normally used	Supplied by Mackay Helicopters	Supplied by Mackay Helicopters and GBR Helicopters
Pilots engaged (January 2011)	41 contractors (including trainees)	Two contractors	34 contractors (including trainees)
Boat crew and office staff	Employees	Employees	Employees

Pilot transfers are central to the operation and business of all three pilotage provider companies. The providers have large investments in pilot boats or helicopters and there are high operating costs associated with these services. Both Australian Reef Pilots and Torres Pilots operate a number of pilot boats exclusively for their pilots. The pilot transfers for Hydro Pilots are provided by its sister company, Mackay Helicopters, which also services Torres Pilots. The parent company of Mackay Helicopters and Hydro Pilots is the Curry Kenny Aviation Group, which owns a

number of aviation interests. For a number of years before it acquired Hydro Pilots in 2006, this parent company had provided helicopter transfers for Torres Pilots.

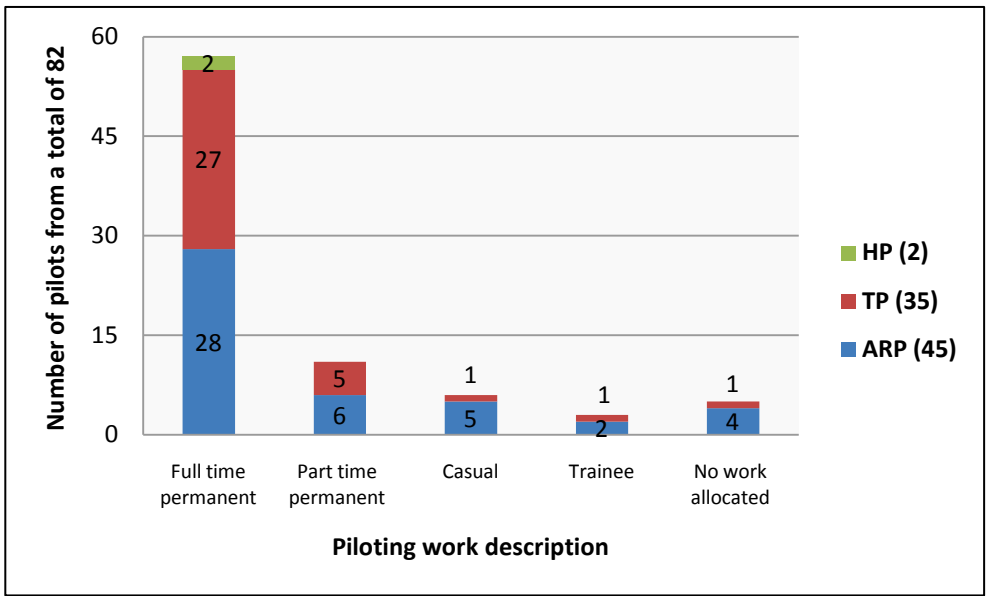
With regard to the provision of actual pilotage services, each pilotage provider contracts a number of self-employed pilots. These pilot contractors provide services exclusively to a pilotage provider who acts as the agent and/or manager of each pilot. Table 1 shows the number of pilots engaged by each provider at the time of the ATSB survey (five licensed pilots were not being engaged by any provider).

2.4.3 The pilots

The ATSB survey of pilots was completed by all 82 licensed coastal pilots, including three trainee pilots. All pilots were self-employed contractors and their exclusive pilotage provider assigned them pilotage jobs, arranged pilot transfers and paid them agreed fees. Pilots cannot offer their services directly to ships because they are not pilotage providers. In principle, any individual pilot who can meet the requirements in the provisions of MO 54 is eligible to become a provider (Appendix C, item 3). However, these requirements, particularly in relation to the logistics of pilot booking and pilot transfers render this impracticable for an individual pilot.

The ATSB survey indicated that 70 per cent of pilots worked full time (Figure 5). The number of pilots who indicated that they were providing services to each provider was 39 (Australian Reef Pilots), 33 (Torres Pilots) and two (Hydro Pilots), that is a total of 74 pilots (excludes the three trainee pilot licence holders).[37] The remaining five licensed pilots stated that their provider had, in effect, dismissed them by not allocating work and/or not renewing their contract because of disagreements between those pilots and their former provider.

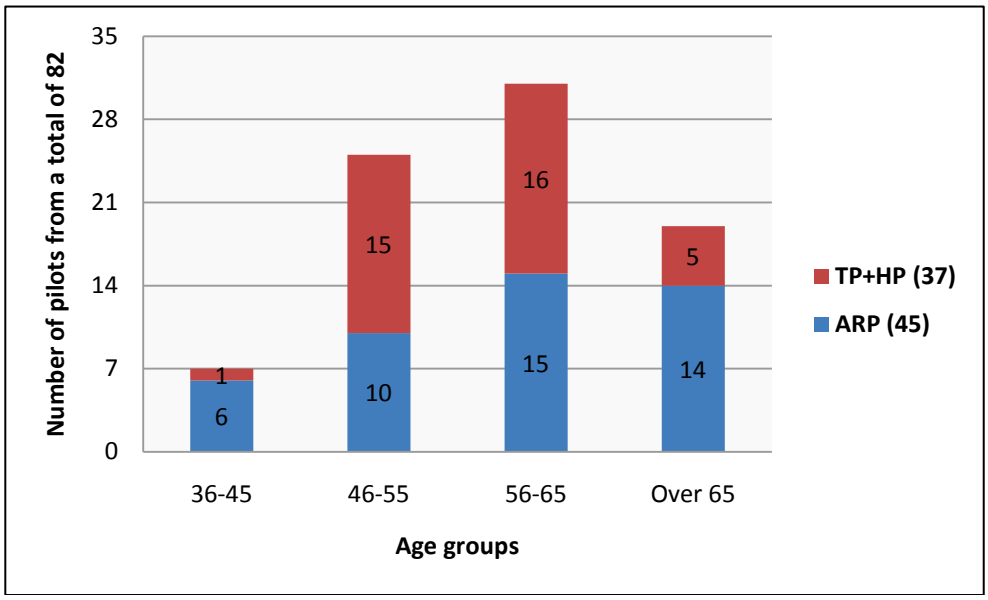
Figure 5: Piloting work description indicated by pilots



[37] The survey data for the two pilots engaged by Hydro Pilots, where appropriate, has been shown separately in the charts. In certain charts, to make the data statistically relevant, information provided by these two pilots has been combined with that of Torres Pilots' pilots, whose check pilots assess Hydro Pilots' pilots, and both providers use Mackay Helicopters for pilot transfers.

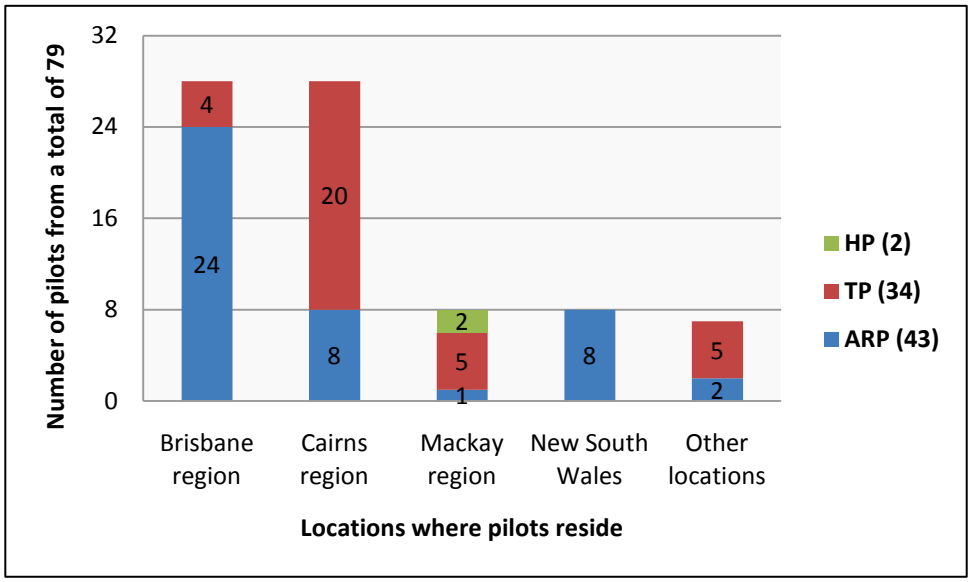
There is no age limit for pilots and the survey indicated that 61 per cent of coastal pilots were over 55 years of age, with a number over 65, including some who were over 70 (Figure 6). While there is no gender based restriction, all pilots are male. Ninety five per cent of pilots are either Australian citizens or permanent residents (Appendix A, item 41). All the pilots indicated that they were fluent in English, which is the first language for nearly 90 per cent of them. The first language of other pilots included Dutch, Norwegian and Polish.

Figure 6: Age groups of coastal pilots



The survey indicated that the majority of pilots live in Queensland, adjacent to compulsory pilotage areas. The Brisbane region, which includes the Sunshine and Gold Coast areas, was home to 28 pilots or about a third of the total number of pilots (Figure 7). Cairns and its surrounds also accounted for 28 pilots. A few pilots working only in the Hydrographers Passage lived in, or near, Mackay. Several pilots lived in New South Wales, mainly in Newcastle or Sydney. Four pilots resided in Melbourne and one each in Adelaide, Townsville and Thursday Island.

Figure 7: Locations where coastal pilots reside



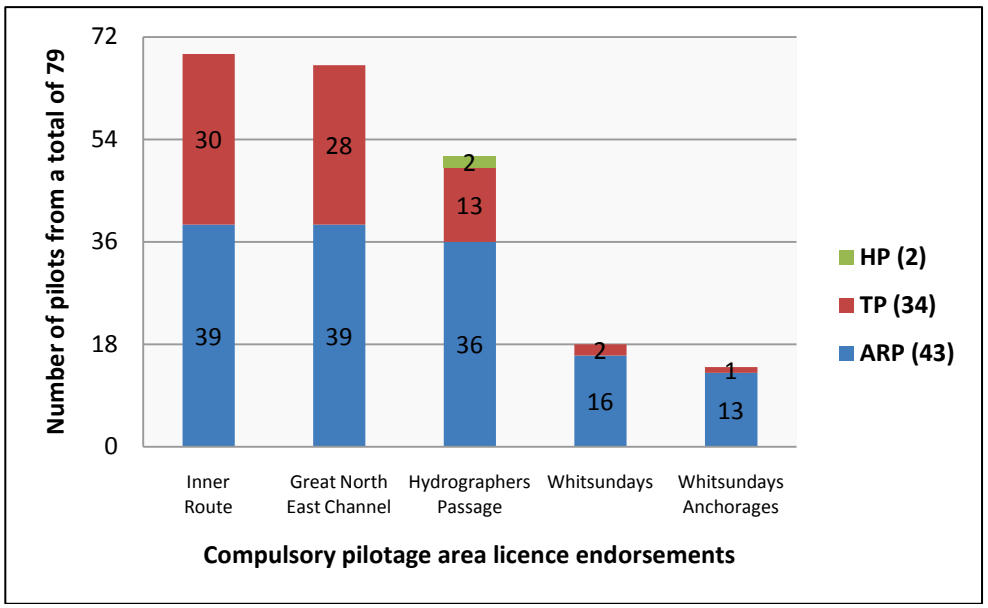
Pilots are experienced mariners who, when they became pilots, held qualifications to sail as the master of a ship of any size, or the Royal Australian Navy (RAN) equivalent. Seventy three per cent of pilots obtained their master's certificate of competency in Australia (Appendix A, item 40). In general, pilots have previously sailed as masters and most of those that started before 2000 had previous seagoing experience in the GBR.

New pilots who meet AMSA requirements are issued with a trainee pilot licence and undertake transits as an observer to complete the AMSA pilot training program (discussed in section 3.4.4). Following a check pilot assessment, they obtain a restricted pilot licence for the relevant compulsory pilotage area. This licence allows them to conduct pilotages independently (when assigned to a ship by a pilotage provider), subject to restrictions based on ship type and draught.

A pilot with a restricted licence is not authorised for the pilotage of loaded tankers of any type or, in the Great North East Channel and Inner Route, a ship that has a draught of more than 10 m. A minimum number of transits are necessary to obtain an unrestricted licence and, in the relevant areas, a staged process is used to increase the draught for which a licence is endorsed, up to the maximum allowable draught of 12.20 m.

Restricted and unrestricted pilot licences are endorsed for one or more pilotage area, i.e. the Inner Route, Great North East Channel, Hydrographers Passage, Whitsundays and Whitsundays anchorages. The survey responses indicated that the majority of pilots were licensed for all three main pilotage areas (Figure 8). Ten pilots held a licence for only the Hydrographers Passage (four pilots each were engaged by Australian Reef Pilots and Torres Pilots, and two by Hydro Pilots).

Figure 8: Compulsory pilotage area licence endorsements indicated by pilots



In general, pilots undertake a tour of work (tour) of 2 to 4 weeks during which they perform a number of pilotages. They then take a break of 3 to 5 days (sometimes more) at home before their next tour. The survey indicated that full time pilots (working mainly in the Inner Route and Great North East Channel) spent more than 200 days per year, on average, away from home but this varied depending on where a pilot lived (Appendix A, item 5). The Mackay based full time pilots working only,

or mainly, in the Hydrographers Passage return home between most pilotages and, hence, were away for only 38 days per year, on average. Part time pilots based in the Brisbane and Cairns regions were away from home, on average, for 157 days and 124 days per year, respectively.

The survey indicated that full time pilots performed about 65 pilotages per year on average except Mackay based pilots who worked only, or mainly, in the Hydrographers Passage (Appendix A, item 4). The shorter Hydrographers Passage transits mean that Mackay based pilots performed about 110 pilotages per year, on average. Cairns based full time pilots performed more Inner Route pilotages than Brisbane based pilots who performed more Hydrographers Passage pilotages (Appendix A, item 4).

The number of ships serviced by each pilotage provider per pilot engaged varies with their market share in the different pilotage areas, their pilots' work status, roster and where they live, and other factors such as the Torlesse Island pilot base in PNG. For example, Torres Pilots serviced a much greater number of ships than Australian Reef Pilots although the latter engaged a larger number of pilots than Torres Pilots (Figures 4 and 5, and Appendix A, item 4).

2.5 Coastal vessel traffic service

A coastal vessel traffic service (VTS)[38], the Great Barrier Reef and Torres Strait Vessel Traffic Service or REEFVTS, covers the GBR and Torres Strait PSSAs. The vessel traffic service is jointly operated by AMSA and Queensland's maritime safety regulator, Maritime Safety Queensland (MSQ). The traffic service operates 24 hours a day from a VTS centre located in Townsville. One vessel traffic service operator (VTSO) is on duty at the centre at all times to perform the service's operational functions. All VTSOs have completed the minimum, internationally recognised competency standard of a Certificate III, VTS operations.

The major components of REEFVTS are REEFREP[39] (a ship reporting system for all ships 50 m or more in length and all tankers) and traffic monitoring/surveillance systems. These systems use raster navigational charts to electronically display ship position and other data obtained via radar, AIS, automatic position reporting (APR) via Inmarsat-C satellite communications or very high frequency (VHF) radio, on a screen. Automated alarms are set up to provide warning of a ship standing into danger. The large amount of information available to REEFVTS is used for a range of safety enhancement services.

Unlike air traffic control in the aviation industry, REEFVTS does not control or direct traffic. The service's main role is to assist shipping by providing relevant information and advice. Routine services provided by REEFVTS to shipping in the GBR and Torres Strait include traffic encounter predictions with ship names and encounter times, navigational warnings and other relevant information. Importantly, navigational assistance in the form of information to assist shipboard decision-making can be given in situations triggered by an automated alarm (e.g. if a ship leaves a defined safe corridor for navigation) or in the event of an incident or emergency.

Communications initiated by REEFVTS with ships are printed messages via satellite communications or voice calls via VHF radio. Pilots and ships' crews normally contact the duty VTSO via VHF radio on designated channels or, if necessary, the distress and urgency channel (VHF Channel 16). To enhance communication and coordination in all situations including emergencies, REEFVTS is electronically linked to the Australian Rescue Coordination Centre (RCC) in Canberra. Hence, ship position and incident, pollution or other reports are passed directly to RCC.

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[38] IMO Resolution A.857 (20) defines a VTS as a service implemented by a Competent Authority, designed to improve the safety of vessel traffic and to protect the environment. The service should have the capability to interact with the traffic and respond to traffic situations in the VTS area.

[39] The mandatory ship reporting system, the Great Barrier Reef and Torres Strait Ship Reporting System (REEFREP), established by IMO Resolution MSC.52 (66) and amended by Resolution MSC.161 (78). Australian regulations for the system are contained in the provisions of *Marine Orders, Part 56, REEFREP*, Issue 2, AMSA, 2004.

2.6 Past reviews into coastal pilotage

Since 1993, at least 10 reviews, inquiries or studies into coastal pilotage (collectively referred to here as reviews) have been conducted. Eight of these reviews were commissioned by AMSA. However, they were generally carried out independently of AMSA. Each review examined specific aspects of pilotage, consistent with its terms of reference, including safety aspects to varying degrees.

The past reviews provide a useful insight into various aspects of coastal pilotage. An outline of 10 past reviews, with particular reference to safety, is presented below.

1993-Inquiry into Pilotage Services on the GBR

In September 1993, the Prices Surveillance Authority (PSA) released the report into its inquiry into coastal pilotage services.[40] The PSA reported on the charges (costs) for pilotage services, the influences on those charges and competition, ways to improve efficiency and competition, and the PSA's role in the ongoing monitoring of charges.

The PSA report endorsed the competitive approach, citing a significant reduction in pilotage charges and commercial benefits to users. However, the report noted that the competitive environment had been in place for a short period of time (less than 3 months) and that the industry was in transition. Therefore, the PSA recommended being tasked to prepare a further report by December 1994. This recommendation was not acted upon and no further report was published.

While the PSA recognised that safety was important, it was not considered appropriate for the PSA to assess AMSA's pilot licensing standards. However, the PSA noted that competitive pressures could improve safety where a better safety record could be a marketing advantage. With regard to the potential diminution of safety standards from commercial pressures, the report noted that the coercive power of the revocation of a pilot's licence still remained, citing AMSA's submission that 'in the event of an incident, their [pilots] livelihood is on the line'.

Some matters discussed in the PSA report indicate the views prevalent at the time with regard to safety and risk management. The potential for shipping companies to employ their own pilots (company pilots) was noted as a key factor indicating that competition in the long term may be effective. Similarly, the possibility of freelance pilots was discussed in the report.

Other relevant subjects in the PSA report included the number of pilots and their remuneration. In this regard, AMSA had advised the PSA that pilots 'should be capable of earning a reasonable income both to maintain their preparedness to remain in the industry and to ensure a safe standard of operation'. The PSA noted that the hourly charges for port pilots were significantly above the fees paid to coastal pilots. Since the PSA inquiry, there have been no significant changes in the industry to reconcile this apparent disparity in pilot remuneration.

While the PSA endorsed a competitive approach and considered that safety would not be impeded, it acknowledged that this assessment was based on a short period of time. The PSA also stated that 'as part of the overall waterfront reform process,

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[40] PSA, *Inquiry into Pilotage Services on the Great Barrier Reef*, Report No. 50, 24 Sept 1993.

State governments and/or port authorities refer [as an example] to the Queensland coastal pilotage experience as a possible approach for port pilotage in Australia's major ports'. However, in the two decades since, no port in Australia has taken up the model for the delivery of coastal pilotage services.

1994-Review of Coastal Pilotage Regulations

In August 1994, AMSA published the report into an independent review of its coastal pilotage regulations.[41] The review had been commissioned in May 1994 and its terms of reference required an assessment of pilotage licensing arrangements, their effect on safe pilotage and any enhancements that could be identified.

The 1994 review assessed the coastal pilotage regulations (MO 54, issue 1) as appropriate to ensure safe pilotage. The review found that, provided appropriate safety audit and control mechanisms were implemented, there was no evidence to suggest that the absence of direct commercial regulation posed a risk. The enhancements suggested included a confidential reporting system for pilots, monitoring of pilot codes of conduct and fatigue control standards.

In terms of safety, the 1994 review primarily assessed pilot licensing arrangements in relation to practices at the time. The report noted that while local area experience was likely to be beneficial for a trainee pilot, such experience was not considered necessary where there was a structured training program. However, it recommended that AMSA monitor the pilot training program and regularly review, with supervising pilots, the supervised and assessed passages required by trainees.

The review also made the following observations.

> Many examples of overseas and Australian practice were presented to support the latter view that any competition in pilotage had always had to be suppressed or abandoned in the overriding interest of safety. Reading the references in context, revealed a common thread. Safety was generally enhanced by the creation of disciplined and regulated pilot services. However, these were far from the main or only reasons for such developments. That they were usually monopolistic generally reflected broader political, economic and social agendas at the time of their creation.
>
> The recent studies cited on pilotage regulation not surprisingly reflect the same broader community and government attitudes in their own environment. If a conclusion can be drawn from such varied material, it is that it is the absence of a well constructed safety regulatory regime based on clear policy principles which creates a problem. Evident in more recent overseas reports was some failure of oversight and audit by the regulatory body which may have been compounded by a lack of clarity in the aims of the regulatory scheme itself. [42]

The 1994 review also discussed the possibility of company pilots and the factors that would influence their engagement by shipping companies.

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41 Crone, P 1994, *Review of Coastal Pilotage Regulations*, AMSA, August 1994.

42 ibid. p.14, s.5.9-5.10.

1998-Coastal Pilots Fatigue Study

In April 1998, a Queensland University of Technology (QUT) research team completed a study for AMSA into the fatigue aspects of the work of coastal pilots.[43] The study made eight recommendations for the development of strategies to address pilot fatigue. The areas targeted by the recommendations included implementing guidelines for rest breaks, methods to allocate work to comply with rest breaks, monitoring rest and work, reporting fatigue related incidents, fatigue management education and medical monitoring of pilots.

1999-GBR Pilotage Fatigue Risk Assessment

In September 1999, an independent fatigue risk assessment for coastal pilotage commissioned by AMSA was completed.[44] This risk assessment took into account the recommendations of the 1998 QUT study.

The fatigue risk assessment supported some of the recommendations of the QUT study but found other recommendations were of less value, or would be expensive to implement. The assessment report noted that it would be very difficult for AMSA to dictate fatigue management methods, and that strategies be implemented through the pilots' code of conduct. Significantly, the assessment report stated that there was a mistaken impression that risks were very low and hence costly risk reduction was not justifiable. The report drew attention to the view of pilots that increased commercial pressures had compounded the fatigue problem.

Subsequently, the Centre for Sleep Research, University of South Australia (UniSA), developed a fatigue management policy for AMSA.[45] The policy provided practical guidance to pilots and their organisations. Since then, the UniSA Centre for Sleep Research has played a major part in the development of coastal pilot fatigue management plans.

2000-Review of GBR Safety Initiatives

In April 2000, the report of an independent review of safety initiatives in the GBR was submitted to AMSA and Queensland Transport (both had commissioned the review).[46] The terms of reference of the review required an assessment of the performance of the ship reporting system, REEFREP, and the operation of the regulatory framework for coastal pilotage with particular reference to pilot entry level experience, competency, training, auditing and professional development.

The 2000 review pre-dated REEFVTS which, in 2004, incorporated REEFREP to enhance safety. However, the review made a number of recommendations to improve REEFREP, including the carriage of AIS by ships to enhance traffic surveillance and monitoring functions.

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[43] AMSA, *Study into the fatigue aspects of work practices of Coastal Pilots*, QUT, April 1998.

[44] Det Norske Veritas (DNV) Consultancy Services, *Great Barrier Reef Pilotage Fatigue Risk Assessment for AMSA*, September 1999.

[45] UniSA, Centre for Sleep Research, *Fatigue Management Policy Document for Marine Pilots*, Australia, October 2000.

[46] Holden D, Ross K, Mansell J 2000, *The Great Barrier Reef Review of Safety Initiatives*, April 2000.

The review recommended that 'a competitive structure for the provision of safe pilotage and regulation, that has the minimal impact on commercial economic issues, should remain the hallmark of coastal pilotage policy'. However, the review team noted that although financial and economic issues with respect to compulsory coastal pilotage were outside their terms of reference, problems were 'inextricably linked with these issues'. The report included comments on these issues where the team considered it might assist AMSA and Queensland Transport. Those comments related to various financial matters affecting pilots including the lack of funding for training, loss of income when attending professional development courses, costs associated with attending these courses and pilots falsifying records of hours worked to carry out more pilotages (i.e. higher earnings).

Many of the review's recommendations were aimed at addressing issues related to pilot recruitment, training, auditing and professional development, pilot transfer standards, fatigue and incident reporting. There is no evidence of action to address a number of the recommendations, such as those related to the funding of pilot training costs and the reporting of incidents by pilots without fear of recrimination.

2001-Review of GBR ship safety and pollution prevention measures

In July 2001, the report of the review of safety and pollution prevention measures in the GBR, commissioned by the Australian Government, was published.[47] The review was initiated in response to the 2000 grounding of the container ship *Bunga Teratai Satu* after the coastal pilot had disembarked the ship off Cairns.[48] The review was tasked to develop strategies to address, amongst other matters, the extension of compulsory pilotage, tracking and monitoring ships and enhanced ship routing and traffic management.

The 2001 review made 41 recommendations, of which a number led to enhanced safety measures during the following years. These measures included improvements to REEFREP and its subsequent incorporation into REEFVTS, adequate charting of the Fairway Channel and LADS Passage[49] (Figure 1), compulsory pilotage for the Torres Strait and ship routing measures.

Recommendation 15 of the review related directly to pilotage and stated:

> The review recommends that pilotage service providers continue to be expressly included in the regulatory framework covering coastal pilotage services. The review endorses the safety systems approach promulgated in the Great Barrier Reef Safety Management Code, which encompasses both pilots and pilotage service providers.

The 2001 review noted that 'AMSA reports that the Code has provided a timely reminder to pilot service providers on their obligations to address fatigue and other safety issues'.

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47 Australian Government, Great Barrier Reef Shipping Review Steering Committee, *The Review of Ship Safety and Pollution Prevention Measures in the Great Barrier Reef*, July 2001.

48 ATSB report number 162, Grounding of *Bunga Teratai Satu*, Sudbury Reef, 2 November 2000.

49 The LADS Passage takes its name from the RAN Laser Airborne Depth Sounder (LADS).

2005-GBR Coastal Pilots Fatigue Study

In November 2005, the report of an independent study into pilot fatigue was completed.[50] The study had been commissioned by AMSA to determine if controls such as the fatigue management plan were effective, noting that the new route within the Inner Route via the Fairway Channel and LADS Passage had made increased pilot rest breaks possible during a transit.

The fatigue study was based on the actual work, sleep and performance patterns of 17 coastal pilots. The study's report noted that pilots in the study had appeared to get sufficient sleep opportunity and obtain sufficient sleep to maintain alertness. While the report noted that fatigue had not appeared to be a major problem, it recommended a tailored training package for pilots to manage fatigue and the introduction of a fatigue risk management system.

2005-AMSA Coastal Pilotage Regulation Review

In December 2005, the report of an independent review of coastal pilotage regulations was submitted to AMSA, which had commissioned the review.[51] The terms of reference of the review required an assessment of the coastal pilotage regulations and related systems, the impact of commercial pressures on compliance with the regulations and on pilot recruitment, and the use made by pilots and pilotage providers of information provided by AMSA and REEFVTS.

The 2005 review found that the draft issue 4 of MO 54 contained the most comprehensive safety regulation of pilotage by a regulator in Australia. The review also found that while the conduct of pilotage operations was not unsafe, there were significant gaps in safety management systems and noted the absence of standard procedures, passage plans and checklists. The review found that the check pilot system was adequate for its purpose.

The review report documented that the pilot boats appeared to be well below an acceptable standard, noting that this was likely to be the effect of commercial pressures. The review found no evidence to indicate that these pressures impacted on the recruitment of suitable pilots.

Many findings of the 2005 review, like those of the 2000 review, related to recurrent themes and issues in coastal pilotage, such as the need for pilots to maximise pilotages performed to earn more and their view that training was a cost to them with little benefit.

2008-Delivery of Coastal Pilotage Services Review

In October 2008, an expert panel established by AMSA and the Commonwealth's Department of Infrastructure, Transport, Regional Development and Local Government (DITRDLG) provided its report on the delivery of coastal pilotage services.[52] In addition to options for the delivery of pilotage services, including

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[50] UniSA, Centre for Sleep Research, *Great Barrier Reef Coastal Pilots Fatigue Study for AMSA*, Australia, November 2005.

[51] McCoy, J 2005, *AMSA Coastal Pilotage Regulation Review*, December 2005.

[52] AMSA and DITRDLG, *The Delivery of Coastal Pilotage Services in the Great Barrier Reef and Torres Strait - Review Panel Report*, October 2008.

'serial competition'[53], the review panel looked at MO 54 (issue 4), under keel clearance (UKC) management in the Torres Strait and other safety aspects.

Two of the review panel's five recommendations related to the effectiveness of MO 54, and the remaining ones related to a system for UKC management. It was recommended that sanctions and measures in MO 54 be amended to improve their effectiveness in dealing with procedural breaches that had the potential to put ship safety at risk. With respect to UKC management, it was recommended that there should be a single system. Other recommendations dealt with the implementation of MO 54 and the UKC management system.

The 2008 review panel encountered many of the recurrent issues found by previous reviews. The panel concluded that the contractual arrangements of pilots did not always contribute to effective risk management. The panel also noted that pilotage providers had made significant investments in pilot transfer equipment. However, it was concluded that if improved compliance and enforcement strategies (through amendments to MO 54) proved ineffective in improving safety outcomes, then an alternative model for the delivery of pilotage services should be considered. The preferred alternative model was a Government contracted pilots' cooperative, subject to a number of conditions, to reduce commercial pressure on safety while allowing providers to compete for pilot bookings and pilot transfer services.

Importantly, the review panel noted that its report was 'a first step in the review process', and hoped that its recommendations provided a firm basis to consider the future delivery of pilotage services.

In July 2011, AMSA implemented issue 5 of MO 54 which included provisions consistent with the review's recommendations. In December 2011, the single dynamic UKC management system that was developed became operational.

2010-Review of Queensland Coastal Pilotage Fatigue Management Plan

In September 2010, an independent review of AMSA's fatigue management plan was completed.[54] The 2010 review noted that in contrast to the 2005 study, which had focused on whether pilots were obtaining sufficient rest, it had had a much broader focus on the overall functioning of the fatigue risk management system to reach its findings.

The 2010 review report noted that its findings reflected the need for a greater focus on the management of the organisational contexts of fatigue risk management. The review made four recommendations and, significantly, the first of these was to address its finding concerning 'the current prioritisation of commercial imperatives over safety', a theme that previous reviews had also documented. It was recommended that a working group with representatives from the pilots, providers and the regulator be established to develop strategies to address this issue.

The review recommended formal risk assessments for the 'high-risk pilotage operations of the long Inner Route transit and "double-header" [multiple pilotages within a single work period] operations'. It also recommended that the management

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[53] A single service provider providing services during a defined period of time instead of multiple providers in open or parallel competition with each other.

[54] UniSA, Centre for Sleep Research, *Review of the Queensland Coastal Pilotage Fatigue Management Plan-2010*, Australia, September 2010.

of fatigue-related risk mature beyond the initial hours of service and adopt a fatigue risk management system approach, and that roles and responsibilities with respect to fatigue risk management be clarified when MO 54 was revised.

Conclusion

The findings of past reviews allow a better understanding of the events that have occurred since those reviews. They also provide useful lessons for the future. The fact that some past reviews, depending on their terms of reference, documented similar safety issues, and recurrent themes related to the influence of commercial and contractual arrangements, indicates that safety issues in coastal pilotage are a complex matter. These issues are explored in detail in section 3 which follows.

3 DISCUSSION AND ANALYSIS

3.1 Essential elements of a pilotage service

The International Maritime Organization's resolution on pilotage:

> Recommends to governments that they should organize Pilotage services in those areas where such services would contribute to the safety of navigation in a more effective way than other possible measures and should, where applicable, define the ships or classes of ships for which employment of a pilot would be mandatory.[55]

A ship is generally exposed to higher risks in ports and confined waterways because of the smaller margins of safety due to factors which include the reduced depth and width of fairways, increased traffic, tidal variations and stronger currents. Pilots have traditionally used their local knowledge and skills to conduct ships navigating such areas and, over time, pilotage has been introduced in many areas. Modern pilotage is about effectively reducing the risk of damage to ships, ports, property, the environment and harm to all those who may be affected by a shipping incident.

An increase in the size of ships, changes to ports and waterways, the opening of new passages, use of new technology and modern methods has, in many cases, resulted in a change to safe operating limits, parameters or allowances and, hence, a change in the risk profile. At the same time, there has been a greater recognition of these risks, particularly the potential consequences of serious incidents, and the reduced acceptance of incidents because measures and systems to prevent them were, or should have been, in place.

The following description of safety is particularly relevant with respect to the changing expectations of the community at all levels.

> Irrespective of the concept invoked to define what safety is at a particular point in time, as society progresses, it demands a higher degree of safety. Thus safety is a target moving continuously toward zero risk...[56]

In practice, risk in any operation can be reduced but not completely eliminated (other than by not carrying out the operation). Therefore, responsible management of operations in any industry is considered to be one where risks are identified, analysed and reduced to a level that is 'as low as reasonably practicable' (ALARP). The following observation on risk reduction provides a better understanding of the terms 'reasonable' and 'practicable' in this context because their meaning is constantly evolving.

> ...The focus is on doing all that is reasonably practicable to reduce risks: this entails applying relevant good practice and then applying further safety measures until the money, time and trouble required become grossly disproportionate to the risk averted.[57]

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[55] IMO, Resolution A.159 (ES.IV), *Recommendation on Pilotage*, 1968.

[56] Baram, M 1993, *The use of rules to achieve safety: introductory remarks*, *Workshop on the Use of Rules to Achieve Safety*, Bad Homburg, Germany, 6 May 1993.

[57] Brighton, P 2006, *Risk Management, Section 2.2, Safety Science Monitor, Vol 10, Article 2*, Safety Science Monitor - KTH CHB, Sweden, 2006.

3.1.1 Safety management system

In many industries, including maritime, contemporary systems to manage risks are known as safety management systems (SMS) and have been described as follows:

> A management system used to manage all aspects of safety throughout an organisation. It provides a systematic way to identify hazards and control risks while maintaining assurance that these risk controls are effective.[58]

An SMS includes documented procedures and processes to manage risks for all routine, significant and critical operations. It includes the reporting of non-conformities, risk events, near-misses, incidents and accidents. An audit and review process is also necessary to identify existing and potential risks to continuously improve the system and allow for the evolving nature of what is reasonable and practicable in terms of risk reduction. In safety regimes with performance based regulation (where required outputs are specified instead of prescriptive inputs), it is imperative that an SMS address how the required outputs will be achieved.

From July 1998 onwards, the ISM Code has required ship management companies to implement a shipboard SMS by specific dates, which depended on the ship type. During this period, many port pilotage services in Australia and overseas have developed similar systems for pilotage operations. These pilotage SMSs generally integrate the collective knowledge and experience of pilots, existing piloting methods, recommended navigational practice, advice from consultants, and industry standards and guidelines into a single system to manage risk.

In the event of an incident, a pilot's civil liability through 'neglect or want of skill' has been limited.[59] Recently, however, there have been cases internationally where pilots have been successfully prosecuted under statutes relating to environmental pollution or loss of life, resulting in prison sentences or fines. In an environmentally sensitive world, a pilot is seen as owing a duty of care to protect waterways, infrastructure and lives. Therefore, there is a greater need to support pilots in this role through a safety system that incorporates regulations, training, working environment and organisational structure.

Coastal pilots are increasingly aware of the changing trend in legal proceedings that inevitably follow a serious incident and their ramifications. In submission to the draft report, a pilot stated that this changing trend means increased scrutiny of a pilot's due diligence in conducting a pilotage in accordance with a robust and contemporary SMS and, hence, questions of liability.[60]

In Australia, the National Maritime Safety Committee (NMSC) prepared guidelines for marine pilotage standards.[61] These national guidelines define a pilot

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[58] Federal Aviation Administration (FAA), *System Approach for Safety Oversight (SASO) Outreach, Spring 2009 Edition*, United States of America, 2009.

[59] A principle of maritime law is that a pilot is the 'servant of the shipowner'. Notwithstanding any mitigating factors, this principle recognises the vicarious liability of the employer of the pilot in the event of an incident and that little will be achieved in prosecuting an individual pilot who is not in a position to bear the costs of damage and loss even in a relatively minor incident.

[60] Coastal pilotage regulations in the past (MO 54, issue 3) contained provisions relating to the 'function and liability of pilots', which were not included in subsequent issues of MO 54.

[61] Australian Transport Council, *National Marine Guidance Manual- Guidelines for Marine Pilotage Standards in Australia, Edition 2*, NMSC, November 2008.

organisation as 'the organisation responsible for delivering the day-to-day pilotage service in a particular port, pilotage area or jurisdiction'. The following extracts from the guidelines are particularly significant.

> Pilot organisations should maintain a documented safety management system (SMS) which addresses each of the matters in these guidelines and any legislation governing the scope of the pilot organisations operation. The ultimate goal of the SMS is the development of a safety culture throughout the entire pilot organisation.[62]
>
> The primary objective of a pilot organisation is to manage the risk to life, vessels, the environment within the port or pilotage area, during pilotage. A pilot organisation's SMS should address all significant risks identified using a recognised methodology...[63]

The key points here are to manage risk 'during pilotage', and that managing this risk is an organisational responsibility. Therefore, a pilot organisation's SMS should include best practice piloting procedures and passage plans adopted as standard. Such a pilotage SMS complements the local area knowledge and practised piloting techniques of a pilot, and a shipboard SMS, to effectively reduce risk during a pilotage.

The Australasian Marine Pilots Institute (AMPI) has developed a standard SMS framework for pilot organisations which can be adapted by any pilot organisation for its specific operations. In submission to the draft report, AMPI advised that it had worked closely with NMSC in developing the NMSC guidelines discussed above. Progress in this area has also been made in other countries.

The International Standard for maritime Pilot Organizations (ISPO) standards and guidelines are similar in principle to the NMSC guidelines.[64] The ISPO standards and guidelines were developed, and are maintained, by a number of industry organisations[65] to provide safety benefits for their users. Although not universally recognised or adopted by all pilot organisations, the ISPO standards and guidelines are based on relevant IMO requirements, such as the ISM Code, and the guidelines and recommendations of recognised pilotage associations.

The ISPO standards and guidelines describe a safety and quality management system, which combines elements of an SMS with those of a quality management system. The ISPO, therefore, also takes a systematic approach to reducing risk and the guidelines state that a safety and quality management system should ensure:

> Compliance with mandatory local, national and international rules and regulations; that relevant guidelines and standards recommended by recognized maritime industry organizations are taken into account; [and] that relevant and recognized customs and traditions are taken into account.[66]

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62 ibid. Chapter 2, Section 5.1.

63 ibid. Chapter 2, Section 6.1.

64 ISPO, *Part A (Standards, V 08, 2009) and Part B (Guidelines to standards, V 05, 2010)*, Netherlands. <http://www.ispo-code.com/>

65 The European Maritime Pilots Association (EMPA), Lloyd's Register (LR) and pilot organisations in various countries, including a number from the Netherlands.

66 ISPO, *Part A (Standards, V 08, 2009)*, Introduction, Section 1.2.3.

While documented procedures and records are central to an SMS, the system is much more than a collection of documents. The SMS should comprise everything that an organisation does to operate safely. With regard to safety, it is the shared attitudes and values within an organisation that determine the actions and behaviours of individuals. Effectively implementing an SMS requires a commitment from everyone and, in particular, for the highest level of management to make safety its highest priority. This commitment is necessary for positive organisational influences which better ensure that risk controls are effective.

External factors have a significant influence on all aspects of an SMS, including the contents of its documented procedures. These factors also affect the implementation of the SMS and determine the degree to which its objectives will be achieved.

3.1.2 System of safety

A 'system of safety' is a feature of an industry, or industry sector, rather than of an organisation. A system of safety is defined by the shared safety objectives of key stakeholders resulting in a systemic approach to reducing risk. Complementary roles and operations of stakeholders promote the system and introduce multiple layers of defences to prevent adverse occurrences. Therefore, the SMS of an organisation is one amongst a number of layers of defences within a system of safety.

In the safety critical pilotage sector, an effective system of safety that minimises the risk of an incident is invaluable. The key stakeholders in pilotage include the pilot organisation, individual pilots and the regulator, as well as the shipping companies. In some jurisdictions, the regulator directly controls the pilot organisation but where this is not the case, regulatory oversight should complement the pilot organisation's SMS. The operations of regulators and pilot organisations are governed by other stakeholders, including the wider community, and the general expectations for safety and environment protection.

In essence, while a pilot organisation's SMS is central to the broader system of safety, this broader system includes measures such as vessel traffic services, navigational aids and charting along with all the other factors that enhance safe pilotage. These factors include those that may be the responsibility of governments, particularly where compulsory pilotage has been imposed.

3.2 Reducing risk in Queensland coastal pilotage

Compulsory pilotage was introduced in the GBR to protect the PSSA and was extended to the Torres Strait on the basis that 'the carriage of a properly qualified, skilled person with local knowledge as a pilot considerably reduces the risk of a shipping incident throughout Torres Strait'.[67] According to AMSA, coastal pilotage is the final layer in a total navigation safety system that includes REEFVTS, navigational aids, ship routing measures and charts.[68]

As the final layer in the system of defences to ensure the safe passage of a ship, coastal pilotage is critical. Pilotage takes account of the prevailing local conditions including location, ship type, size and characteristics, traffic, weather, currents and tides. Executing the task requires awareness, skills and judgment to take pro-active decisions and actions in real time. It is essential that pilotage is supported by an SMS so that, together with other defences, this final layer reduces the risk of an incident to a level as low as reasonably practicable. The compulsory nature of the pilotage in the GBR and Torres Strait PSSAs amplifies the expectations of the general community and the maritime industry, including ship owners, masters and cargo interests that the pilotage services are of the safest possible standard.

The three groundings in the GBR and Torres Strait pilotage areas since 1999 (noted in section 1.1.2) resulted in part from systemic issues. A significant safety issue identified by the ATSB investigation into the 2009 grounding of *Atlantic Blue* included deficiencies in AMSA's check pilot system, the only system to assess pilotage practices and rectify less than optimal practices.

The check pilot system finding referred to above was of more concern because the system had been in place for over 6 years. It had been implemented after the 2002 grounding of *Doric Chariot* and, amongst other things, was intended to address safety issues identified in that incident and the 1999 grounding of *New Reach*. Those issues related to the management of bridge resources, pilot working hours and training related matters. The measures introduced to specifically address these issues (and complement the check pilot system) included compulsory bridge resource management training for pilots, additional requirements to manage pilot working hours and more focused professional development training for them.

Together, the safety issues identified in those three groundings, some of which were common to all, indicate the inadequacy, or absence, of safety measures, systems and regulations in place at the time.

In its submission on a draft version of this report, Australian Reef Pilots (the pilotage provider) stated that the report did not contain a time-based statistical analysis of pilotage incidents (frequency rates) making it impossible to determine the effectiveness of the current system compared to the previous system. This analysis, according to the provider, is critical to validate the evidence provided in the report. In addition, some stakeholders consider the safety record of coastal pilotage since compulsory pilotage was introduced as 'commendable' or 'enhanced'. To support their claim, they have cited a reduction in the number of groundings and collisions, particularly during the last decade.

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[67] IMO, MEPC 49/8, *Extension of the Existing Great Barrier Reef PSSA to include the Torres Strait Region*, p.18, Section 5.11, 2003.

[68] AMSA web page <www.amsa.gov.au/Marine_Environment_Protection/Torres_Strait/Measures.asp> (20 October 2011).

However, views or assessments such as those above miss the point of a systemic approach to managing risk. The frequency of groundings and collisions is not the only factor to consider when assessing risk. The potential consequences of such an incident must also be taken into account. Furthermore, the factors that contribute to an incident or near miss incident demonstrate inadequacies in the defences designed to prevent the incidents which lead to 'frequency rates'. Each of the groundings since 1999 occurred as a result of the pilotages not being managed to an acceptable standard (primarily fatigue, passage planning and bridge resource management issues) rather than any extraordinary circumstances that were beyond the control of the bridge team.

Under AMSA regulation, between 1993 and 2009, nine groundings have occurred during a coastal pilotage. In one case, the pilot was away from the bridge resting and in one other case, the actions of the crew led to a shutdown of the ship's main engine. However, almost all of the groundings have demonstrated the inadequate management of bridge resources and/or pilot fatigue (Appendix B refers). Similarly, the factors that contributed to the five collisions in the same period that involved a piloted ship were related to ineffective bridge resource management, including awareness of approaching traffic, anticipation of traffic movements and action to avoid collision. Four of those collisions involved a fishing vessel and two of the incidents occurred during a period when the pilot had left the bridge to rest.

Whilst the incidents referred to above did not result in serious pollution or loss of life, and damage to the vessels involved was limited, it is the potential consequences of a serious or very serious shipping incident in the PSSAs that elevates the level of risk and it is that risk which needs to be addressed.

In terms of risk reduction, it is also important to note that the reduced incident rate could be the result of many factors and some of these factors are not directly related to specific pilotage safety initiatives such as the check pilot system. An example of these other factors which have reduced risks is the opening of the Fairway Channel and LADS Passage in 2004. This new route bypasses a particularly narrow and challenging part of the Inner Route, thereby increasing rest break opportunities available to pilots during the transit. While use of the new route reduced the fatigue risk for Inner Route transits, it did not eliminate this risk.

Other factors that have reduced navigational risk include the reduction in fishing vessel traffic in the Inner Route after 2003, the introduction of REEFVTS in 2004 (incorporating REEFREP) and improvements to electronic navigational aids. For example, REEFVTS data indicates a relationship between its monitoring of traffic and interaction with ships with a reduction in the number of groundings from one per year on average between 1997 and 2004 to one incident during the following 5 years. It is also worth noting that the number of piloted ships has progressively increased and, between 1993 and 2010, this number more than doubled.

In summary, the introduction of compulsory pilotage in the GBR raised public and user expectations of the safety standards which would be followed by any pilotage service operating in the PSSA. While past incidents provide valuable lessons for risk reduction, a reduced incident rate of itself does not indicate that all lessons have been learned or that risks have been adequately addressed. In fact, the recurrence of the same or similar factors contributing to incidents (primarily the management of bridge resources as summarised in Appendix B) indicates the opposite.

The following sections of the report describe the safety factors that increase risk in Queensland coastal pilotage and how or why they do.

3.3 Coastal pilotage safety management

As outlined in section 2.4.1, the safety management of pilotage services is driven by MO 54. The background to the introduction of MO 54 in 1993, and the evolution of its provisions since, provides an understanding of the safety measures that existed at the time of this investigation.

3.3.1 Marine Orders Part 54

In 1992, following the introduction of compulsory pilotage in the GBR Region, it became known that, by July 1993, responsibility for the regulation of safety aspects of coastal pilotage and pilot licensing would be transferred to the Commonwealth Government. As noted in section 2.3, commercial aspects, such as the pricing of pilotage and the number of pilots would not be regulated because it was considered that 'appropriate mechanisms'[69] existed for reviewing these aspects. Consequently, the Commonwealth Government amended the *Navigation Act 1912* to allow AMSA to make the necessary regulations for coastal pilotage.

On 1 July 1993, AMSA began regulating coastal pilotage in accordance with the first issue of MO 54, which was prepared after extensive consultation with industry. The marine orders were, and remain, performance based regulations that focus on pilot licensing and training in accordance with the pilot training program (described in section 3.4.4). The professional behaviour and general operational practices of pilots were covered by codes of conduct developed by pilotage providers and approved by AMSA.

The legislation, regulations and practices of the Queensland Government regulated former pilot service were also taken into account during the initial development of MO 54. While the marine orders changed the pilot licensing requirements and formalised them, in general they retained the traditional concept that a qualified pilot conducting a ship could, by himself, assure an adequate level of safety. The marine orders contained the following description of the role of a pilot.

> The function of a pilot on board a ship is to provide information and advice to the master of the ship to assist the master and ship's navigating officers to make safe passage through the pilotage area or areas for which the pilot is engaged. Despite the presence of a pilot on a ship, the master of the ship continues to be responsible for the conduct and navigation of the ship in all respects.[70]

The *Navigation Act 1912* defines a pilot as follows:

> Pilot means a person who does not belong to, but has the conduct of, a ship.

After AMSA assumed regulatory responsibility in 1993, existing pilots were issued with AMSA licences and continued to conduct pilotages as they had previously. New pilots were trained and licensed in accordance with AMSA's training and licensing program. Similarly, pilotage providers performed the functions that the former pilot service's secretaries had (i.e. to accept pilotage bookings, assign pilots to ships, arrange pilot transfers, collect pilotage charges and pay pilots their fees).

Essentially, operating pilot transfer services has been the primary business of the pilotage providers and their main functions relate to pilot booking agency services.

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[69] The Trade Practices Commission and the Prices Surveillance Authority.

[70] Crone, P 1994, *Review of Coastal Pilotage Regulations*, p. 5, AMSA, August 1994.

This role and their functions probably resulted in the following definition for a provider that, in 2001, was included in MO 54.

> Pilotage provider means a person who assigns or allocates a pilot to a particular transit, irrespective of the legal relationship, contractual or otherwise, between that person and the pilot.[71]

In 2001, MO 54 (issue 3) introduced the Great Barrier Reef Pilotage Safety Management Code (the Code)[72] which, for the first time, formalised a requirement for pilots and providers to manage safety. The introduction of this Code was consistent with the adoption of the ISM Code for ships by the maritime industry some years earlier and its text was very similar. The pilotage Code's stated objectives were to promote safety at sea, prevent injury or loss of life and avoid damage to the marine environment and to property by ensuring that all persons, procedures and operations involved in pilotage were covered by an approved SMS.

The Code required pilotage providers to develop and implement the SMS in accordance with certain requirements (Appendix C, item 1). It also contained the following, slightly revised definition for a provider.

> Provider means a person or entity engaged in the business of provision of pilots to ships transiting the Queensland coast and Torres Strait areas including the compulsory pilotage areas of the Great Barrier Reef Marine Park.[73]

This definition did not materially change a provider's role or function which was consistent with their responsibilities (Appendix C, item 1). While the Code stated that a provider's SMS must include instructions and procedures for pilots to promote the safe pilotage of ships and protection of the environment, the defined responsibilities did not indicate that the overall management of pilotages was the provider's responsibility. Instead, managing the conduct of pilotages was the responsibility of individual pilots (Appendix C, item 1). Consequently, the providers' SMSs had no piloting related content and only covered operations which they directly controlled (i.e. those that occur before or after a pilotage, primarily, though not exclusively, pilot transfers). They were issued with a document of compliance (DOC) by AMSA that was subject to annual audits.

The individual, self-employed contractor pilots were responsible for the conduct of a ship's passage under pilotage and, hence, the management of safety risks associated with the task of pilotage. Each pilot had, or developed, his own piloting method and system that included passage plans, checklists, forms and guidance notes for ships' crew - items that are normally part of a pilot organisation's SMS. These numerous piloting systems were not part of their provider's SMS or any other standard. As outlined in section 2.4.1, the check pilot system was implemented in 2003 in accordance with the Code to assess pilots and their piloting systems.

In October 2006, when issue 4 of MO 54 was implemented, the Code had been renamed but it had changed little, retaining the same responsibilities for providers and pilots (Appendix C, item 2).[74] A pilotage provider was redefined as follows:

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71 AMSA, *Marine Orders Part 54, Coastal Pilotage,* p.2, Issue 3, 2001.

72 ibid. Appendix, *Great Barrier Reef Pilotage Safety Management Code*.

73 ibid. p.14.

74 AMSA, *Marine Orders Part 54, Coastal Pilotage,* Issue 4, 2006. Appendix 1, *Queensland Coastal Pilotage Safety Management Code*.

> Pilotage provider means a person who assigns or allocates a pilot to the transit of a ship through particular waters, irrespective of the legal relationship, contractual or otherwise, between that person and the pilot.

This definition (effectively the same as before) was then (in 2006) included in the *Navigation Act 1912*, which had previously not defined a provider. However, other amendments to the Act in 2006 included significant changes to its Section 186D, Division 1 of Part IIIA. Section 186D, titled 'Regulations may make other provisions relating to pilotage etc.', now contained the provisions in (aa) below in addition to those in (a), (b) and (c) that had existed since 1994.

> For the purposes of this Part, the regulations [MO 54] may also make provisions in relation to:
> (aa) the operations of a pilotage provider, including, but without limiting the foregoing:
> (i) the duties of a pilotage provider and the manner of discharging those duties; and
> (ii) the professional relationship between a pilotage provider and a licensed pilot; and
> (iii) the making by the Authority of safety management codes for pilotage providers; and
> (iv) the observation of such codes by a pilotage provider and by a licensed pilot under the control of a pilotage provider; and
> (v) matters relating to pilotage safety management systems including the content and implementation of such systems; and
> (vi) the keeping of records by a pilotage provider; and
> (vii) training of pilots, and monitoring of their performance, by a pilotage provider; and
> (viii) the professional liability of a pilotage provider and the limitation of that liability; and
> (a) the duties of a licensed pilot and the manner in which a licensed pilot is to discharge his or her duties; and
> (b) the professional relationship between a licensed pilot and the master or other officers of a ship, including provisions in relation to the professional liability of a licensed pilot and limitation of that liability; and
> (c) the keeping and maintaining by a licensed pilot of records relating to pilotage carried out by the pilot.

The inclusion of Section 186D (aa) powers in the Act meant that an issue of MO 54 could contain any regulations related to pilotage safety management, all of a provider's operations, the content of a pilotage SMS and a provider's liability. While the requirement for a provider to have an SMS had been in place in MO 54 (issues 3 and 4) since the Code's implementation in 2001, the new powers in the Act provided for a far greater potential scope for MO 54 provisions.

In 2011, issue 5 of MO 54 did not include the Code as an appendix but its main elements, the check pilot system and pilot transfer standards, were incorporated into the relevant provisions of these marine orders.[75] In addition, a number of provisions specifically refer to a provider's SMS (Appendix C, item 3), which, for the first time in MO 54, has been defined as follows:

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[75] AMSA, *Marine Orders Part 54, Coastal Pilotage,* Issue 5, 2011.

> Safety management system, for a pilotage provider, means a system for coordinating and managing the provider's operations that minimises the risk of personal injury and environmental damage.

However, given the definition of a pilotage provider as one who only assigns or allocates pilots, and the providers' traditional role, the reference to 'the provider's operations' above does not indicate the need for a pilotage SMS. Furthermore, there is no provision that clearly indicates that the SMS should include content that directly relates to the conduct of a pilotage or that the SMS provide standard procedures for all routine, significant and critical pilotage operations. Nor is the responsibility for managing pilotage risk assigned to a provider or any other organisation. Instead, a demerit points system has been introduced whereby a provider's licence[76] can be suspended for non-compliance with certain provisions, including some related to the activities of its pilots (Appendix C, item 3).

3.3.2 The situation in 2011

For nearly two decades, the provisions of successive issues of MO 54 have prescribed the safety framework governing coastal pilotage. In adopting this particular formulation of performance based marine orders, AMSA assumed a degree of responsibility for the qualifications, training and competency of pilots. Under the various issues of MO 54, the traditional reliance on pilots and their licensing process to ensure safe pilotage has continued and pilotage providers have had little or no connection with the management of the actual pilotage task.

Roles and responsibilities

Pilotage providers are not pilot organisations within the framework that is in place under MO 54. The primary objective of a pilot organisation, as described in section 3.1, is to manage risk during pilotage. A provider's defined role is to assign and allocate pilots to ships and, consequently, their objective is to operate a pilot booking and pilot transfer service. The transfer service is the main business of providers and they comply with the provisions of MO 54 to the extent necessary to operate that service. While pilots are necessary for every provider's business, the provision of the actual pilotage services is a separate matter because, under successive issues of MO 54, pilotage itself has not been a provider's responsibility. Neither has any provider proactively decided to manage a complete pilotage service and develop an appropriate pilotage SMS.

Since 2001, in accordance with MO 54 (issues 3 and 4), individual pilots have been responsible for managing risk during pilotage consistent with the principles of passage planning and bridge resource management. To assist pilots and better manage risk, AMSA has put in place measures related to pilot training, codes of conduct, fatigue management and check pilotage, and has issued numerous pilot advisory notes (PAN).[77] However, an unintended result is about 80 different individual systems (one for each pilot), or variations on systems, for the same pilotages. A uniform pilotage standard has not been a requirement in successive

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[76] A pilotage provider licence issued to a provider to conduct business as a provider replaces the document of compliance (DOC) that was previously used to authorise a provider.

[77] A Pilot Advisory Note or PAN contains AMSA advice or guidance considered relevant to coastal pilots. The PANs cover a range of subjects, including navigation and pilotage.

issues of MO 54 nor has such a standard been developed by pilots through a professional organisation or collegiate body. In contrast, a standard pilotage SMS is the norm in many major Australian ports.

Since neither a pilot organisation, as defined in section 3.1.1, nor an overall collegiate pilot body exists in coastal pilotage, and because AMSA does not itself manage pilotage services (nor has it developed a pilotage standard framework), the effectiveness of the various piloting systems in use depends entirely on the check pilot system (described in section 3.7). One of the main functions of the system is to assess the adequacy of an individual piloting system in accordance with AMSA-defined criteria (Appendix D, item 1). The system's other function is to assess pilot competency. It has therefore become the responsibility of check pilots to ensure that their peers conform to an acceptable, but not specifically defined, piloting standard.

No organisation has taken on the role of managing risk during pilotage on a day-to-day basis because no MO 54 issue (previous or current) has specifically assigned this responsibility to any organisation. In this situation, AMSA has initiated a number of measures, such as the Code and the check pilot system, to better manage risk. However, the different roles and priorities of pilots, providers and AMSA, and their working relationships (discussed in section 3.9), further complicate the management of the safety risks associated with pilotage. Furthermore, the former Code's objective to ensure that all pilotage operations were covered by an SMS has not been achieved and, as explained in section 3.3.1, issue 5 of MO 54 does not clarify this objective.

In submission to the draft report, Ports Australia[78] stated that the situation described above was the key issue, indicative of a systemic failure. It believes that AMSA should develop the appropriate regulatory model where, rather than providing pilots directly with inputs, providers were held accountable for outputs. Ports Australia stated that it has not seen any indication that providers were reluctant to take on this role. To further illustrate the issue, it cited the following from one of its members:

> The simple fact remains that MO54 still falls short of ensuring a systematic and safe approach to pilotage, because it is not directed to companies operating the service, but to the Pilots themselves...

Ports Australia also submitted that it had touched on this key issue with AMSA in the past and had 'emphasised that failings that had been reported in service levels, culture and so on are due, in the first instance to regulatory, not market failure'.

According to Ports Australia, this central and key issue gets lost in issues and detail provided in the following sections of this investigation report because of the methodology used and the survey of pilots, in particular.

However, while the absence of a pilot organisation(s) in coastal pilotage is central to the other safety issues identified, it is not the only issue. Almost all of the other issues identified reflect this central issue, and although addressing it should be a first and significant step in improving coastal pilotage in an effective system of safety, it is not the only step necessary or the only issue that needs to be addressed. The following sections of the report describe how, and to what extent, this core issue of organisational responsibility influences other key areas, and explain why addressing the other issues in isolation will have limited success.

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[78] The peak industry body representing all port authorities and corporations at a national level.

3.4 Coastal pilotage management

The defining feature in the management of the coastal pilotage services, and an apparent flaw in the system, is the separation of responsibilities between pilotage providers and the pilots with whom they have a contract for service. The providers take bookings from ship owners, charterers or agents requiring pilotage services (their clients). The ship is then assigned to a contracted pilot, a separate business entity, and his transfer to and from the ship is arranged by the provider. The pilot is responsible for the safe management and conduct of the pilotage. Hence, provision of the actual 'pilotage service' is sub-contracted to an individual pilot with no organisational responsibility for the safety management of the services provided.

All three pilotage providers own and operate pilot boats or helicopters to provide the pilot transfer services. Operating transfer services and contracting licensed pilots to provide pilotage services in the manner described above has resulted in each provider having comparable management arrangements. Other similarities in the providers' management are a result of the need to comply with MO 54.

3.4.1 Pilotage provider safety management systems

All the pilotage providers maintain a documented SMS manual, in accordance with MO 54, that mainly covers operations that occur before and after a pilotage. At the time of the investigation, these SMS manuals mentioned piloting related subjects in general and to varying degrees, usually by referring to an AMSA document such as MO 54, the former Code, the pilot training program or PANs. The SMS and operations of providers are regularly audited by AMSA (discussed in section 3.4.7).

Australian Reef Pilots

The AMSA approved and audited SMS manual[79] under which Australian Reef Pilots operated as a provider was a consolidated document containing detailed policies and procedures to comply with the provisions of MO 54 (issue 4). The safety and environment policy stated that the objective of the SMS is to ensure the company's activities are sufficiently controlled to protect personnel, pilot sub-contractors (particularly in relation to fatigue management), property and the environment from all risks that can be reasonably expected.

The SMS manual also contained procedures, known as work instructions, of which some are related to the activities of pilots. The work instructions more relevant to piloting included training, pilot code of conduct, pilot transfers, under keel clearance and emergencies during pilotage. Throughout the SMS manual, wherever there was a need to address a piloting related matter, the reader was referred to an AMSA document (MO 54, the Code, the pilot training program or PANs). Many work instructions contained the same or similar general guidance to that contained in documents such as the pilot training guide. Hence, the SMS manual did not provide pilots with any specific guidance for piloting such as defined standard procedures for the pilotage task.

A number of documents, forms and records associated with the SMS were maintained by Australian Reef Pilots and audited by AMSA. Some of these records related to the training, rosters and fatigue management of pilots.

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[79] Australian Reef Pilots, *Quality Management System*, Updated - 10 February 2011.

In submission to the draft report, Australian Reef Pilots stated:

> ARP's Safety Management System, containing well documented work instructions and an operations handbook for pilots, does in fact cover topics such as Passage Planning, Pilotage Communications, Underkeel Clearance and Squat, Pilot Code of Conduct, Fatigue Management, Casualty Procedures, Bridge Resource Management, Incident Reporting, REEFVTS Procedures etc.

However, while these subjects were covered in general as stated above, there were no standard procedures and passage plans in the provider's SMS manual. Check pilot records (discussed in section 3.7) show that each pilot had his own procedures, practices and plans and while some were similar, there is no one standard. Although general guidance can form the basis of useful standard procedures, it cannot replace the procedures. For example, the provider's SMS manual states:

> All pilots are to be aware of the requirements of Bridge Resource Management and endeavour to create an environment on the bridge whereby the Master and navigating officers understand that they are part of a team. Remember: Communication - Open, interactive, closed loop; Briefings and debriefings; Challenge and Response - a bridge environment where challenges are expected, made and responded to; Short term strategy; Delegation; State of the Bridge - situational awareness.[80]

While it could be useful to reiterate these bridge resource management (BRM) principles, which are really desired behaviours, all pilots would be aware of them because they have completed a BRM course, from which these principles have been extracted. However, implementing effective BRM involves measures such as standard passage plans and checklists, and an SMS that includes such content will be much more useful to a pilot.

Therefore, Australian Reef Pilots submission that it 'is continuing to update and expand its SMS in respect of the actual pilotage task as part of its commitment to continuous improvement' is very positive.

Torres Pilots

The AMSA approved and audited SMS manual[81] under which Torres Pilots operates as a provider was a concise document containing sections covering the 11 provisions of the former Code in the same order and with similar content. Some detail was provided in 21 attachments covering a number of subjects. The stated objective of the SMS is to promote safety at sea within the GBR region, prevention of injury or loss of life and the avoidance of damage to the marine environment and to property. This objective is essentially the same as that of the former Code.

A number of the SMS attachments were related to the activities of pilots. Those that were more relevant to their activities included pilot transfer procedures, pilot rosters and code of conduct. A number of documents, forms and records associated with training, rosters, fatigue management and incident reporting were also maintained. The SMS included frequent references to MO 54, the Code, the pilot training program and PANs but it did not provide pilots with any specific guidance for piloting.

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[80] ibid. Work Instruction No. 13.

[81] Torres Pilots, *Pilotage Safety Management System*, Revision - 13 March 2011.

Hydro Pilots

The AMSA approved and audited SMS manual[82] under which Hydro Pilots operates as a provider was a document containing eight sections covering subjects as required by the former Code. The SMS included policy statements to the effect that Hydro Pilots is committed to achieving and maintaining a safe and healthy workplace. The company's environmental policy is to maintain the highest possible standards while operating in the environmentally sensitive area of the GBR and environs.

The SMS section titled 'procedures' comprised six procedures that mainly covered the logistics of providing pilots by helicopter transfer. The section related to fatigue management was more relevant to the activities of pilots. A brief code of conduct included some relevant general guidance. A two page section that referred to AMSA requirements comprised the check and training manual. A section containing forms included an incident report form. The SMS manual frequently referred to AMSA documents such as MO 54 and PANs. This manual, like the SMS manuals of the other providers, did not provide pilots with any specific guidance for piloting.

Summary and pilot views

It is evident that providers' SMSs were not intended to provide specific guidance for piloting, but rather to meet the providers' specific legislative obligations. For example, guidance for fatigue management and incident reporting was included in the SMSs to meet the requirement for pilot compliance in these areas. Pilots could also use these SMSs as a guide or reference document to develop their own procedures for piloting.

As noted in section 3.3.2, each pilot had his own piloting system with passage plans, checklists and forms which were not part of the provider's SMS. Their individual piloting practices were not documented anywhere. Hence, each pilot performed the pilotage task using his own system and this made the provider's SMS relevant only in terms of pilot booking and transfer, incident reporting and fatigue management. The providers' SMS manuals were not of any significant relevance in conducting any particular pilotage.

In the ATSB survey, 18 pilots indicated that they had not been provided with an SMS manual by their provider and a further five pilots did not know if they had (Appendix A, item 15). Sixty-four pilots responded to a subsequent question about the usefulness of their provider's SMS for piloting (Figure 9). It is also worth noting here that in addition to the 27 pilots who indicated that the SMS was either not at all useful or a little useful, 18 others were not fully aware of its existence or contents.

It is possible that pilots who found their provider's SMS useful may believe that it achieved its objectives, given the separate responsibilities of pilots and providers, as defined in the former Code. In this respect, their mixed views about the Code's effectiveness are also relevant (Appendix A, item 14). In general, pilots engaged by Australian Reef Pilots expressed a less positive view on these subjects than did the pilots with the other providers.

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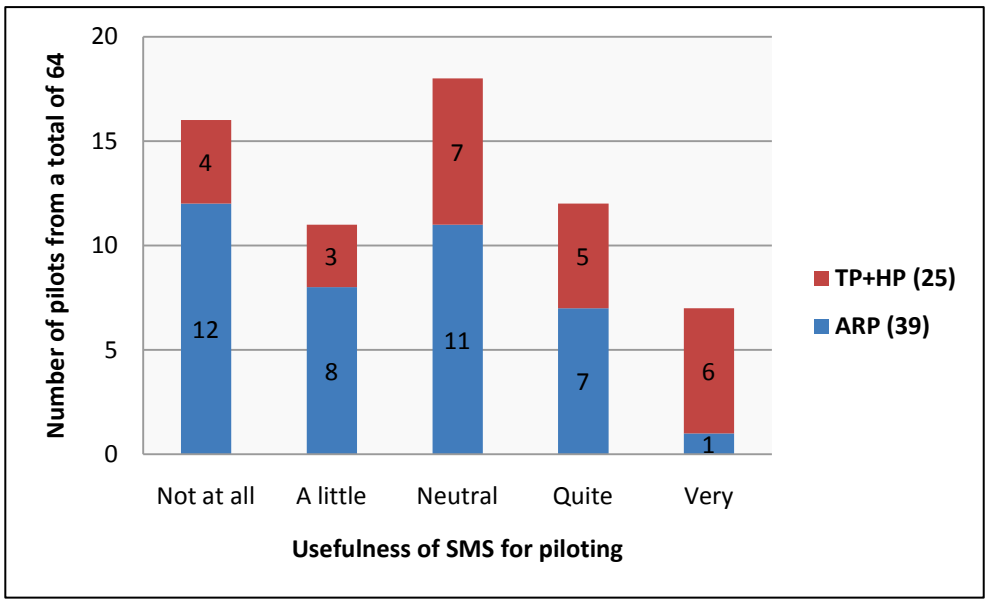
[82] Hydro Pilots, *Safety Management System*, Updated - 28 Jan 2010.

Figure 9: Usefulness of provider's SMS for piloting



3.4.2 Recruitment of pilots

For a number of years preceding 2011, the AMSA requirements for a trainee pilot licence have included an unrestricted master's certificate (or equivalent Royal Australian Navy qualification), minimum recent experience as master, mate or pilot, a seafarer's medical fitness certificate, bridge resource management training and an entitlement to work in Australia. Other requirements that have been more recently included are a trainee pilot induction course, a psychometric assessment and English language related testing.

Before 1993, masters aspiring to join the former pilot service, and identified as suitable by serving pilots, became known to the pilot service over a period of time.[83] The main entry requirement for the former service was significant experience in the GBR area and time in command. The candidates either approached the service or those that were considered suitable were invited to join. Essentially, the assessment of their experience, capability and suitability was made by their future peers through a ballot. Approval for their selection was endorsed by the service's secretaries. The process was competitive and, according to a pilot who joined the former service, less than 10 per cent of applicants succeeded.

In 1993, AMSA re-defined the pilot entry requirements. The basic requirements include an unrestricted master's certificate, recent watchkeeping experience and a seafarer's medical fitness certificate. As Torres Pilots had a small number of pilots (including three who came out of retirement), it undertook an energetic recruitment campaign to meet demand from its clients and recruited eligible trainees, many with local area experience. Australian Reef Pilots had a sufficient number of pilots to meet demand and did not initially recruit.

In the years leading up to 2000, Torres Pilots continued to expand, recruiting pilots who met the entry requirements and, preferably, had local area experience. The competition between the providers led to significant recruitment as each provider

[83] Twenty one pilots who started with the former service were still piloting in January 2011.

had to meet demand with their own contracted pilots. The steady increase in traffic and the retirement of some older pilots increased demand for new pilots.

Another factor that increased demand for new pilots after 1993 has been a trickle of pilots leaving (a couple every year or so) to take up other employment, usually in port pilotage or administration. More recently, the departure rate appears to have increased. For example, of the 82 pilots who participated in the survey, at least five pilots retired and eight others left coastal pilotage in the 12 months following the survey.[84] By contrast, a pilot who started in the former service stated that just three pilots left the service (not retired) in the period between 1950 and 1990.

Over the years, a few pilots first recruited and engaged by Torres Pilots have been recruited by Australian Reef Pilots. Hydro Pilots expanded from three pilots when it started to five pilots before the company was sold in 2006 and the number of pilots gradually declined. At the time of the survey (2011), Hydro Pilots was contracting two pilots. In recent years, Australian Reef Pilots has recruited qualified mariners to cover pilot retirements and meet service demands.

As a result of the diminishing number of Australian ships and seafarers, most of the pilots recruited since 2000 have not been drawn from the traditional pool of recruits with local area experience. Hence, many new entrants did not have previous local area experience. In the survey, 20 pilots indicated that their primary qualifications were obtained overseas. However, their qualifications are recognised in Australia and those with recent seagoing experience (mostly overseas) have a working knowledge of a shipboard SMS under the ISM Code.

In submission to the draft report, Maritime Safety Queensland (MSQ) pointed out that pilot recruitment needs to be closely examined given the forecast increase in shipping and the shrinking pool of professional seafarers in Australia. It feels that adopting a new framework for the qualification and experience levels of pilots and exploring other sources for new pilots is necessary, and noted the recruitment of RAN navigators in recent years.

The pilots' survey responses with regard to their own recruitment suggest that, in general, the selection and recruitment process of pilotage providers is not uniform but has, over time, become more structured. Overall, the process is focused on an applicant meeting the AMSA entry requirements on which the selection criteria are based. Despite a diminishing number of suitably qualified applicants from within Australia and an increasing number from overseas, there does not appear to be an excessive number of applicants to make the recruitment process overly competitive.

None of the pilotage providers describe their pilot recruitment process in their SMS or quality manuals.

In submission to the draft report, Australian Reef Pilots stated that its pilot recruitment is managed by a recruitment committee through a structured selection process based on criteria and evaluation methodologies developed by professional human resources consultants and a panel of expert pilots. The provider advised that this process is described in a commercial-in-confidence document.

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[84] The eight pilots that took up other employment included all three trainee pilot licence holders, none of whom completed their training. In this period, none of the five licensed pilots not engaged by any pilotage provider at the time of the survey, resumed work in coastal pilotage.

Torres Pilots submitted that it maintains a pilot recruitment and manning plan to identify future trainees. Selection involves verifying applicant qualifications with AMSA and considering their background and command experience. Suitable applicants are interviewed by the provider's management with a senior pilot present if considered necessary. The applicant then undertakes two observer voyages with experienced pilots to assist the applicant in making a decision and allow the provider and its pilots to assess the applicant's aptitude for training. An applicant's references, including any from amongst the provider's pilots, are also considered.

There is, however, a difference in how pilots perceive their recruitment process to that described by the providers. The comments of pilots in the survey and interview, including the comments of some who were recruited in recent years, do not suggest processes that are as formal or defined as those indicated by their providers.

A trainee pilot licence must be obtained before a pilot can start training. Most applicants first contact a provider to assure themselves of an opportunity to train and of probable employment before applying to AMSA for a trainee pilot licence. Provided applicants meet the qualification, medical and other AMSA requirements, they are issued with a licence.

Therefore, obtaining a trainee pilot licence is the defined and formal part of becoming a coastal pilot and the recruitment process is centred about it. Effectively, AMSA's licensing process for a trainee is also a principal risk management tool for pilot recruitment.

3.4.3 Pilot working arrangements

Working arrangements and contractual terms are critical to creating an environment that allows individuals to concentrate on the service they provide rather than being distracted by professional dissatisfaction or feelings of insecurity.

On the face of it, the contractual arrangements between the pilotage providers and the pilots whom they engage would seem to be simply a commercial matter, unrelated to safety and safe operations. However, when contractual issues affect the performance of pilots, safety can be compromised. The working arrangements of pilots have the potential to influence everything from pilot training to the safe conduct of pilotages.

The contracts or agreements between pilotage providers and pilots identify the provider and the pilot as separate business entities and are generally valid for 3 years or more. Since 1993, pilots have provided their services exclusively through one provider, whether or not their contracts contained exclusivity clauses. At the time of the survey, the contracts offered by all providers included exclusivity clauses or implied this condition. For example, the Torres Pilots contract stated:

> The pilot will not assist a competing pilot organisation nor in its formation hold any official position with a competing pilot organisation during the currency of this agreement.
>
> Application to other pilot organisations will allow the Manager [Torres Pilots] to terminate this agreement if the Manager in his absolute discretion deems that termination is in the Manager's best interests.[85]

[85] Torres Pilots, *Service Contract 2011*, Clause 11, SMC 007 Revision 13 – IMM Contract.

The key point here is that individual contractor pilots provide their services through a single rather than multiple pilotage providers. Each provider has different arrangements for remunerating and/or assisting pilots with regard to pilot transfers and fees, travel, accommodation, rosters, training and licensing. All of these matters are decided and controlled by providers and, in practice, are not open to negotiation by pilots, either individually or collectively.

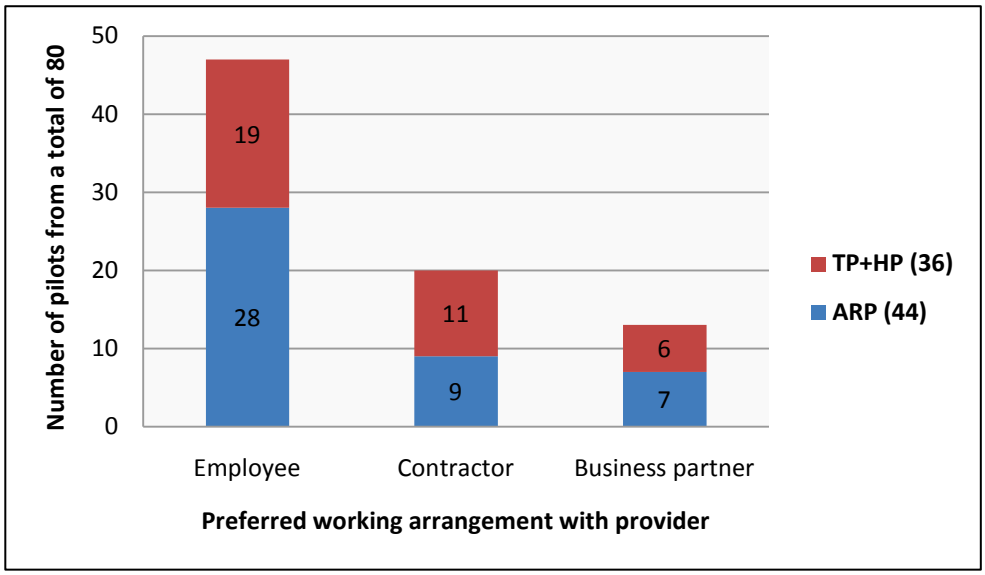
As outlined in section 3.4, providers take bookings from clients (often through a ship's agent) requiring pilotage services. The cost of a pilotage service to a client (pilotage charge) is agreed with the provider. Each provider has regular clients with whom they have negotiated certain pilotage charges, depending on factors such as the expected volume of future bookings. Other clients pay their provider's standard pilotage charge or negotiate another rate. The rate for a particular pilotage varies as it is set by competing providers. There can be a number of standard and negotiated rates for a pilotage between the same two locations or pilot boarding grounds. The rates are not directly proportional to pilotage distance or duration and no component of pilotage charges are specifically based on ship size, draught or speed.

Pilot transfer costs account for a major part of pilotage charges. For example, the PSA inquiry (section 2.6 refers) found that Blossom Bank helicopter transfer costs (post-June 1993) were about 90 per cent of the Hydrographers Passage pilotage charge. Torres Pilots' pilotage charge schedules (2008 and later) indicate that these helicopter transfer charges are generally about 75 per cent of the pilotage charge for that route. The provider's pilot boat transfer charges (boarding and disembarking) have, over the years, generally comprised a little over half of its Great North East Channel pilotage charges and about 40 per cent of its Inner Route pilotage charges.

The remaining part of pilotage charges cover a provider's other costs, including pilot remuneration. The provider's contractor pilots are not involved in setting or negotiating pilotage charges with clients.

The ATSB survey and pilot interviews left no doubt that contractual issues are a source of discontent amongst the majority of pilots. In the survey, 59 per cent of pilots indicated their preference to be employees while 25 per cent preferred remaining contractors (Figure 10).

Figure 10: Preferred working arrangement indicated by pilots



Of the remaining 16 per cent of survey respondents, most indicated a preference to either work for a pilots' cooperative or a pilot-owned entity, some indicating a preference for shareholder status. Overall, these and some other comments in the survey suggest that many pilots wanted more control of their working arrangements even if they preferred employee status. This indicates that they considered their contractor status provided them less control of their working arrangements than what they expected as independent contractors.

Remuneration

A coastal pilot is paid a service fee (pilot's fee) by his provider for each pilotage he has performed. A pilot's total remuneration is driven by the number of pilotages performed, regardless of the pilot's working hours or days on duty.

The pilot's fee is set by the provider, or defined in the contract. The fee depends mainly on the pilotage charge (for the area or route) and, like the charge, it is not based on pilotage distance, time, ship size or draught. The pilot has no input into setting his fee other than agreeing to the terms of the contract. There are no defined hourly or daily rates for coastal pilots (through an award, regulation, or set by a co-operative or other body) on which their fees can be based.

Australian Reef Pilots has fixed pilot's fees. Therefore, two pilots performing separate pilotages between the same two locations receive the same fee. The pilot transfers and other costs are recovered by the provider from the pilotage charge.

Hydro Pilots also pays its pilots a fixed fee that is specified in their individual contract (not necessarily the same). An annual fee increment applies for the 5 year term of the contract. At the time of the survey, the contract of one of the pilots assured him of being assigned at least 96 pilotages (per year). The contracts of each of the two pilots specified that they had agreed to 'contract to Hydro Pilots exclusively'. The cost of pilot transfers supplied by its sister company, Mackay Helicopters, are recovered from the pilotage charges received by the provider

Torres Pilots distributes pilotage charges in a different way to other providers. The pilot's fee is set as a part of the pilotage charge. The fee can vary depending on the negotiated contractual arrangement or agreement between Torres Pilots and its clients. Hence, two pilots performing a pilotage between the same two locations generally do not receive the same pilot's fee.

In submission to the draft report, Torres Pilots stated that the fees earned by its pilots are aligned and proportionate to pilotage distance or duration. To support this claim, the provider compared its standard pilot's fees with pilotage duration (based on a speed of 13 knots) in the three main pilotage areas. This example indicated that the pilot's hourly rate for the Hydrographers Passage and Great North East Channel is 3 times and 2.8 times, respectively, the rate for the Inner Route. The provider noted that the higher hourly earnings recompense pilots for the time on board and between consecutive pilotages. Torres Pilots also advised that it negotiates lower pilotage charges for container ships in recognition of their faster speed.

However, Torres Pilots' numerous different pilotage charges (and pilot's fees) and the inevitably different transit durations (due to the ship's capability, ballast/loaded condition and weather) introduce a wide variability to a pilot's hourly rates. In any case, if the aim is to align pilot's fees to total time (on board and between ships), it could simply and transparently be achieved by using that time as the basis rather than different charges and fees which depend on factors that cannot be controlled.

The different methods by which providers remunerate pilots provide different levels of transparency and certainty of income. These methods and the contracts are also intended to suggest that the pilot is a self-employed contractor providing pilotage services to different clients. This relationship between a pilot and various clients is apparent in the manner that Torres Pilots has documented financial transactions.

Torres Pilots has traditionally invoiced clients for the pilotage charge on behalf of the pilot performing the pilotage and, until 2006, provided a copy of the invoice to the pilot. When a client paid the pilotage charge, Torres Pilots retained 10 per cent of the pilot's fee as its commission and paid the balance to the pilot. The costs of pilot transfers provided or arranged by Torres Pilots to the pilot were debited to his monthly account statement when incurred. The pilot's account statement detailed the pilotage charges, transfer charges, pilot's fees, commissions and other credits or debits. In case a client did not pay the pilotage charges, the bad debt was shared between the provider and all pilots. These documents provided pilots with transparency in those transactions.

The method used by Australian Reef Pilots and Hydro Pilots to remunerate their pilots does not provide the transparency described above. Pilots engaged by these providers may have a general idea of the pilotage charges, particularly if they were previously contracted to Torres Pilots or through information passed on by its pilots. However, it is apparent that they have little understanding of how pilotage charges are apportioned by their provider to cover their costs for pilot transfers, travel, accommodation and other operating costs. Nevertheless, the fixed pilot's fee provides pilots certainty of their income from an individual pilotage.

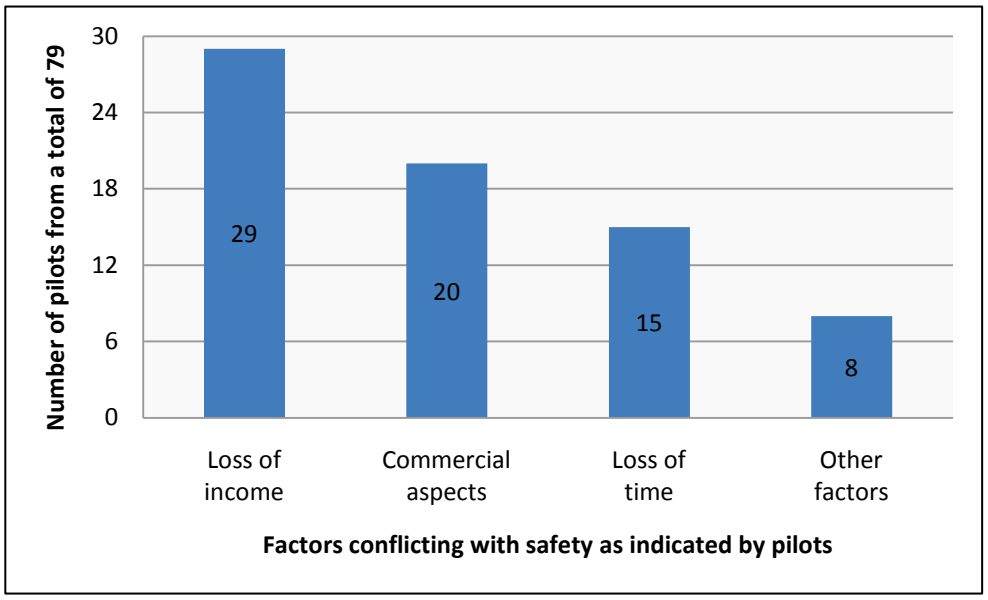
Regardless of the provider, pilot income is based on pilotages performed and not on time. Faster ships, particularly where a pilot's fees are fixed, offer pilots a better return for their time; the less time spent on a ship means the pilot is available earlier for his next job. The return for a pilot's time also varies with pilotage route because the pilot's fee is 'passage based' and not 'time based' and numerous factors impact on this time. Consequently, performing pilotages on certain routes may be more lucrative than others. In addition, long periods between pilotages, particularly when away from home on a tour of work, are a disadvantage because there is no income during these periods. The time based pay rate (using hours worked, days away from home or tours of duty duration) of coastal pilots is less than that of harbour pilots in Australia, and is discussed in the following section titled 'tours of duty'.

In the ATSB survey, 37 pilots indicated one or more factors that affected the importance they intended to give safety (Figure 11). 'Loss of income' was the most commonly indicated factor. Pilot comments indicate that this factor translates to avoiding a reduction in their earnings, and the safety risk is related to fatigue plan infringements, not reporting incidents or risk events which may result in losing a client or otherwise disadvantage the pilot, and other such reasons. Sixty-two per cent of pilots considered pilots with other providers as competitors, 30 per cent considered pilots with their own provider as competitors and a few pilots were unsure (Appendix A, items 17 and 18). Similar views on this subject were expressed by a number of pilots at interview.

The per job basis of remunerating a pilot means that there may be instances when a pilot is placed in a position where managing duty hours and other matters in a certain way could provide a better financial return for a pilot's time or some other advantage. These circumstances include recording travel and transfer time within mandatory rest periods, adjusting the completion time of a pilotage to get ahead in

turn for the next job or to position their availability for a more attractive or lucrative pilotage, disembarking earlier to expedite the pilotage and other similar methods. Such actions may appear quite safe or harmless to the pilot but there is the potential for these to detract from safety, particularly when they reduce pilot rest or when ship speed, draught or tides are not considered as they otherwise would be. While such safety risks cannot be quantified in terms of risk events toward which they may have contributed, neither can the risks be dismissed as being insignificant.

Figure 11: Factors conflicting with safety as indicated by pilots



All pilotage providers are probably aware of the conflicting priorities of pilots described above. For example, in October 2011, Australian Reef Pilots provided information to its pilots in relation to a proposed revision of the pilot contract model. The following, from a series of numbered frequently asked questions included with that information, are relevant:

14. What advantages will this package have over our present system?

    It gives pilots certainty and security of income and working life. Personal and professional lives can be planned. It relieves the stress of competing for work against colleagues so that a pilot can, while working, concentrate all his efforts on the task thus applying the strictest safety considerations to every aspect of his vocation.

20. What will stop the 'rorts' e.g. working the board to avoid ships?

    A new set of operational rules will be written and ARP Ops will strictly manage those rules under the auspices of the CEO and the Chief Pilot. In effect, every ship will be a nomination and penalties (disqualification from future work) will apply to those deliberately 'dodging' particular ships.

In submission to the draft report, Australian Reef Pilots stated that situations resulting from internal competition between pilots based on their turn were a very rare occurrence.

However, pilots engaged by Australian Reef Pilots have a very different understanding of this matter. In submission, one of the provider's senior pilots stated that the practice of pilots assessing and managing their turn for the next job 'goes on a lot' with pilots attempting to utilise their time to earn more or avoid a

loss of time. Another of its pilots elaborated on a method routinely used by pilots (including himself) to get ahead in turn was by recording the landing time in a pilot boat instead of the arrival time at the pilot house. He explained further that all pilots took great interest in upcoming jobs by being fully aware of ship traffic via emailed job sheets, and job boards at pilot houses, a practice he described as 'board watching'. One of the provider's pilots noted the potential safety risk due to ill feeling between pilots competing with each other because per job remuneration meant different earnings for working the same number of days.

The extent to which pilots may have taken a safety risk probably varies but rest periods have apparently been a common casualty in attempts to best utilise their time. The survey, pilot interviews and submissions indicate that recording of rest periods and other ways to avoid financial disadvantage are not confined to the pilots of any one pilotage provider.

In submission, a pilot engaged by Torres Pilots offered other strategies through which pilots get ahead of others in turn for the next job. One method relates to disembarking a ship earlier (off Goods Island) by persuading the master that its lighter draught allows the pilot to disembark there (the rules permit this) instead of off Booby Island, as booked. He claimed that another method used by some was unnecessary overtaking in the Prince of Wales Channel to get ahead in turn. Such cases are probably rare but if and when they occur, the relatively confined waters of the channel mean unnecessary navigational risk. According to this pilot, some pilots remained in close contact with the provider to gain advantageous jobs and were favoured by the provider in return for their support.

Tours of duty

The per job basis of remunerating pilots is further complicated by their working arrangements in terms of the duration of the periods they are on duty and the number of pilotages that they perform during those periods.

Since 2003, pilot duty rosters have complied with the requirements introduced by AMSA under MO 54 (issue 3) to manage pilot fatigue (discussed in section 3.6). These requirements place limits on the duration of a pilot's 'tour of duty'[86] and the number of consecutive pilotages that can be performed during a tour. In general, pilots undertake a tour of duty of 2 to 4 weeks followed by 3 to 5 days (sometimes more) of rest at home. The duration of these tours depends on various factors, including the pilotage area and the location of a pilot's residence.

The number of pilotages performed by a pilot during a tour of duty, and hence the pilot's income, has little to do with the tour's duration. The volume of shipping traffic, the number of pilots waiting and the particular pilot's turn in the queue for the next job are amongst the main factors that determine the number of pilotages he performs. Other factors that can have an influence include the duration and/or route of the next pilotage; the port where the pilot disembarks; the traffic there; whether it is his home; and the duration of a particular tour of duty.

In the ATSB survey, pilots indicated the number of days per year they spent away from home on tours of duty and the number of pilotages they performed per year. The number of days away and the pilotages performed depend on a number of

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[86] The fatigue management plan accepted by all pilots and pilotage providers defines a 'tour of duty' as 'the time between a pilot leaving home to commence work and the time of returning home'.

factors, including the location of a pilot's home, whether or not the pilot worked full time and the pilotage area/route worked. On a day-to-day basis, these factors introduce a high level of variation in the number of pilotages performed in a given period of time. This creates uncertainty about the amount of work that will come a pilot's way and, hence, his income during a particular tour of duty.

Although some pilots choose to work on a part time or casual basis, the majority are full time pilots. At the time of the survey, 70 per cent of pilots were working full time and most of them lived in Cairns, Mackay, Brisbane and New South Wales. The Mackay based pilots worked only, or mainly, in the Hydrographers Passage and spent 38 days away from home per year, on average, to perform 112 pilotages, on average (Appendix A, item 5). Pilots from Cairns, Brisbane and New South Wales spent over 200 days away from home per year, on average, to perform 65 pilotages, on average, in the three main pilotage areas.

However, the average figures above are not indicative of the wide ranges that exist. For example, the number of days away for Brisbane based pilots ranged between 160 and 240 days and the pilotages performed was between 12 and 80 (Appendix A, items 4 and 5). In this regard, it should be noted that a Whitsundays pilotage on a passenger ship could take several days or weeks. On the other hand, the duration of a pilotage in the Hydrographers Passage is just a few hours, although boarding off Torlesse Island, PNG, significantly increases a pilot's time on board.

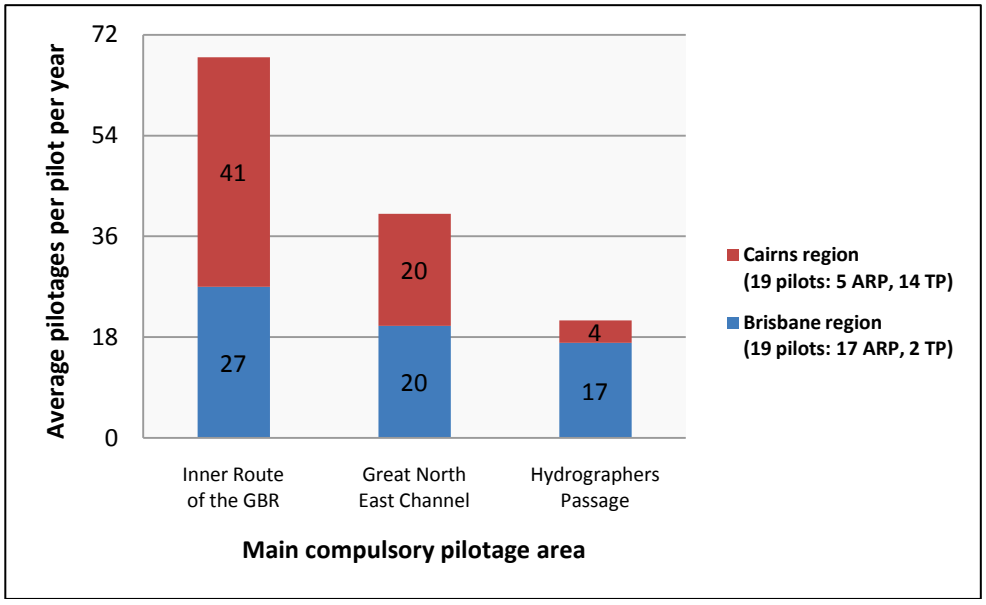
Working away from home in remote areas/on board ships is probably a major factor impacting the perception that coastal pilots have of their working arrangements. Since most pilots (except those living in Mackay and working in the Hydrographers Passage) spend considerable time away from home, they may consider the financial return for their time is low in comparison to harbour pilots in Australia. Harbour pilots in most Queensland ports (except Brisbane) earn in the region of $200,000 per year. Coastal pilots working full time earn about the same, although some earn 10 to 20 per cent more depending on pilotage jobs done in the year and pilot's fees specific to their provider (section 3.9.3 also refers). However, these coastal pilots are away from home for over 200 days per year and, in terms of time, this is more than double the annual working hours of harbour pilots, who are normally based in the ports where they work. In some remote area ports like Port Hedland, pilots stay there for the weeks when they are on duty (flying home when rostered off) but their incomes are much higher (more than twice that of full time coastal pilots).

Some of the issues related to coastal pilots working away from home can be partially addressed. For example, pilots living in ports adjacent to a compulsory pilotage area can often return home between pilotages. This is an advantage for them because they do not incur the costs of living away from home and have the benefit of more normal social interaction.

To better manage pilot rosters (and benefit pilots), Torres Pilots requires its pilots to reside in a port adjacent to a pilotage area so that they can regularly be assigned a ship without needing to travel to another port. About 75 per cent of the provider's pilots live in the Cairns or Mackay regions and this has benefited them. According to Torres Pilots, its Cairns based pilots are rarely away from home for more than twelve consecutive days. They also have the option of returning home from the Torres Strait if a wait of more than 3 days is expected between consecutive pilotages. In contrast, most of the pilots engaged by Australian Reef Pilots live in the Brisbane region. A comparison of the number of pilotages performed by full time pilots based in Cairns and Brisbane indicated that Cairns based pilots

performed more pilotages in the Inner Route than those residing in Brisbane while the latter performed comparatively more in the Hydrographers Passage (Figure 12). Pilot's fees for the longer Inner Route pilotages are generally two to three times (depending on the provider and the different pilotage charges) that for Hydrographers Passage pilotages.

Figure 12: Number of pilotages performed as indicated by pilots



Pilot tours of duty are, therefore, complicated by a range of factors with a wide variation in the number of days that pilots spend away from home each year and the number of pilotages that they perform. The per job basis of remuneration means that two pilots contracted to the same provider, and who work for the same number of days, have different earnings. Hence, the connection that some pilots made between 'loss of time' and safety refers to circumstances that could disadvantage them unless managed in a certain way (Figure 11). While this is also a matter of personal choice and probably seen by the pilot as quite safe and harmless, other pilots may view it as manipulation. The key point here is that pilots should not, on a day-to-day basis, need to consider how to utilise their time to maximise earnings.

In submission to the draft report, Torres Pilots indicated that per day earnings of its pilots (residing in the same location) averaged over a 12 month term, were similar. The provider, therefore, considers that the per job basis of remuneration does not result in different earnings for the same number of days worked.

However, what is missing from Torres Pilots' argument above is that there is a difference between 'similar' and 'same' earnings. Many factors affect those earnings on a day-to-day basis, when pilots do not necessarily consider their annual earnings. Furthermore, if the provider considers that per day pilot earnings are similar for the same number of days worked, then it would be logical, equitable and far simpler to base pilot remuneration on time rather than the per job method used.

Leave

As contractors, pilots have no 'built-in' paid leave entitlements. In 2003, as part of regulating pilot work and rest periods, AMSA set minimum recuperation periods for pilots and defined these as 'leave'. These 'leave' periods are in addition to the

rest days between consecutive tours of duty. Under the requirements, a pilot cannot work for more than 5 months without taking 'leave' and must have at least 9 weeks 'leave' per year. A 'leave' period cannot be less than two consecutive weeks.

The rosters developed for each provider's pilots meet or exceed the minimum 'leave' requirements above. Hydro Pilots offers its pilots, through their contract, an additional 3 weeks of such 'leave' per year.

These 'leave' periods are effectively unpaid because pilots cannot conduct coastal pilotages during these periods and this adds another dimension to their non-time based remuneration. A number of pilots take up other work during this 'leave' to augment their income and/or occupy their time. Such work includes piloting in small ports, consulting and teaching. These work periods are not included in the management of their coastal pilotage work and rest periods.

Other arrangements

All pilotage providers expect contracted pilots to exclusively use their pilot transfer services and pilots have always used the transfer services provided or arranged by their provider. Providers operate these services from pilot bases which are located at, or as near as practicable to, the pilot boarding grounds of the respective pilotage areas and/or to suit their business and operational requirements. Therefore, pilots who are not resident at a pilot base must travel to or from the location of these bases and, between pilotages, require accommodation. These logistical requirements are funded by each provider from the pilotage charges recouped by them. Each provider manages these costs differently.

The accommodation for Australian Reef Pilots contracted pilots is arranged and paid by the provider. Pilots are provided a pilot house or equivalent accommodation at Cairns, Mackay, Thursday and Yorke islands in the Torres Strait and off Torlesse Island in PNG; where Australian Reef Pilots' pilot bases are located. Meals are also provided in the three remote island bases. Similarly, travel for pilots while on a tour of duty is arranged and paid for by the provider. However, pilots are required to arrange their own travel at the start and the end of a tour of duty, usually to and from the base ports of Cairns or Mackay. The accommodation and travel arrangements are defined in their contracts.

Pilots contracted to Hydro Pilots live in Mackay from where their pilot transfers operate and they return home between pilotages. They are paid taxi fares, if required, to transfer to or from ships berthed at the Hay Point or Dalrymple Bay coal terminals, located about 35 km south of Mackay.

Until late 2010, pilots engaged by Torres Pilots made all their own travel and accommodation arrangements. To cover these expenses, they were paid a fixed amount called a 'relocation allowance' and this was included in the pilotage charge. The pilots stayed in motels or hotels except when at Coconut Island in the Torres Strait, where dedicated accommodation was provided and part of its cost shared among all pilots.

In 2009, two pilot houses were established at Thursday Island for pilots engaged by Torres Pilots. The first pilot house is owned by a group of pilots and used by them and some regular tenant pilots who make up about half the provider's pilots. The other pilot house is owned by Torres Pilots and used by its remaining pilots. In late 2010, Torres Pilots began arranging travel for pilots while they were on tours of duty. To fund these travel and accommodation costs, Torres Pilots retained the

relocation allowance from all pilotages, including those performed by pilots who did not use the provider's pilot house at Thursday Island.

Insurance policies for loss of income and personal accidents are generally arranged on behalf of pilots by their providers and the costs recovered from each pilot. There may also be other arrangements that each provider has in place to manage extraordinary costs incurred, such as non-payment by clients and expensive charter flights. For example, Torres Pilots apportions such costs equally amongst its contracted pilots.

Summary

In general, the working arrangements of coastal pilots are largely determined by Australian Reef Pilots and Torres Pilots, the two main pilotage providers. Each pilot provides services through a single provider. Long term contracts, with exclusivity clauses and/or similar restrictions, have ensured that pilots are only contracted to a single provider. Since pilots are not providers, they cannot offer their services directly to clients.

The provider sets the pilot's fee either as a fixed amount or some part of the pilotage charge. The pilot's fee is 'passage' not 'time' based and, therefore, a pilot can only increase his earnings by performing more pilotages. Furthermore, the pilot's fee varies with the pilotage area and there are also different fees in the same area. As pilot earnings are not directly related to time, there is a natural motivation for a pilot to utilise available time to maximise the number of pilotages performed. Safety requirements, particularly AMSA mandated rest and leave periods may be seen by some pilots as an impediment to their potential earnings.

The principle used by providers for deciding pilot travel, accommodation and other arrangements is similar to that used for pilot remuneration. These matters are decided by the providers and funded from pilotage charges (although Torres Pilots documented financial transactions to show its pilots as separate entities, distinct from the provider). Effectively, pilots work for a provider much like employees and are independent contractors only in terms of taking responsibility for the conduct of a pilotage. It is consistent then, that the majority of pilots have indicated that they would prefer to be employees. This could assure them of a fixed, equitable income and employment conditions rather than being independent contractors with very limited independence.

3.4.4 Training and licensing of pilots

As described in section 3.4.2, pilots who joined the pilot service before 1993 had extensive experience navigating within the GBR over an extended period of time. Their command time often included experience in the GBR. It was not unusual for some of them to have made a hundred or more transits of the area as mates and masters. After joining the service, those pilots did not undertake any formal training and generally made a couple of transits as observers before they began piloting independently on ships of limited draught.

In 1993, AMSA introduced a pilot training program[87] as a principal requirement for the issue of a pilot's initial licence. The training program was developed with input

[87] AMSA, *Queensland Sea Pilotage Training Program*, 1993.

from industry and pilots and was based on self-learning to acquire a degree of local area knowledge and the necessary skills. Trainees were provided with a study guide and had to complete a workbook. Their competence was assessed by experienced pilots over a number of transits of the relevant pilotage area.

A pilot who was involved with other pilots in the development of the training program stated that pilots tasked to develop the program had reservations that their intellectual property would be used to train prospective competitors. As a result, the study guide was general rather than detailed and referred to charted hazards rather than clearing marks, bearings or distances.

In 2004, the training program was revised mainly to incorporate changes related to the then recently implemented check pilot system.[88] In addition to the study guide, trainees were provided a specific workbook to document their learning in defined subjects and areas. The training program itself was basically unchanged, retaining its focus on self-learning. The number of assessed transits also remained the same.

The training study guide does not refer to an SMS or to uniform standard procedures for piloting in any pilotage area. The absence of any such guidance could be taken as tacit acceptance of individual variations in the manner that pilots compile passage plans, interact with a ship's bridge team and generally conduct a pilotage. While issues of MO 54 since 2001 have required pilots to comply with their provider's SMS, the only training or piloting material in those SMSs are references to AMSA's pilot training program, pilot codes of conduct or MO 54.

Initial training and licence

In general, trainees can obtain an initial licence for a pilotage area after four transits of that area with an assessing (check) pilot. One of the transits completed must be an assessment voyage as per the check pilot system (section 3.7 refers). The training program defines the following transit requirements for the areas and sectors thereof:

> Torres Strait: 2 east bound passages, 2 west bound passages, 1 passage in each direction must be by day, 1 passage in each direction must be by night, involve at least 2 assessing (check) pilots.
>
> Cairns to Thursday Island: 2 north bound passages, 2 south bound passages, involve at least 2 assessing (check) pilots.
>
> Great North East Channel: 1 northeast passage, 1 southwest passage, 1 passage should be by day if practicable, 1 passage should be by night if practicable, involve at least 2 assessing (check) pilots.
>
> Hydrographers Passage: 4 passages, one in each direction by day and one in each direction by night, [and include the area] between Creal Reef and Blossom Bank, involve at least 2 assessing (check) pilots.
>
> Whitsunday Islands: Assessment voyages not required.[89]

The requirements for the Torres Strait sector refer only to the Prince of Wales Channel. An Inner Route licence covers the Torres Strait and Cairns to Thursday Island sectors. Similarly, a Great North East Channel licence covers the Torres Strait and Great North East Channel sectors. An Inner Route licence is a pre-

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88 AMSA, *Queensland Coastal Pilotage Training Program*, Version 1, October 2004.

89 ibid. p.49, *Study Guide, Section 3, Assessment of Competence.*

requisite for a Great North East Channel licence. A Hydrographers Passage licence covers the compulsory pilotage area there. Licences for the Whitsundays can be endorsed either for transits of the area only or have an additional endorsement that permits the pilot to anchor passenger ships in defined tourist areas.

As outlined in section 2.4.3, there are two main types of restrictions applicable to initial licences. An initial or restricted licence holder is not permitted to pilot a loaded oil tanker, chemical tanker or gas carrier in any area. In the Inner Route and Great North East Channel licence areas, a draught restriction also applies. In addition, AMSA has stated that the first 12 pilotages for Inner Route licence holders should be on ships with speeds of not more than 15 knots.

Since 1993, observer and assessed transits have been relied on to ensure that trainee pilots acquire the local area knowledge and skills considered necessary for the issue of a restricted licence. Consequently, a pilot's initial training is heavily focused on these transits during which all the practical learning must be completed. The check pilot assessment is expected to ensure that the transits undertaken (at least four) and the training program have provided the trainee pilot with the knowledge, skills and understanding to safely and independently conduct ships in all conditions within the restrictions of his licence.

According to a pilot who was closely involved with the development of the initial pilot training program, it was recommended that the minimum number of transits required be graduated, based on the trainee's experience in the GBR. However, this principle was not included in the training program.

It is not clear how the minimum number of transits required was decided. There could be a number of reasons, including that a similar number of transits were undertaken by new pilots before 1993. It is also possible that the increasing use of modern electronic navigational aids to supplement traditional piloting methods was taken into account.[90]

In any case, the limited number of transits undertaken by trainees (generally a few more transits than the minimum of four), usually within a relatively short period of 2 to 3 months, is of potential concern. For a new pilot with little or no previous local area experience, the few (albeit long) transits undertaken cannot provide the experience, knowledge and skill necessary for a local knowledge expert to operate confidently in a range of conditions and areas, particularly in confined passages. The GBR covers an extensive area and variations in seasonal conditions (such as the wet season during summer) over such an area relating to visibility, prevailing winds and currents is significant. There is also a wide variety of ships and other conditions encountered by pilots and a number of confined areas where practised skills and techniques are important.

Trainee pilots learn what they can by observing the supervising pilot(s) or check pilot(s) during their observer transits. Supervising pilots must have at least 5 years of experience and may provide guidance to a trainee during observer transits and assist the trainee with his workbook. They cannot assess the trainee's study modules or transits. As indicated by the transit requirements above, these assessments are completed by check pilots, who are more experienced pilots, licensed by AMSA to perform the functions of a check or assessing pilot (described in section 3.7).

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[90] Traditional methods, such as the use of visual marks, require detailed local area knowledge and different skills, and are normally acquired over numerous transits and repeated use of the marks.

According to Torres Pilots, its trainees are assessed only after one of the provider's check pilots has evaluated a trainee during an observer transit(s) and, based on his evaluation, advised the provider that the trainee is ready for formal assessment.

The trainees are responsible for their own learning and the study guide provides general guidance for developing their own piloting procedures and passage plans. The guide is mainly used to complete required study modules and the workbook. However, since there are no standard parameters within which a pilot's own piloting system can be developed, the trainees develop their own procedures by observing the varied practices of other pilots, some of which may not necessarily be the best practices. Some pilots also offer trainees their individual passage plans, checklists and notes. In the absence of a standard pilotage SMS, these varied, non-standard documents become 'unapproved' learning resources for new pilots.

In submission to the draft report, a pilot who began piloting within the last 5 years stated that effective training can only be based on clearly defined pilot skills and knowledge, and specifically developed assessments to ensure a trainee acquires the skills and knowledge necessary for a pilot. He considers that this should be the foundation of a training program and manuals to guide trainees, and believes that trainers also need to be trained. He noted that pilots need to be motivated to continually improve their skills and knowledge with rewards and recognition for their initiative including higher qualifications and the opportunity to become check pilots. He also feels that ongoing training for the professional development of pilots needs to be relevant to their task and current in terms of contemporary methods and technology.

The initial training is largely self-funded because trainee pilots receive no, or reduced, remuneration while training. Both Torres Pilots and Hydro Pilots have not paid trainees while Australian Reef Pilots has paid trainees an allowance of 25 per cent of the applicable pilot's fee. Both larger pilotage providers, on an ad hoc basis, have provided trainees with other assistance, including loans and paying part or all the fees for bridge resource management courses and pilot licences. The providers see their own role as mainly providing trainees with opportunities to undertake the transits necessary to complete the training program. Since providers are separate entities from their pilot contractors, there is no implied obligation that they fund training for independent contractors.

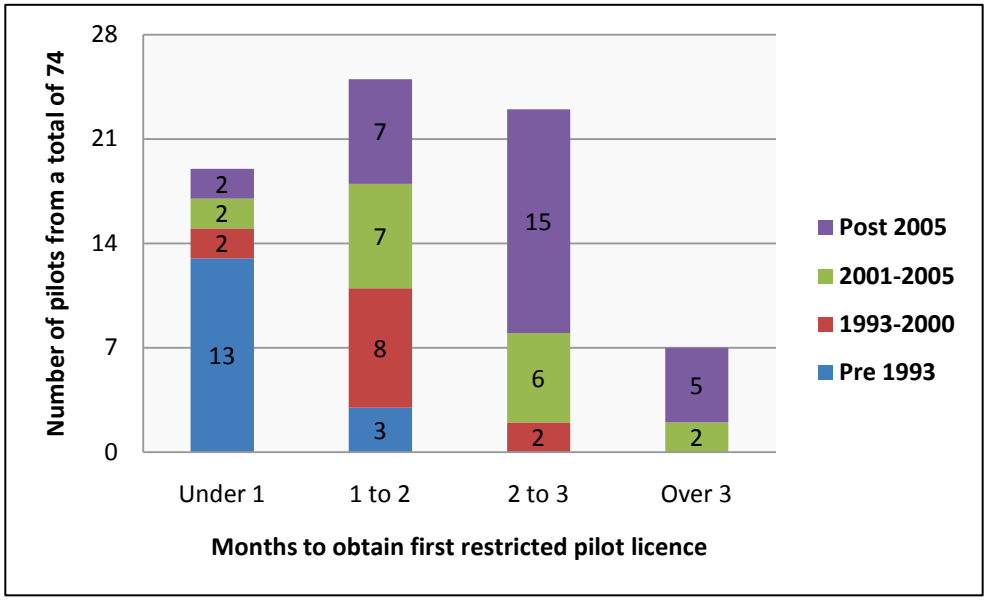
In submission to the draft report, Torres Pilots noted that all new overseas trainees will have to be employed.[91] The provider stated that all its future trainees will be employed and that two applicants (at that time) had been offered employment with salaries and benefits to start when they were ready to commence training. According to Torres Pilots, this was not due to safety reasons but to ease the financial burden on new trainees and attract high quality candidates.

The time taken to obtain a restricted licence impacts directly on the ability to start earning and depends on many factors, including the pilotage area. For example, the comparatively short Hydrographers Passage transits mean that a licence for that area could be obtained in a shorter period than one for the Inner Route. The survey indicated that over 80 per cent of the pre-1993 pilots began piloting independently in less than 1 month (Figure 13). Since then, the time taken by pilots to obtain their first restricted licence has increased and more than half the pilots who started after 2005 have taken 2 to 3 months. The increased time is partly attributable to the

[91] Amendments to the relevant Australian legislation require overseas migrants to be employed.

assessment required under the check pilot system. Another reason is that many recent entrants undertook a greater number of observer transits because they had little or no previous local area experience.

Figure 13: Months taken by pilots to obtain their first restricted licence



The survey asked pilots to rate the adequacy of their training on a five point scale (Appendix A, item 10). Forty-six per cent of the pilots rated their training as 'very adequate' and a further 27 per cent rated it as 'somewhat adequate', the two highest options on the scale. More than 80 per cent of the pilots who trained before 1993 (17 out of 21) and 70 per cent of pilots who trained after 1993 (40 out of 57) chose these options. More than 26 per cent of all pilots selected the lowest two options of 'very inadequate' and 'somewhat inadequate'. While most pilots consider their training was adequate, their comments indicate areas for improvement.

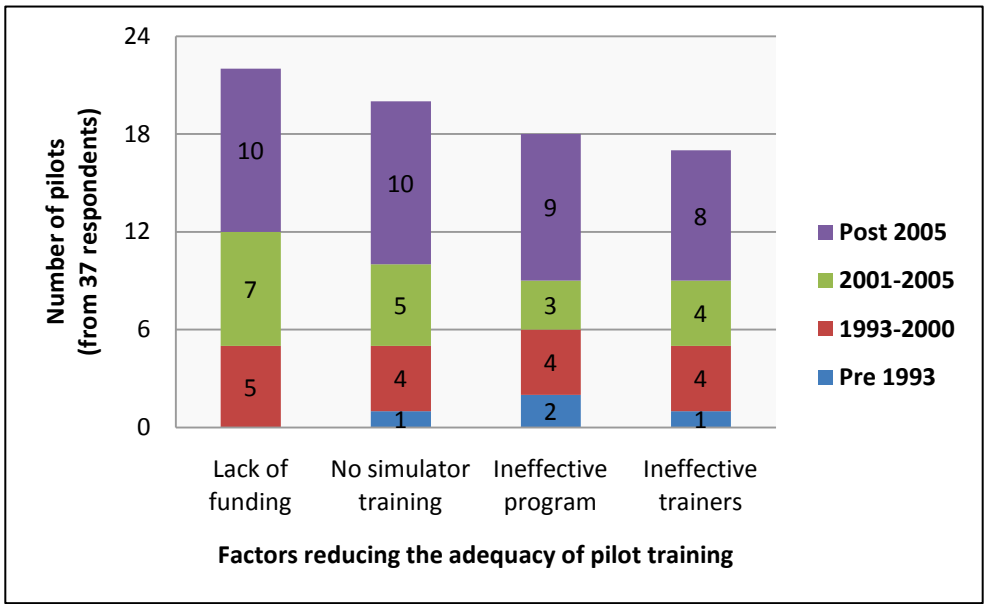
In the survey, 48 per cent of the respondents (37 out of 77 pilots) indicated areas where their training had been deficient or factors that reduced its adequacy (Figure 14). Most of the respondents (31 out of 37) were pilots who trained after 1993. The three factors that pilots felt had had the greatest impact on the adequacy of their training were the absence of modern training methods, such as simulation, a lack of funding and ineffective trainers, in that order. A few pilots also indicated a short training period and the absence of competency tests as factors.

The factors identified above provide a useful insight into pilot training and should be taken into account when implementing any measures to improve training. Since training is practically self-funded by pilots, any increase in the number of transits required for training purposes would result in a trainee pilot having little or no income for a longer period of time. During this time, the trainee also incurs travel, accommodation and other expenses making the training period seem even more onerous. The factors indicated by pilots are also closely related because little or no income is a powerful incentive to complete the training program as quickly as possible, which, in turn, may reduce the program's effectiveness.

In submission to the draft report, a pilot pointed out that trainees would focus on their training if it was properly funded and they did not feel pressured, including by their pilotage providers, to obtain a licence in the shortest possible time. Another

pilot submitted that as a new pilot he had had to wait for a couple of months after starting to pilot independently before receiving any income and that such a waiting period was not unusual. One pilot noted that training is considered a cost by both providers and pilots, the latter because they consider the training period delays when they can start earning to their full potential. Another pilot stated that providers needed persons with a pilot's licence at minimum cost and training a contractor was a cost for which they did not consider themselves responsible.

Figure 14: Factors reducing the adequacy of initial pilot training



The views of pilots with regard to funding also influence and are influenced by their poor working relationships with their providers (discussed in section 3.9). The expectations of pilots have much to do with a levy which providers started charging their clients (over and above pilotage charges) in 2002 to fund costs associated with the check pilot system (described in section 3.9.2).

The AMSA training program does not clearly address one essential aspect of pilot training that was a pre-requisite before 1993. At that time, recruitment was based on a new pilot having local area experience through frequent transits, which in effect provided a significant 'apprenticeship' period during which their aptitude for the demands of a long single-handed pilotage could be assessed. Since 1993, there has been reliance on the training program to ensure a trainee gains sufficient local area experience, whether or not the trainee had any beforehand. Sufficient experience in confined passages such as the Prince of Wales Channel is particularly important but alternate methods, such as bridge simulators to train in these areas, have so far not been used. Instead, in recent years, the check pilot system has been relied upon to ensure a trainee's competence and readiness to independently pilot ships.

A pilot who was involved in the initial development of the training program submitted that a trainee with little or no GBR experience would need a couple of years to become a fully confident coastal pilot. He acknowledged that a trainee with no or little income would find it impossible to consider such a long training period. The key point here is that during the first couple of years, a new pilot for the Inner Route and Torres Strait would complete 50 to 100 transits of confined areas such as the Prince of Wales Channel (in different conditions/ships).

While a greater number of transits on different types of ships and conditions would be beneficial in terms of experience in confined passages, the long coastal pilotages mean long training periods and financial hardship for the self-funded trainees. The use of bridge simulators to augment experience in confined areas offers a solution in terms of time but the question of funding remains because simulator training is costly and there has been no guidance or common understanding, among AMSA, providers and pilots, of who should bear the training cost. Regardless, training needs to fully address the subject of local area experience and take into account the background and experience of trainees.

A fair comparison between the training and transits undertaken by harbour pilots in Australia and coastal pilots is difficult because they require different skills and experience, such as ship-handling and tug use.[92] However, certain aspects can be compared. For example, while coastal pilotage provider SMSs refer to AMSA's pilot training program, harbour pilot training is an integral part of an SMS in ports with a developed SMS. Port pilot services also fund pilot training and pay trainees.

Certain aspects of Queensland coastal pilotage can be compared with deep sea pilotage in the North Sea and English Channel, although the latter is not compulsory. In the United Kingdom, Trinity House licenses deep sea pilots who are self-employed. Deep sea pilot candidates require at least 3 years of experience while holding an unrestricted master's certificate, including at least 1 year in command. Local area experience is required but defined as 'recent' and 'sufficient'. Trainees generally undertake two to four observer transits (a transit is about 8 days) depending on the extent and currency of their knowledge. An examination must be passed to obtain a licence which must be revalidated each year.

In the Inland Sea (Seto Naikai) of Japan, pilotage is compulsory. However, Inland Sea pilots also perform harbour pilotage. Therefore, their qualification and training requirements are similar to harbour pilots. To become a pilot, a master with at least 2 years of command experience has to complete a 9 month training program and pass an examination for a second grade pilot. A first grade pilot licence is obtained after further experience and another examination.

Another important area for training is related to the contemporary, systems-based approach to manage risk. In this regard, the more recently recruited pilots are better equipped because they have worked on ships operating with an SMS under the ISM Code. Most senior pilots have not had this experience and their knowledge in this area is reliant on AMSA's mandated professional development (discussed later in this section).

While the IMO pilot training recommendations are not specifically intended for coastal or deep sea pilots, they include subjects which are equally relevant for all pilots.[93] Subjects that may be particularly useful for coastal pilotage include master-pilot information exchange, bridge resource management, reporting incidents and accidents, simulators and continued proficiency. The International Maritime Pilots' Association (IMPA) supports the use of the IMO pilot training recommendations by

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[92] For information, to obtain an initial licence in some large Australian ports, trainee pilots undertake 40 or more observer transits over about 3 months. To obtain a full licence, the pilots then conduct progressively larger and deeper ships and the process involves several hundred transits and takes about 3 years or more.

[93] IMO, Resolution A.960 (23), *Recommendation on Training and Certification and on Operational Procedures for Maritime Pilots other than Deep-Sea Pilots*, 2003.

pilot organisations. The NMSC and ISPO guidelines referred to in section 3.1 also include guidance for pilot training.

Modern pilot training should include non-technical skills such as bridge resource management. Simulation with formal competency assessments can enhance training by exposing pilots to a wide range of possible situations. While bridge resource management training became a requirement for coastal pilots in 2002 and the check pilot system was implemented in 2003 to assess pilots, the 2009 grounding of *Atlantic Blue* raised questions in both of these areas and, in particular, the effectiveness of the check pilot system (discussed in section 3.7).

The training requirements for coastal pilots need to address a number of issues, including the number of transits and their effectiveness in providing pilots sufficient experience as discussed above. It is worth noting here that pilot inexperience was found to be a factor in the 1999 grounding of *New Reach*. In that case, the pilot had less than 1 year of experience as a coastal pilot, which indicates that a pilot may not be able to acquire the skills necessary to independently pilot ships within the structure and duration of the current training program.

Full licence issue and renewal

The AMSA training program and MO 54 (issue 4 at the time of the ATSB survey) describe the requirements for a full or unrestricted licence. The main requirement is the number of transits of the relevant area and, additionally for the Inner Route and Great North East Channel, a graduated process related to the ship's draught.

As outlined in section 2.4.3, restricted licences for the Inner Route and Great North East Channel are initially endorsed for a maximum draught of 10 m. The endorsed draught is increased to 10.5 m after 12 transits, to 11 m after a further six transits and to 11.5 m after a further six transits. Another six transits, one of which must be on a ship with a draught of at least 11 m and assessed by a check pilot, are required to qualify for an unrestricted licence. To obtain a Great North East Channel licence, two transits of the Great North East Channel are also required.

The graduated process above, therefore, entails a minimum of 30 transits of the Inner Route and Prince of Wales Channel. Full time pilots could complete these transits in 6 to 9 months. Therefore, within about a year of obtaining a trainee pilot licence, new pilots can usually obtain an unrestricted licence for the Inner Route and Great North East Channel. This process is reliant on the check pilot assessment (for a deep draught transit) ensuring that the experience gained during the training and restricted license period has provided the new pilot with the necessary skills and knowledge. Therefore, a proper, objective check pilot assessment is essential.

An unrestricted Hydrographers Passage licence can be obtained after 20 transits of the area and a full time pilot could complete these transits in a couple of months. Unrestricted Whitsundays licences require two transits of the area, none of which are required to be assessed by a check pilot.

As noted earlier, in the first year or two of piloting, pilots are probably still becoming sufficiently proficient (to the standard expected of an experienced and skilled local knowledge expert) in confined areas such as the Prince of Wales Channel. Expecting new pilots with restricted licences to gain the necessary local experience in the confined areas of such environmentally sensitive waters, a pilot submitted, was not good risk management.

An unrestricted pilot's licence is valid for 2 years. A main requirement for renewing the licence is a minimum number of transits (as a pilot) within the 2 years since the licence's issue or previous renewal.

For an Inner Route or Hydrographers Passage licence renewal, eight transits of the relevant area are required within the previous 24 months, of which four must be within the previous 12 months. The transits required for the renewal of a Great North East Channel licence are four and two within the previous 24 and 12 months, respectively. The Whitsundays licences can be renewed if pilotage duties have been carried out in the area at any time during the previous 24 months.

Another requirement for licence renewal is a check pilot assessment voyage during a transit of the relevant pilotage area. For an Inner Route, Great North East Channel or Hydrographers Passage licence, one of the transits necessary for renewal must be an assessment voyage. An assessment is not required for the Whitsundays licences.

Attendance at an AMSA-approved professional development (PD) course is also required for licence renewal. Since a PD course must be attended within 4 years of the licence renewal application, attendance at one course is usually valid for two consecutive licence renewals.

As with the issue of initial restricted licences, the process for upgrading to an unrestricted licence is heavily reliant on the check pilot system ensuring that pilots have the necessary skills and local area knowledge. The system, therefore, needs to ensure that the transits undertaken by a pilot for the issue of a higher grade or unrestricted licence have been sufficient to expose him to possible scenarios to enable him to fully understand, and safely pilot in, the conditions imposed by the greater draught and/or speed. The check pilot system also needs to ensure that pilots renewing their licences have retained the necessary skills and knowledge.

Professional development

The duration of mandatory AMSA-approved PD courses is between 3 and 5 days and pilots complete a course once every 4 to 5 years.[94] This translates to about 1 day of PD per pilot per year. Some pilots indicated that they undertake additional optional training and many choose to revalidate their master's qualifications. The 2002 pilot entry requirement for bridge resource management training was applied retrospectively. Since 2009, helicopter underwater escape training (HUET) courses have been attended by an increasing number of pilots in anticipation of HUET becoming compulsory. The survey indicated that the additional courses and training have resulted in a mean of 3.3 days of PD per pilot per year.

As a principal requirement for licence renewal, the mandatory PD course should be effective and useful to pilots. In the survey, 49 per cent of pilots provided a positive response in assessing the adequacy of opportunities for their PD, with a further 16 per cent having no particular opinion (Appendix A, item 12). However, 35 per cent of pilots selected the lowest two options on the five point scale provided. Of greater interest was that 52 pilots (about two in every three) indicated one or more factors that had reduced the adequacy of their PD (Figure 15).

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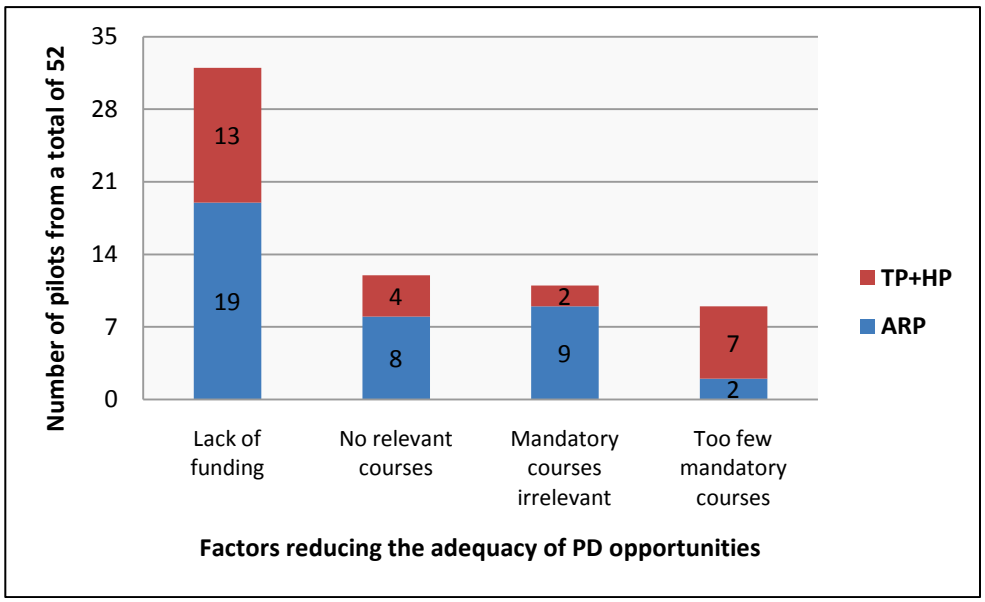
[94] The 5 day Advanced Marine Pilot Training (AMPT) course conducted by the Marine Consultancy Group (MCG) in Australia is often undertaken by coastal pilots to meet the PD requirements.

Figure 15: Factors reducing the adequacy of PD opportunities



The majority of pilots attributed the inadequacy of their PD to the lack of, or inadequate, funding and several pilots indicated factors such as no relevant courses were available and mandatory courses were irrelevant. Pilots also identified the lack of funding and irrelevant courses as having the greatest impact on the adequacy of the PD. Other factors that were claimed to devalue the mandated courses were the competitive environment, poor course location and availability, loss of income, lack of simulation to test new ideas and poor training equipment. In submission, a very experienced pilot (as a coastal pilot) stated that much better use of the time taken by PD courses could be made by ensuring the learning was relevant.

At the time of the survey, the fees for mandatory PD courses for most pilots were covered by pilotage providers. The exceptions were pilots engaged by Hydro Pilots (which has not funded these costs) and pilots 'casually engaged'[95] by Torres Pilots. Other pilots engaged by Torres Pilots have been paid PD course fees since about 2005. This initiative followed much email correspondence between the provider and its pilots.[96]

While lack of funding was indicated by pilots as a factor, this is probably because they lose the opportunity to earn income. In addition, they have accommodation, travel, and other expenses related to the PD courses. This factor may also have influenced their views about the relevance of the courses.

Standard procedures

Standard procedures, passage plans and other components of a pilotage SMS should be the basis of coastal pilot training and professional development. However, pilots have learnt mainly by observing the individual piloting methods and systems of their trainers, all of which vary to some degree. Without standard procedures or a pilotage SMS for comparison, training can be potentially confusing for trainees.

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[95] Torres Pilots has defined the term based on availability and compliance with the pilot roster.

[96] On 5 October 2004, Torres Pilots had emailed a pilot spokesman advising that it would not be funding pilot PD courses at that stage and provided various commercial reasons for its decision.

The trainees have been left to develop their own piloting system, with elements derived from the various systems to which they have been exposed.

As detailed earlier, it is worth highlighting that new pilots have fewer transits and a much shorter period in which to acquire local area knowledge and skills than those that started with the former service. The short period of time probably makes it difficult for them to assess different piloting methods and systems and learn enough to develop an effective system of their own. This process probably results in greater variation in piloting systems, which in turn is harder to check and audit.

At interview, a number of more recently recruited pilots expressed a view that check pilot assessments had provided them an opportunity to learn and understand issues that were not shared with them during training. While it is encouraging that the check pilot system has created learning opportunities, this also indicates that it may be some time after piloting independently that some opportunities present themselves and that equally important opportunities may be completely missed. At the same time, some information that might be passed on to a new pilot may represent a particular view which may be contrary to a recognised method.

Collectively, coastal pilots have accumulated a vast amount of local area knowledge over a long period of time. This knowledge is invaluable and, if validated against contemporary standards and documented, can be an excellent training resource and the basis for the standard procedures of an SMS. While the AMSA training program asks experienced pilots to pass on unrecorded 'tricks of the trade', there needs to be a more formal process to capture and pass on this knowledge.

Safe pilotage within the GBR now requires knowledge sharing and a systems-based approach for managing risk. While local area knowledge was traditionally kept a closely guarded secret and regarded as the 'tools of the trade' to be shared only with a chosen apprentice, this should no longer be the case. There is really no place in contemporary pilotage for unrecorded 'tricks of the trade' or secrets, even though some of these have been made redundant by technology.

As noted earlier in this section, the reservations that pilots had about passing on their intellectual property in 1993 probably still exist in some measure. There can also be other issues if a trainer considers his knowledge as intellectual property and other pilots as competitors, resulting in a reluctance to pass on knowledge and, thus, impede learning. In submission, a pilot stated that as a trainee with Torres Pilots there had been the option of purchasing a trainer's passage plans from him, and that his experience was not isolated. This indicates that some trainers may be inclined to pass on their knowledge (directly to a trainee or indirectly through input to an SMS) if they consider they have been suitably compensated for doing so.

Therefore, while individual systems of pilots are similar and many common practices exist, having as many systems as there are pilots is inconsistent with a systems-based approach. Contemporary risk management methods require standard piloting procedures and passage plans contained in a documented SMS.

Evolving training needs

The increase in shipping in the GBR and Torres Strait has resulted in more large ships transiting the area. In general, all ships regardless of size are now equipped with modern navigational aids that enable precise and accurate navigation to maintain a ship within a safe fairway or defined limits. Similarly, transmitting tide gauges and current meters provide useful information in real-time (normally via

VHF radio). While in no way discounting the need for a full awareness of currents, tides and terrestrial features, particularly where the ship's equipment is deficient, the pilotage task has changed significantly since the 1990s.

At the same time, the perception of risk has changed. The modern pilot is expected to manage risk through best practice. Best practice pilotage cannot be achieved without effective pilot training as part of a continually evolving SMS. The factors that need to be taken into account when developing or reviewing training include changes to technology as outlined above, contemporary risk management systems, available training aids, and the knowledge and experience of trainees. Equally important are advances in international standards of training, certification and watchkeeping for seafarers, differing standards of ship crews that may be encountered and strategies that a pilot can employ to deal with the diversity and standards of different bridge teams to work with them effectively.

Significantly, the systems-based approach to managing risk has shifted the focus from learning only technical piloting skills to include the appreciation of human factors necessary for bridge resource management. The aim is to use all available resources to implement defences against inevitable single-person errors with the aim of preventing serious incidents. There is also increasing use of multi-layered systems of defences which include, for example, vessel traffic services. These systems and additional layers of defences cannot be fully effective unless they are fully understood and supported by pilots.

Since about 2000, rapid technological advances have resulted in significant changes to electronic navigational aids. Electronic charting systems (ECS) with global positioning system (GPS) input have had a particularly significant impact on pilotage methods. The use of personal laptop computers equipped with such ECSs is widespread among coastal pilots. In addition, an increasing number of ships are fitted with IMO compliant electronic chart display and information systems (ECDIS) in anticipation of this equipment being mandatorily phased in from July 2012 (depending on ship type and size).

Both ECDIS and ECS are valuable navigational aids because their chart display provides real-time information about the ship's position, course and speed in an easy to understand graphical form, which enhances situational awareness. These aids reduce the reliance that coastal pilots had placed on traditional piloting techniques. While using traditional methods such as visual marks and/or radar are still appropriate options in many areas and in most conditions, these electronic aids provide further defences against error. A pilot's training and previous experience will influence his individual techniques and reliance on ECS. However, pilots are increasingly using an ECS as their primary pilotage tool. Therefore, it is essential that their training ensures they can use these aids confidently and effectively.

The pilot training program contains general guidance about using an ECS. However, pilots are not required to meet any proficiency standards relevant to the use of electronic charts nor do they undergo any specific ECS or ECDIS training. This may result in a pilot not being fully proficient with these aids, including a full awareness of their limitations. The laptop-based ECSs used by pilots are not standard across a provider's pilots, or otherwise authorised, and may not be considered sufficiently reliable.

In their submissions to the draft report, a number of pilots commented on ECS and ECDIS use. A relatively new and self-acknowledged 'traditionalist' pilot stated that 'the use of laptop-based ECSs by pilots heralds the demise of pilotage as we know

it'. He considers the basis of pilot training should be about consistently using at least three other means of determining the ship's position (visual transits, compass bearings, radar and parallel indexing, and GPS) to maximise the use of all available means. A pilot who started in the pre-1993 pilot service acknowledged the need to use ECS and similar aids but pointed out that overreliance on these reduced a pilot's ability to confidently use traditional methods. Another pre-1993 service pilot stated that despite ECSs becoming the tool most commonly used by pilots, their training and PD was very limited with regard to using such modern aids.

Two pilots who trained in recent years submitted that many senior pilots, including check pilots, were averse to using modern aids and had neither all the necessary knowledge nor the attitude to properly train pilots. They stated that such matters, in the absence of a pilotage SMS, resulted in a training culture which was in a critical condition.

On the other hand, a pilot (one of two pilots opposed to the draft report/findings) stated that areas where pilot training could be improved as suggested in the report were conducive to a 'monkey see, monkey do' culture and an overreliance on technology. In his opinion, this culture would lead to an inability to cope in unusual circumstances.

While these views of pilots could be useful when reviewing the training program, some contrasting views suggest that implementing change could pose difficulties. For example, the 'monkey see, monkey do' analogy above was also used by some pilots to describe the existing self-learning approach of observing different trainers with no uniform procedures. In any case, the key point is that, just because ECDIS and ECS are considered modern (as GPS and radar were in the past) there is no reason why they should not be effectively used to make pilotage safer. The objective of effectively using these modern aids can be achieved by ensuring that pilots who are, or will be, using these aids are appropriately trained and understand both the benefits and the risks involved in their use.

On the subject of ECS use, the Australian Hydrographic Service (AHS)[97] stated that the level of knowledge amongst coastal pilots in terms of interpreting electronic navigational charts (ENCs) and operating their laptop-based ECSs varied greatly. The AHS also indicated that pilots' ECSs and some of the navigational charts used with them were not IMO compliant, and that the charts were often out of date.

In submission, a pilot noted that the cost of navigational charts for their ECSs was a factor in pilots preferring the cheapest charts available or not updating them. He felt that all pilots should use a standard, approved and compliant system in which they were properly trained, but noted that the cost would again be an issue. He pointed out that, in the interests of safety, official and corrected ENCs were available at no cost to users in USA.

As discussed earlier, the training and professional development of pilots can be supplemented by training based on ship simulators. A modern bridge simulator includes all the IMO mandated navigational equipment, including ECDIS. A simulator can provide pilots with the opportunity to experience and manage different scenarios that may be experienced with a variety of ship types and

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[97] Part of the RAN, the AHS conducts hydrographic surveys and provides Australia's charting service under the terms of SOLAS, the International Convention for the Safety of Life at Sea, and the Navigation Act. The AHS provides products and services to enable safe navigation, support and protect the marine environment and support national infrastructure and maritime trade.

conditions in different areas of the GBR, thus enhancing competence. Importantly, simulators provide a safe and controlled environment in which to gain experience.

There are a number of modern bridge simulator facilities in Australia, including recently established facilities in Brisbane and Cairns, conveniently located for coastal pilots. These bridge simulators could augment shipboard training through structured courses that focus on transits of confined channels and areas in a variety of conditions. Time under assessment in a simulator could also form part of a suite of competency measures to complement observer transits and assessment voyages.

In submission, some pilots and those involved in pilot training made comment that 'manned model'[98] simulators could complement bridge simulators and other training for coastal pilots. A trainer at the manned model facility near Newcastle with coastal pilotage experience noted that a 3 day course at the facility would adequately enhance necessary skills amongst most coastal pilots.

The use of manned models could benefit pilots if the focus was specific training such as shallow water effects and narrow channels that replicated confined passages such as the Prince of Wales Channel or Bond Entrance. While training on manned models, like bridge simulators, is costly, one advantage is the visual perspective that it offers.

Summary

In essence, pilot training needs have rapidly evolved because of changes in technology, the greater perception of risk and the systems-based approach to managing risk which followed. Effective training and professional development should, therefore, adequately address these changed and evolving training needs.

The AMSA pilot training program based on self-learning and observing other pilots with no standard procedures, leads to inconsistent practices and cannot adequately address modern needs. Similarly, the check pilot system, by itself, cannot ensure that pilots achieve the necessary level of proficiency. A pilotage SMS that includes specific training components is a pre-requisite to address training needs.

The pilot training program needs to ensure that trainees acquire the local area knowledge, particularly in confined areas, necessary for a local knowledge expert. Given the widespread use of electronic charting systems by pilots, their training also should ensure that their knowledge and skills in this area of electronic navigation is adequate.

Finally, pilot training and professional development cannot be effective if it is impeded by funding related issues. Although as professional contractors, pilots are in principle responsible for funding their own training, the incentive to complete training as soon as possible and earn to their full potential may result in a lack of objectivity about their training needs. Given that the goal of compulsory pilotage is to protect the PSSA for public benefit, there is a case that organisations, including regulators and pilotage providers, consider pilot training as a shared responsibility.

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[98] A manned model is a scaled down model of a ship (with matching manoeuvring characteristics) that allows a trainee to be located within the model whilst manoeuvring it in water (usually a shallow artificial lake) at the training facility. The facility can include a number of different ship models and appropriately scaled fairways, narrow channels, berths and other infrastructure.

3.4.5 Pilot transfer arrangements

Pilotage providers operate two distinct services: pilot booking and pilot transfer, the latter being their main business in terms of assets and revenue. Each provider operates (or procures) its own services to transfer its contracted pilots.

Pilot transfer times and conditions can reduce the adequacy of a pilot's rest before a pilotage and, hence, impact the safe conduct of the pilotage. The transfer times and conditions are affected by the travel distances, prevailing weather, the condition and capability of the pilot boat or helicopter to operate in those conditions and their scheduling, including any time waiting at pilot boarding grounds.

In the ATSB survey and at interview, a large proportion of pilots indicated that excessive pilot transfer times and substandard boats, in particular, were the two main reasons that had, at times, reduced the adequacy of their rest before a pilotage. A larger proportion of pilots engaged by Australian Reef Pilots than Torres Pilots indicated these reasons (Appendix A, item 26). This is particularly apparent in relation to pilots' views about the condition of the pilot boats. Amongst other factors, the views of pilots about transfer arrangements both contribute to and are influenced by poor working relationships with their providers (described in section 3.9).

It is worth noting here that providers' pilot boats routinely operate for long hours in often difficult conditions and maintaining them to any reasonable standard in remote areas is challenging.

Transfer times and conditions

Pilot transfers can involve long distances in remote areas and difficult conditions. Transfers in the Torres Strait and Hydrographers Passage involve the longest transfer times.

In the Torres Strait, pilot transfers are conducted by boat. Pilot boats based there by Australian Reef Pilots are typically about 10 to 12 m in length and 3 m in breadth although a larger boat has been used. The boats used by Torres Pilots in the Torres Strait are typically about 13 to 14 m in length and 4 m in breadth. In general, these pilot boats have an operating speed of between 14 and 22 knots[99], subject to the weather conditions. Sea conditions can have a significant impact not only on the speed of the boats but also on their movement in the waves. In addition to the transfer time, the movement and noise levels in the boats, has the potential to affect a pilot's level of alertness and rest before he begins the actual pilotage task.

In the GBR Region, the prevailing winds for most of the year are from the southeast, except during summer from December to March, when the predominant wind is north-westerly with frequent heavy rain squalls. In general, the sea conditions in the summer months with stronger monsoonal winds have the greatest impact on the pilot boats and transfer conditions.

The pilot boarding ground off Booby Island in the Torres Strait is a 23 mile boat transfer from Thursday Island which takes between 1 and 2 hours, depending on the boat's speed and the weather and sea conditions.[100] In the Great North East

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[99] One knot, or one nautical mile per hour, equals 1.852 kilometres per hour.

[100] Torres Pilots allows a boat transfer time of 1.5 hours between Booby and Thursday islands.

Channel, a transfer off Dalrymple Island involves a 35 mile boat journey from Torres Pilots' Coconut Island base and an 11 mile boat journey from Australian Reef Pilots' base at Yorke Island.

When the arrival times of two or more ships (serviced by the same pilotage provider) boarding or disembarking pilots at the same location are close together, two or more pilots can be transported in one of the provider's pilot boats. Occasionally, there is insufficient time between the scheduled arrival times of ships for the available boats to make a return journey to base and this means one or more pilots have to wait in the boat for some time while the other pilot(s) embark or disembark ship(s). Such multiple pilot transfers also reduce the high operating costs of pilot boats.

In submission to the draft report, Torres Pilots advised that both of its pilot boats based at Thursday Island are used if there is a difference of more than 1.5 hours between the arrival times of ships. The provider considers that, except in unusual circumstances when a second boat is not available, its pilots do not have to wait in a boat for more than 1.5 hours. Torres Pilots also submitted that it operated only one boat from its Coconut Island base due to various restrictions[101], sometimes resulting in longer pilot waiting times. To reduce pilot waiting periods in this area, the provider uses Yorke Island, subject to the availability of accommodation for its pilots and a safe berth for its pilot boat.

However, a pilot engaged by Torres Pilots submitted that pilots frequently spent up to 3 hours on pilot boats off Dalrymple Island and occasionally off Booby Island while the boat waited for another pilot(s). He stated that if a number of ships were expected off Dalrymple Island within a 4 to 5 hour window, which often happened, the boat did not return to Coconut Island. He noted that accommodation at Yorke Island was not always available resulting in pilots remaining on the boat. According to him, Booby Island transfer delays often occurred because the provider declared that a rested crew for the other pilot boat was not available.

Pilot transfers in the Hydrographers Passage for Torres Pilots and Hydro Pilots are conducted by helicopters operating under the safety oversight of the Civil Aviation Safety Authority (CASA). Single-engine helicopters are used during daylight and twin-engine helicopters are required for night-time operations.

The helicopter transfer from Mackay to the Blossom Bank area for a Hydrographers Passage pilotage involves a flight of 100 miles or more. The transfer takes well over an hour and in monsoonal months (December to March), strong winds and heavy rain can make conditions difficult. The transfer of multiple pilots rather than make a return journey to Mackay, for similar reasons to those described above, is common.

In submission, a pilot stated that helicopters often flew well to seaward off Blossom Bank and landed pilots on inbound ships over 3 hours before their arrival at the charted pilot boarding ground. This allows a single-engine helicopter to complete its operations in daylight, or a twin-engine helicopter to service an inbound and outbound ship in the same operation. The pilot pointed out that a pilot could sometimes spend up to 26 hours on an inbound ship as it was usual to be picked up by a single-engine helicopter returning from Blossom Bank at about mid-morning on the following day. Delays being picked up from outbound ships are sometimes

[101] Restrictions related to native title provisions for the island that limit crew accommodation, pilot boat security in severe weather and other security concerns.

up to 4 hours to allow the helicopter to service more than one ship. The pilot stated that in such situations, some masters reluctantly decided to drift, causing them unnecessary anxiety due to the delay in commencing their voyage. Helicopter availability for operational reasons, including priority for harbour pilot transfers also resulted in delays, which another pilot claimed were frequent and lengthy.

On the subject of pilot transfers in general, a pilot engaged by Australian Reef Pilots submitted that transfer resources were 'wasted' because of the duplication of services by the two main pilotage providers. He also pointed out the 'wasted' time when pilots travel to/from Torlesse Island, PNG (section 2.2.4 refers) and the long periods they are on board ships while they transit the Coral Sea to, or from, the Hydrographers Passage.

Transfer times and conditions are also affected by the capability and the condition of pilot boats or helicopters. Pilot boats, with the exception of vessels at Torlesse Island, are subject to MSQ survey for class 2C[102] vessels. In recent years, AMSA has inspected pilot boats about once a year to check compliance with the MO 54 standard.[103] The providers carry out their own inspections of pilot boats and, for the last few years, Torres Pilots has had its boats independently surveyed every year.[104]

In the survey and at interview, pilots engaged by Australian Reef Pilots made a number of complaints in relation to pilot transfers off Dalrymple Island. They also indicated overall dissatisfaction with transfer arrangements in the Torres Strait and off Torlesse Island. A number of pilots submitted comments on the ongoing poor condition of pilot boats in the Torres Strait and provided some recent examples. A pilot claimed that even when boat defects were reported to AMSA, they were not rectified and cited an example. He felt that a substandard boat was in use at Torlesse Island as it was not subject to the scrutiny applicable to boats based in Australia, and another described the PNG operation as circumventing safety standards at considerable risk to pilot safety.

The vessels at Torlesse Island are regulated by the PNG National Maritime Safety Authority (NMSA) and are located outside the jurisdiction of MSQ and AMSA. A stakeholder provided the ATSB with documents to support claims in relation to safety issues with *Tateyama Maru*, a vessel that was used as the Torlesse Island floating base. The documents included an April 2010 NMSA report listing nine detainable safety deficiencies, a September 2010 surveyor's report on hull damage from grounding and an October 2010 surveyor's report detailing numerous safety deficiencies. None of these reports, or the deficiencies listed in them, is documented in Australian Reef Pilots' records (section 3.4.7 refers).

Both Torres Pilots and Australian Reef Pilots acknowledged that operating pilot boats, particularly in remote areas, is a challenge because of the availability and/or cost of boat crews, equipment, spare parts and fuel. The providers indicated that, within practical limits, they had addressed problems with boats and each had plans to build new boats in accordance with enhanced standards to be implemented from

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[102] A class 2C vessel is a seagoing non-passenger ship for use in all operational areas up to, and including, restricted offshore operations. Offshore restrictions for the class 2C pilot boats are defined as within the GBR Region and the Torres Strait zone, or within 50 miles of the coast.

[103] AMSA, *Marine Orders Part 54, Coastal Pilotage*, Issue 4, 2006, Annex A, *Pilot Transfer Standard for Queensland Coastal Pilotage*.

[104] The 2011 survey records indicate a high and/or improving standard of the provider's pilot boats.

July 2011.[105] The providers' records, discussed in section 3.4.7, indicate that boat defects, including a few reported by pilots, have been regularly rectified.

The split responsibility for regulatory oversight of pilot transfer arrangements between AMSA, MSQ, CASA and NMSA is a factor that also complicates matters.

AMSA oversight of pilot boats

The AMSA safety oversight of the pilot boats is intended to check compliance with the MO 54 pilot transfer standards. An AMSA 'pilot boat audit checklist' is used to identify non-conformances[106] with a range of criteria, including design, construction, equipment, seaworthiness and operation.

The audit checklists for four Australian Reef Pilots pilot boats inspected in 2008 documented a total of 10 observations.[107] In October 2010, two boats were inspected against the enhanced pilot boat standards to assist preparations for the implementation of the new standards from July 2011. The audit checklists identified a total of six items, mainly related to requirements of the new standard, which would need to be addressed. The most significant comment concerned a 1976 built boat, noting that the boat would be considered sub-standard against the new standard, indicating that it should be phased out after the new standards take effect.

Similarly, audits of two of Torres Pilots' pilot boats in October 2010 against the enhanced standards identified a total of 10 items that would need to be addressed by July 2011. In 2008, four Torres Pilots boats were inspected and a total of three minor non-conformances and one observation were documented. The non-conformance for one boat related to the clear view of a pilot ladder for the boat's skipper. The other non-conformances related to the man overboard recovery system and the emergency drill schedule of another boat.

The number, type or extent of the safety concerns expressed by pilots in the survey and at interview (sections 3.4.6 and 3.9.1 refer) are not consistent or proportionate with the findings of AMSA boat audits or the providers' records. There could be a number of reasons for this, including the working relationships between pilots and their providers (described in section 3.9). The period over which some pilots recalled their experiences includes much of the last decade. During that time, and particularly since 2005, there has been progressive improvement, or replacement, of boats and AMSA audits have focused on their condition. Other reasons may include a better condition of boats at the time of audits, different standards of each provider's boats, and pilots expecting a higher standard than the regulations require.

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[105] AMSA, *Marine Orders Part 54, Coastal Pilotage*, Issue 5, 2011, Schedule 1, *Pilot Transfer Standards*.

[106] Issue 4 of MO 54 defined the term 'non-conformity' as a deviation from requirements specified in the safety management system (SMS), or an error, which could endanger or has compromised the safety of people or the environment. In the maritime industry, major non-conformances are those where immediate corrective action is considered necessary. Where a minor non-conformance is identified, a defined period is allowed for corrective action to be completed.

[107] The term 'observation' was not defined in MO 54 (issue 4) but it is generally considered to mean a statement of fact made during a safety management audit and substantiated by objective evidence. Observations can include suggestions for improvement and positive comments.

3.4.6 Risk event reporting

Risk-related events include what are commonly known as 'near misses', 'unsafe acts', 'non-conformities', 'risk events', 'incidents', 'accidents' or 'hazardous occurrences'. The reporting of these types of events is a basic element of any SMS. The analysis of such risk event reports can initiate remedial action to prevent a serious incident or accident in the future. Analysing only incidents and accidents is a limited, reactive strategy that identifies safety issues that could have been identified earlier from the near miss type risk event reports. In addition, employing a proactive strategy through audits and inspections can identify safety issues and help prevent serious incidents.

In industries such as aviation and nuclear, where incidents can have catastrophic consequences, organisational safety experts have for many years aimed to achieve what is referred to as an 'informed' culture: a culture in which all operators fully understand risks inherent in their operation and when a risk event has occurred. An informed culture, also known as a safety culture, is made up of a series of sub-cultures: a just culture, a flexible culture, a reporting culture and a learning culture, all of which are desirable elements in managing safety. To achieve a learning culture, near misses must be reported and analysed so that lessons can be learned. These concepts of safety and culture have also been explored by Reason[108] and Hopkins[109] and are included in the discussion below. The safety culture concept is increasingly recognised by maritime industry organisations and the ISM Code application guidelines state that 'with an effective safety culture, safety and pollution are always the highest priority'.[110]

A reporting culture is closely associated with proactive reporting where individuals look out for risks that need to be reported. Reason has identified a just culture as one in which people who experience or contribute to an unsafe condition, report the event or incident and, providing they have not been either reckless or irresponsible, are not subject to sanctions. It is self-evident that individuals are unlikely to report if they feel that they will be punished, blamed or disadvantaged for doing so. It is also necessary for individuals to feel part of an organisation which learns from near misses, mistakes and incidents. In such a learning culture, individuals are not likely to become disillusioned and not report because of inaction or reports being ignored.

In essence, an effective SMS relies heavily on an informed culture which in turn is the sum of the collective values, attitudes and behaviours of the management and the individuals within an organisation. It is important that the individuals believe that they are working to reduce risk with their organisation and all opportunities to report risk are taken. The current structure and arrangements for coastal pilotage do not easily facilitate a uniform culture that would support and further these values.

Given the potentially severe consequences of a shipping incident in the GBR or Torres Strait, it is critical that all opportunities to identify and reduce safety risks are taken. Pilots encounter these risks on a daily basis, are best placed to identify risks and, therefore, reporting of all risk related events by pilots is essential.

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[108] Reason, J 1997*, Managing the Risks of Organizational Accidents*, p.196, Ashgate, Aldershot, UK.

[109] Hopkins, A 2005, *Safety, Culture and Risk: The Organisational Causes of Disasters*, p.12, CCH Australia, 2005.

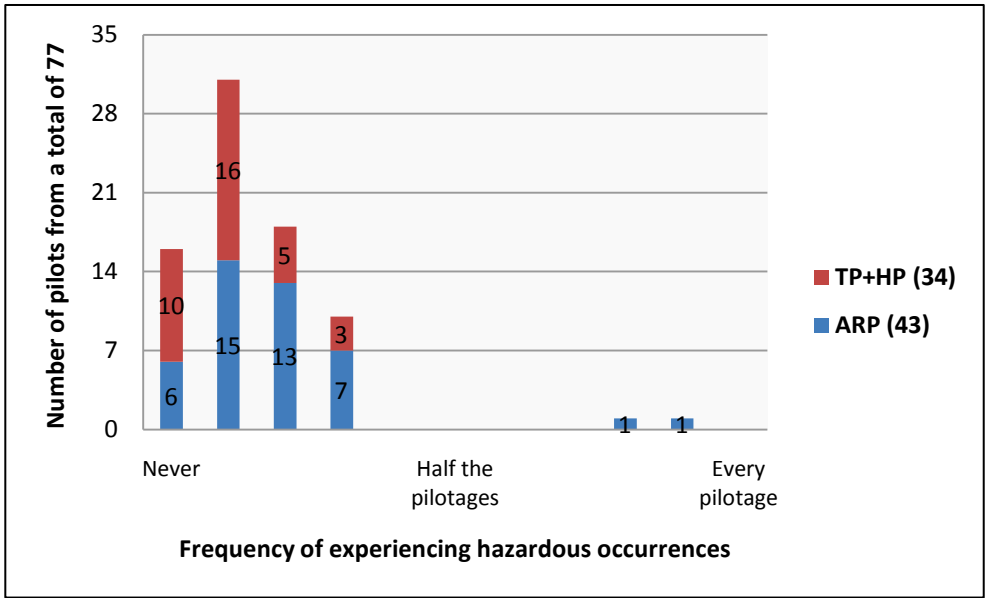
[110] International Chamber of Shipping & International Shipping Federation, *Guidelines on the Application of the IMO International Safety Management (ISM) Code*, p.85, Fourth Edition, 2010.

Hazardous occurrences in coastal pilotage

A near miss has been specifically defined as 'any incident where a pilot has to initiate sudden and unplanned action to avoid an accident'.[111] An accident has been defined as 'any unplanned event whereby a ship, person or the built or natural environment suffers any injury or damage during the course of a pilotage'.[112] Providers are required to implement procedures for the reporting of near misses, accidents and equipment failures with which pilots must comply.

In the survey, the ATSB referred to near misses, incidents and accidents collectively as hazardous occurrences. Pilots indicated how often they experienced hazardous occurrences (Figure 16). The mean score was 1.5 on an 11 point scale from 'never' to 'every pilotage' and a mid-point of 'half the pilotages'. In this respect, it should be noted that pilots performed a different number of pilotages. In addition, every pilot may not have the same perception or understanding of a near miss as defined in MO 54 (issue 4).

Figure 16: Frequency of hazardous occurrences experienced by pilots



The hazardous occurrences experienced most frequently by pilots, as indicated in the survey, have been a high risk of collision (or near miss), pilot boat defect, ship equipment defect, poor ship crew and high risk of grounding (or near miss), in that order. During 2010, the three most commonly experienced occurrences indicated were pilot boat defects, risk of grounding and risk of collision. Of these, the risks of collision or grounding pose the greatest risk to the environment, life and property.

The survey indicated that, in 2010, there were 30 instances where the pilot claimed to have taken urgent or emergency action to avoid collision (Figure 17). Most of the pilots also provided brief comments about the circumstances of the events and a few included the dates and/or ship names. Two of those events were identifiable in AMSA's incident records as close-quarters situations. At interview, some pilots elaborated further on risk events and a couple had saved relevant screen captures of their ECS display.

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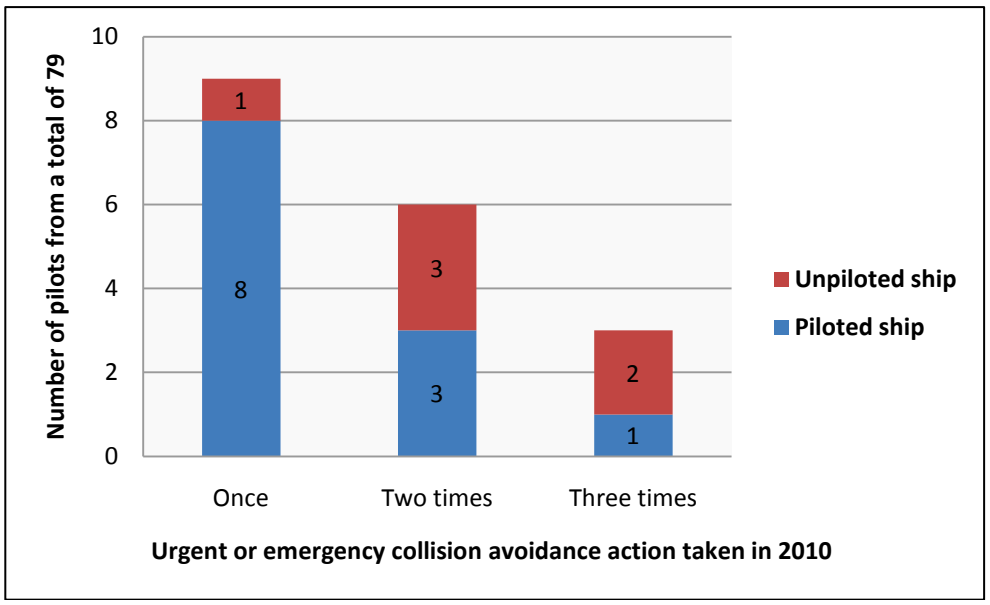
[111] AMSA, *Marine Orders Part 54, Coastal Pilotage,* Issue 4, 2006, Appendix 1, p.22.

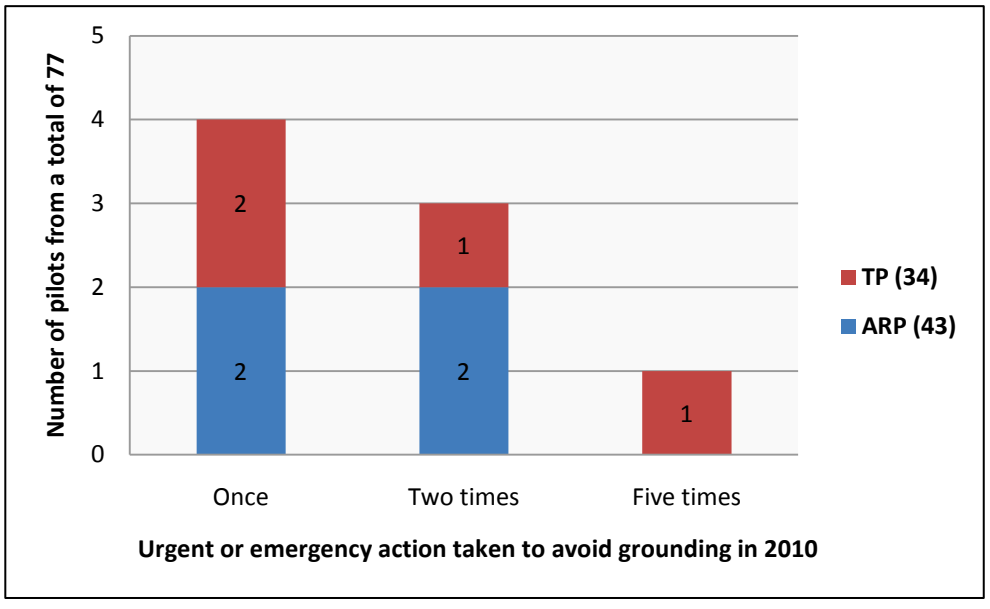
[112] ibid, p.21.

Figure 17: Frequency of collision risk events in 2010



In the same period, there were also 15 instances where the pilot claimed he had taken urgent or emergency action to avoid grounding (Figure 18). A number of the respondents also provided brief comments about the circumstances, and problems with steering or propulsive power was a reason in some of the cases. These cases and the collision risk events referred to above, a total of 45 such events, represent about 1 per cent of the 4,729 pilotages conducted in 2010. This rate equates to one such event in about 1,900 hours of pilotage, on average, and provides another perspective to the frequency of these risk events.

Figure 18: Frequency of grounding risk events in 2010



In submission to the draft report, the Great Barrier Reef Marine Park Authority noted that although the high risk events reported by pilots in the survey comprise 1 per cent of the total pilotages, the consequences of a grounding or collision could have far reaching and long lasting impacts on an already stressed GBR ecosystem.

In their submissions to the draft report, a number of pilots made comment with respect to risk events. A pilot with more than 20 years experience as a coastal pilot stated that common risk events were the result of pilot error, such as incorrect helm orders, poor situational awareness, missing a turn or dozing off. However, he pointed out that most pilots were very reluctant to acknowledge an error or mistake to anyone, let alone formally report a risk event to which they contributed. Another pilot noted that the actions, or lack thereof, of the crew, particularly when the pilot was away from the bridge were a factor increasing the frequency of such high risk events. He described two recent events that he had experienced in pilot rest areas.

While the majority of pilots indicated that they had not experienced collision or grounding risk events in 2010 (Appendix A, items 32 and 33), the potentially severe consequences of such events means that all those that did occur should have been reported to allow the underlying risks to be addressed. However, the pilot survey indicates that the risk events experienced by pilots go largely unreported. It should also be noted that while individual pilots may generally feel they rarely experience high risk events, the overall frequency of such events in the area could still be significant. For example, a pilot indicated that while he had not had a grounding risk event in 2010, he had experienced about 10 such events over the previous 20 years of piloting.

One of the most senior pilots submitted that it was usual for a pilot to have one or two serious risk events per year, on average, and a number of collision risk events involved ships serviced by competing pilotage providers. Another pilot submitted that poor communications between pilots of competing providers and their possibly aggressive attitudes towards each other was a factor in close-quarters situations. According to one pilot, the pilots of competing providers rarely communicated with each other, and develop this attitude from the time they are trainees. As an example of communications (when there is any), a pilot cited a case where a competing provider's pilot had demanded a reduction in speed from him so that the other ship could 'go first' in an area where ships have safely passed for years.

In submission, at least four pilots provided details (names, locations and description of events) of a number of unreported grounding or collision risk events which occurred in 2011 after the survey. Many of these cases were supported with ECS screen captures and a few involved a grounding risk to another piloted ship in the vicinity. A couple of pilots pointed out that REEFVTS had not contacted the ships involved. The pilots did not indicate if they had attempted contacting REEFVTS or the other ship (if one was involved).

In any case, REEFVTS cannot always detect such risk events, particularly those involving a risk of collision (as discussed in section 3.8). Similarly, if a pilot dozes off, incorrect rudder is applied or some other error is made by the bridge team, REEFVTS cannot necessarily detect a developing situation in time to avoid an incident. For example, *Atlantic Blue* standing into danger was detected 2 minutes before it grounded when REEFVTS tried to contact the ship (improvements made to the service's monitoring in that area are described in section 3.8). Had action to prevent the grounding been taken by the ship's bridge team before REEFVTS detected its situation, a near miss would only have been recorded if the pilot or master reported the matter.

About half of the collision risk events (17 out of 30) reported in the survey involved two piloted ships. While individual pilots may, as noted earlier, have different perceptions of what constitutes a risk event and one pilot's close encounter may be

another's safe passing or overtaking distance, any pilot who considers a risk event has occurred should report it. Notwithstanding the fact that a much larger number of ships transit the area with a pilot than without one, a close-quarters situation between piloted ships is a concern in itself. However, it should be noted that a collision between two piloted ships has not occurred (most of the collisions involving a piloted ship have involved a fishing vessel).

Several of the collision risk events reported in the survey involved the pilots of competing pilotage providers. Many of the pilots' comments in the survey and at interview indicate that a lack of understanding of each other's intentions and/or communication was a factor in most cases. These issues are due to an underlying reluctance to contact a pilot with a competing provider (pilots are usually aware of which provider is servicing a particular ship). Their reluctance probably has much to do with them considering other pilots as competitors as noted in section 3.4.3 (Appendix A, items 17 and 18 also refer).

While the identity of an approaching ship's pilot (and which provider engages him) should never be a factor in assessing the risk of collision, taking avoiding action or communicating to ensure a safe passing, it is a factor for some coastal pilots. This points to a culture which may sometimes lead otherwise professional pilots to confuse their sense of responsibility.

Such risk events between piloted ships also indicate that some situations could be avoided through defined procedures (including communication) for passing or overtaking in certain areas and supplement the collision regulations.

Reporting occurrences

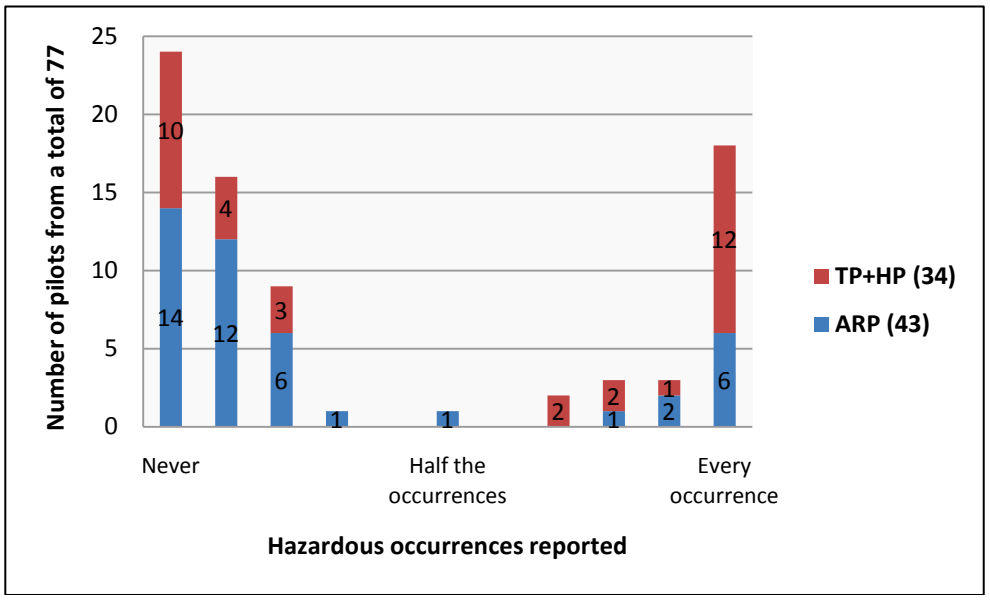
Following the survey question on the frequency of hazardous experiences, pilots indicated (on an 11 point scale from 'never' to 'every occurrence') how often they reported hazardous occurrences (Figure 19). These results are consistent with the pilots' comments discussed above. Two-thirds of the pilots indicated that they reported half, or less than half, of the hazardous occurrences they experienced. The main reasons for not reporting were a perception of personal disadvantage, that corrective action was never taken, that reporting did not reduce risk and a sense of personal financial or organisational pressure not to report (Appendix A, item 38).

Pilots' comments in the survey and at interview indicate that the personal disadvantage and financial or organisational pressure that they perceived was mainly from their pilotage providers. In their submissions to the draft report, a number of pilots elaborated further on this point. Reporting an incident in the current culture, a pilot noted, was a disadvantage to the reporter because it usually involved an adverse response from the provider, potential action by AMSA, embarrassment due to the anticipated reaction of other pilots and paperwork, all for no perceived benefit. According to him, it was easier to report a risk event involving a competing provider's pilot. Another pilot stated that the reasons for under-reporting included a blame seeking environment, provider intimidation and retribution, disadvantaging the peers reported, inability to acknowledge one's own errors and doubts about which events should be reported.

In submission to the draft report, Torres Pilots noted that there was a potential disincentive to pilots when reporting to AMSA due to the lack of a 'no blame environment'. The provider stated that AMSA had issued 'please explain' letters to pilots reporting incidents with warnings that those pilots involved in possible

incidents would be subject to licence suspension or cancellation. There may be some basis to this claim with one of the provider's pilots submitting that, in recent years, AMSA's approach had resulted in pilots basing their decisions on 'fear of punishment instead of safety considerations'.

Figure 19: Frequency of hazardous occurrences reported by pilots



A number of pilots engaged by Australian Reef Pilots submitted similar reasons for not reporting. For example, a pilot stated that when he was a trainee, he was advised by a senior pilot that ship defects (if reported) could be verbally reported to an AMSA surveyor at its next port, instead of reporting immediately via REEFVTS and submitting a formal report. He was told this would ensure that the master remained unaware that the pilot had reported a matter, which could be dealt with in a port state control inspection without any disadvantage to the pilot or his provider for reporting a client's ship. He claimed that when he attempted to use this method, he was asked to submit a written report and decided not to do so. A couple of pilots who trained in recent years claimed their trainers had discouraged the reporting of risk events. At least two others submitted that pilots were extremely reluctant to report any matter to AMSA because the information would soon be in the hands of their provider from whom they feared retribution, or that it would become public knowledge to the disadvantage of the provider and, hence, the reporting pilot.

Torres Pilots submitted that another reason for any perceived under-reporting is confusion amongst pilots as to what is a reportable incident or near miss or near grounding.

Confusion in this matter implies that pilots either do not know which risk events they should report or feel that they cannot report. This is a problem in itself and indicates that an important element of an effective SMS is missing and the pilots' comments are indicative of the absence of an important element of a safety culture. Furthermore, whatever the level of understanding a pilot has of what constitutes a risk event, if the events were significant enough to report in the survey, they should have been reported when they occurred and most pilots are probably conscious of this. For example, in submission a pilot stated that while there might be different interpretations of what constitutes a near miss, he had experienced one or two

incidents per year, on average, that involved a risk of grounding or collision which he should have reported.

In submission to the draft report, Australian Reef Pilots advised that it had a strong and consistent 'no blame' policy on incident reporting and that there was no personal disadvantage for a contracted pilot reporting incidents.

However, Australian Reef Pilots did not provide its no-blame policy document and its SMS manual does not describe a no-blame policy or refer to it in relation to incident reporting. Comments from the provider's pilots indicate that no such a policy has been implemented.

In the survey, pilots indicated that when they have reported hazardous occurrences, it was mainly to AMSA, their provider, REEFVTS and, occasionally, to MSQ (Appendix A, item 36). About 83 per cent of pilots indicated that they had reported occurrences at some time. Of these respondents, 62 per cent indicated reporting both in writing and verbally, 32 per cent in writing only and 24 per cent verbally only. About half of all pilots indicated that reporting was either 'not at all effective' or 'a little effective' (the two lowest scores on a five point scale) in reducing near misses and incidents (Appendix A, item 37). For the reasons explained earlier, this adverse view of the effectiveness of reporting, and the reasons for not reporting, is a serious safety concern.

According to AMSA, pilots have regularly reported matters confidentially via phone or informal emails. Excluding the numerous de-identified reports submitted to AMSA, which led to this investigation, AMSA was unable to produce any record of those 'informal' reports. It would seem that no record was maintained or used to monitor safety by analysing the nature of such reports and identify possible trends.

In submission, a pilot noted that while AMSA encouraged pilots to report matters via email or phone, the process was ineffective because of the lack of action and the absence of records. He cited an example of reporting a pilotage risk event in 2010 for which he claims no action was taken nor was it recorded.

The documented records that AMSA provided for the 4 years to the end of 2010 indicate 16 coastal pilotage related incidents, four of which were close-quarters situations (a higher risk of collision). These figures represent an average of four reported risk events a year, including one per year on average that involved a collision risk. This is well below the number of risk events reported in the survey. Furthermore, AMSA records are based on all reports from all parties, including its own monitoring and reports from ships' masters, indicating that pilots and/or providers have rarely reported.

According to MSQ, any matters reported by pilots to REEFVTS are dealt with by AMSA. Any reports made to MSQ are made on an ad hoc, informal basis and no records are kept by MSQ of such reports.

Over the last decade, the ATSB confidential safety reporting scheme, REPCON Marine (previously the Confidential Marine Reporting Scheme or CMRS), has been brought to the attention of all pilots. No report under this scheme has ever been received by the ATSB from a coastal pilot, which suggests an overall reluctance by them to formally report risk events, even where confidentiality is assured. The overall inability or unwillingness to report indicates the prevailing culture in coastal pilotage, as well as how some pilots view their responsibility.

The REPCON scheme is also available to ship masters and crew to report safety concerns, including pilotage related matters. A coastal pilotage related REPCON has never been received from a master or crew member but masters have reported pilotage concerns to pilotage providers occasionally. The records of Australian Reef Pilots and Hydro Pilots include a few such reports/complaints. The SMS manual of Australian Reef Pilots includes a procedure for handling customer complaints.

Australian Reef Pilots' non-conformance records from 2003 to 2009 indicate that its pilots reported 14 incidents or near misses, i.e. an average of about two per year. In 2010, however, these records include 13 reports from pilots, including one incident each of collision risk with a piloted ship, collision risk with a fishing vessel and a risk of grounding during a pilot rest break. Most of the other reports related to pilot boat defects. During the first 6 weeks of 2011, after the ATSB had initiated this investigation, there were nine reports from pilots. While a welcome change, the sudden and significant increase in the number of reports strongly suggests that a large proportion of risk events were previously not being reported or recorded.

Torres Pilots' non-conformance records indicate that, in 2006 and 2007, there were no incidents or near misses reported by its pilots. The records indicate that the number of reports made by pilots in the following years were one (2008), seven (2009) and two (2010). In 2009, there were two incidents of collision risk (one with a piloted ship and the other with fishing vessels) and the grounding of *Atlantic Blue*.

Hydro Pilots' incident records indicate one incident each in 2008, 2009 and 2010. One of the incidents was reported by a ship's master and the other resulted from AMSA's monitoring. The 2010 incident reported by a pilot involved a failure of the ship's power and main engine and, hence, resulted in a risk of grounding.

Together, AMSA and pilotage provider records indicate that an average of about four risk events per year have been reported by pilots. This equates to one risk event in more than 1,100 pilotages or about a tenth of the figure indicated by the survey. Specifically in terms of higher risk events in 2010, the survey indicated 45 collision or grounding risk events, whereas the records show only five such events (again, about a tenth of the survey figures). While it is possible that pilots overestimated such risk events in the survey, the high level of under-reporting suggested by the survey, and the reasons for it, are a cause for concern given the potential consequences of a grounding or collision.

It is not possible to directly compare the frequency of risk events indicated above with other pilotage areas in Australia because each pilotage is different in distance, channel width and depth, traffic volume and density, and other local conditions. Therefore, the risks are different, as are the safety management standards. However, by way of information, pilots in the port of Brisbane report a risk event about every 25 pilotages, on average. About 2,500 ships call at Brisbane each year, the pilotage is about 45 miles and there is a developed pilotage SMS.

Summary

While there is a regulatory requirement to report risk events, the records held by the pilotage providers and AMSA do not equate to the number of risk events that pilots claim actually occur. The ATSB survey and pilot submissions indicate a high level of under-reporting of risk events.

Unreported risk events where the pilots considered there was a risk of collision or grounding are the most concerning because of the potentially severe consequences

in the event of an incident. The frequency of such higher risk events (one event every 1,900 hours of pilotage or 1 per cent of the number of pilotages) may seem low but is still a significant risk both in terms of number (45 events in 2010) and the potential consequences. Such a rate means one such event is experienced by a pilot every 2 years or so, on average. Some pilots' statements about the number of such events they had experienced over a long period of time indicate the same rate.

The responses of pilots describing the circumstances of risk events (poor situational awareness, incorrect helm orders, dozing off, inadequate communication with other ships and other common situations) also indicate why REEFVTS may not be able detect many such events.

The reasons given by pilots for under-reporting are consistent with their general views and features of the coastal pilotage sector. Pilots offered a number of reasons for not reporting risk events and not complying with reporting requirements, all of which indicate a poor reporting and safety culture. These reasons are mainly related to the disincentive of reporting (including personal disadvantage, corrective action was not taken and organisational or financial pressure). The result is that many opportunities to learn, share knowledge across the sector, and make improvements to reduce risk are being lost.

In the absence of complete and adequate risk event records available to the ATSB, the survey data and pilots' comments in particular, provide some basis to analyse the human factors and reporting culture. It also appears a connection had not been made between the regular informal reports that AMSA receives from pilots and the infrequent formal reports it receives, which may have indicated the level of under-reporting.

Coastal pilotage safety would be enhanced by working toward the concept of an informed culture in, and between, the various providers and pilots. This concept largely relies upon a reporting culture that ensures all safety risks are identified and managed. Ensuring the proper reporting, recording, analysing and closing out of risk events is fundamental to effective risk management within a system of safety. Therefore, AMSA, providers and pilots should re-examine the issue of reporting risk events.

3.4.7 Audits and reviews

The implementation and effectiveness of an SMS, including continuous improvement, is essential for managing risk. In coastal pilotage, there are a number of processes in place to periodically assess or evaluate safety management related systems. These include audits, checks or reviews conducted by AMSA, providers or check pilots to verify or confirm compliance, implementation or effectiveness with, or of, the relevant systems. These processes are described below.

AMSA audits of providers' SMS

In 2001, after the introduction of the Code, AMSA audited each pilotage provider's SMS and operations. Once satisfied, AMSA issued each provider with a document of compliance (DOC) subject to annual verification audits and renewal audits every 5 years. The ATSB examined the audit records for recent years to gain a better understanding of the audits and the provider SMSs current at the time of the investigation.

In general, the audits have examined the provider's SMS-related documentation to check compliance with the issue of MO 54 that was in force at the time. The documentation examined has included the SMS manual and records for internal audits, organisational structure, management meetings, non-conformances, duty rosters, pilot boat maintenance, fatigue management and check pilotage. The audits were conducted over 2 days at the provider's main offices.

In the 2009 audit, AMSA issued Australian Reef Pilots with one minor non-conformance and five observations. In 2010, there were two minor non-conformances and four observations. The auditor documented a comment stating that, overall, the operation and design of the SMS were satisfactory against MO 54 requirements.

The auditor's comment in the 2010 audit of Torres Pilots was the same as in the Australian Reef Pilots audit noted above. One minor non-conformance and two observations were issued. The previous audit, conducted in 2008, had resulted in two minor non-conformances and seven observations.

The 2009 and 2010 audits of Hydro Pilots resulted in a total of one minor non-conformance and 13 observations. In 2010, the auditor's comment about the SMS was the same as that noted above for the audits of the other providers.

The auditor's comment regarding the overall operation and design of the providers' SMSs is representative of the nature and type of the audit findings and observations. In other words, these audits did not indicate any areas of serious non-compliance with MO 54 requirements by any provider. The audits relied on document checks and possible discussion with a provider's office staff to check the implementation of the provider's SMS and the safety of the provider's operations. Since the SMSs do not cover the actual task of pilotage, the audits could not cover pilots or their operations, which are assessed under the check pilot system.

Providers internal audits and reviews

Issue 4 of MO 54 required pilotage providers to implement procedures to periodically evaluate and review their SMS. The audits and reviews from this process were intended to improve safety by identifying deficiencies and taking corrective action. Similarly, issue 5 of MO 54 requires providers to monitor the implementation, operation and effectiveness of their SMS and undertake audits at least once a year.

All three providers have processes to undertake annual audits of their SMS and regular reviews of their systems. The main part of these processes centres on a record of non-conformances (known as NCRs), deficiencies, incident or near miss reports. Hence, these records contain every type of report, from a pilot-reported defect to an audit finding. Corrective action in response to these documented items is included in the same record.

Excluding Hydro Pilots, whose SMS states that whenever possible it will endeavour to involve external auditors, providers have not documented a process for third party or external audits in their SMSs.

Australian Reef Pilots conducts annual audits and undertakes management reviews every 6 months. Audit findings and other items are documented in a register of NCRs and sub-NCRs (excluding items related to the Torlesse Island operation as noted in section 3.4.5). The register contains over 230 items for the 7 years to the

end of 2010. This means an annual average of about 30 items that include NCRs and observations from all audits (internal and AMSA) and reports of incidents from personnel, including pilots. In 2010, a total of 60 items were recorded. Records of the corrective action taken in the last 2 years to close out items on the register indicate that most of the matters were looked at in detail.

Hydro Pilots conducts annual audits and annual reviews of its SMS and related systems. Records provided by Hydro Pilots included a document indicating an internal audit was completed in early 2011, three safety meetings held since 2009 and the pilot-reported incidents referred to in section 3.4.6. The 2009 DOC audit included a non-conformance in relation to an internal audit that was not completed despite similar findings in previous audits. The 2010 DOC audit noted an improvement in these processes.

Torres Pilots conducts annual audits and reviews its systems on an ongoing basis through regular management meetings. Audit findings and other items are documented in a record of NCRs and corrective action reports. The record contains 46 items for the 5 years to the end of 2010. This means an annual average of about nine items that include NCRs from internal audits and AMSA boat audits and reports of incidents from all personnel, including pilots. The record does not include DOC audit items. Records of the corrective action taken to close out recorded items indicate that some of the matters were looked at in detail.

The records of both main providers indicated that a significant number of non-conformances, deficiencies or incident reports were related to pilot boats. The most likely reason for this may be the high pilot transfer related content in the SMS and the lack of piloting related content. This may also partly explain the small number of pilot-initiated reports of non-conformances.

The average annual figures in the providers' NCR register or equivalent record and the number of pilotages serviced by each provider in 2010 indicated one event or condition (near misses, incidents, defects or audit findings) every 62 pilotages (Australian Reef Pilots), 232 pilotages (Hydro Pilots) and 294 pilotages (Torres Pilots). These varied but low rates suggest either a high safety standard or poor reporting and risk identification. These figures also seem at odds with the survey responses and the information provided by pilots at interview with respect to both risk events and pilot boat issues. Under-reporting, as explained in section 3.4.6, should be a cause for concern given that reporting, audits and reviews are central to an effective SMS.

The audits and reviews described above were not intended to assess the individual systems of pilots, which, in any case, are not part of their provider's SMS. Instead, each pilot's individual system and competency have been regularly assessed under the check pilot system (discussed in section 3.7).

3.5 Conduct of pilotages

Ship owners and managers, and ship's masters justifiably expect that, regardless of the individual pilot boarding their ship to conduct a particular pilotage, they will receive a uniform and accredited standard of service from the pilot. It is also reasonable for users to expect that as each ship operates in accordance with an SMS under the ISM Code, the pilotage will be conducted with consistent safety management principles.

However, as outlined in section 3.4, at the time of the ATSB survey there were no standard approaches to coastal pilotage.[113] Each individual coastal pilot has developed his own piloting system. While a pilot's passage plans, checklists, guidance notes, tidal information and other documents may be similar to those of other pilots from which they were derived; they vary from pilot to pilot, sometimes significantly. Similarly, the manner in which a pilot conducts a pilotage is in accordance with his own individual methods, practices and style rather than a set of standard piloting procedures.

While each pilot uses his piloting system to conduct pilotages to the best of his ability, the only common standard amongst all pilots is that they have met the requirements for the issue of an AMSA licence and have been assessed under the check pilot system. In effect, the check pilot system substitutes for certain elements of an SMS and aims to achieve an acceptable standard amongst the numerous systems of the pilots. Aspects of the conduct of pilotages using these multiple piloting systems are discussed below.

3.5.1 Passage plans

A passage plan is central to effective bridge resource management. Amongst other things, the passage plan informs all bridge team members of planned courses and acceptable, defined limits for deviation from those courses. The plan allows a ship's crew to develop the same concept of the passage as the pilot (a shared mental model) and a mutual understanding of individual roles and responsibilities.

On the other hand, the absence of a passage plan, or different understandings of the plan by bridge team members, prevents a shared mental model and impedes the capture and management of single-person errors. Since many of the critical decisions made during a pilotage are made by one person (the pilot), it is essential a plan is agreed before starting the pilotage so that there is a clear understanding, expectation and awareness of the forthcoming pilotage by the other bridge team members and, if the pilot deviates from the plan, he can be challenged by them.

Traditionally, marine pilots around the world did not provide masters with passage plans and/or course alteration position (waypoint) lists. However, over the years, pilots in some pilotage jurisdictions started providing a plan after boarding the ship. This trend has also been progressing in Queensland coastal pilotage.

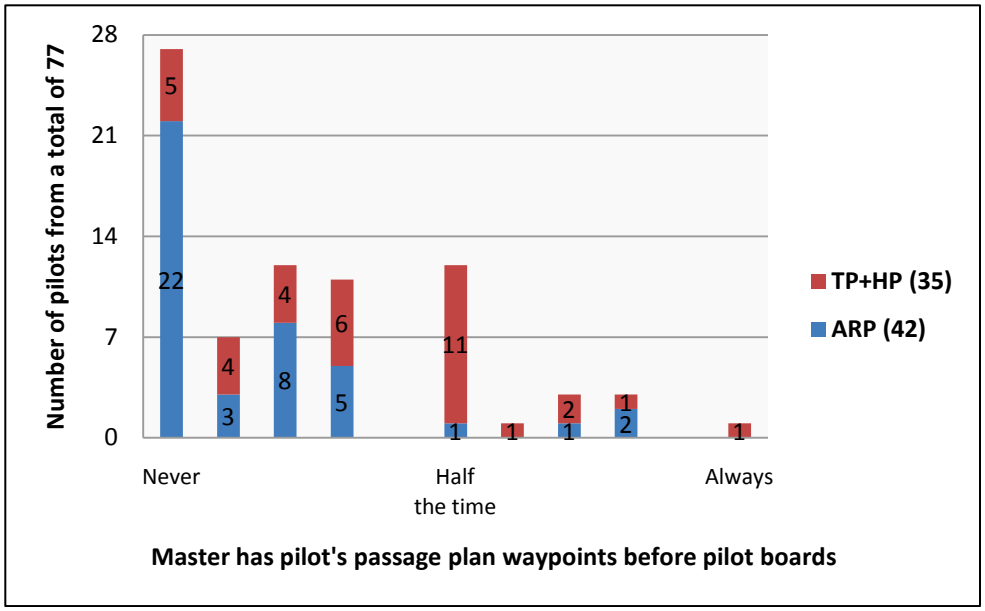
More recently, standard passage plans, with waypoints, have been available on the websites of a number of Australian ports. This has complemented the advent of shipboard SMSs and the mandatory requirement for masters to have a berth-to-berth passage plan. This means that ships calling at these ports (whether for the first time

[113] The introduction of standard passage plans by AMSA from July 2011 is discussed later in this section.

or regularly) are able to prepare a complete berth-to-berth passage plan in advance with courses laid off on navigational charts. The waypoints can be input to GPS, ECDIS or other navigational aids to better monitor the pilotage. Waypoints allow additional defences against an incident to be put in place and, therefore, are a particularly important element of any passage plan.

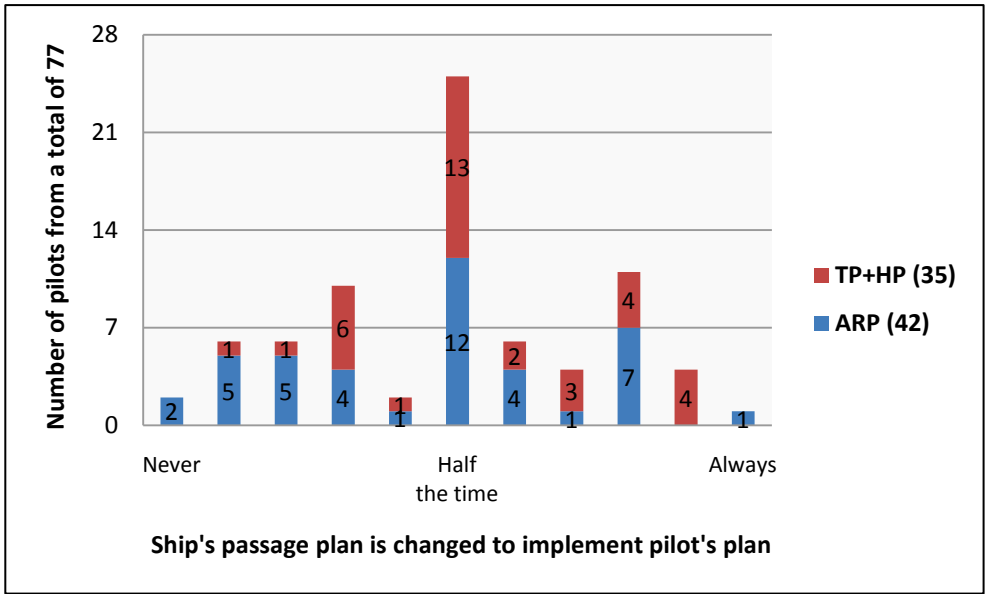
However, the masters of ships transiting the Queensland coastal pilotage areas had not been able to routinely obtain a pilotage plan or waypoint list because there were no standard passage plans. Each pilot had a different plan and the pilot for a ship may not have been assigned until a short period before its arrival; or the assigned pilot may have changed. Other than some passenger ships, it was rare for masters to receive a passage plan beforehand. In the survey, 90 per cent of the pilots indicated that masters had their waypoint list only on half, or less than half, of the occasions before they boarded the ship (Figure 20). According to a pilot, he was asked by the master of a ship that had regularly transited the area which one of the numerous plans that the master had on file (from past transits) would be used for that transit.

Figure 20: Frequency of master having passage plan before pilot boarding



The result of not having the pilot's passage plan in advance meant that the pilotage plan had to be agreed after the pilot boards. The survey indicated that more often than not, pilots changed the ship's passage plan, if one had been prepared, to implement their own plan (Figure 21). After discussing their plans, some pilots often laid off their intended courses on the ship's charts, while others left this task to the crew. Briefing the crew about the plan after boarding is problematic given the length of the pilotage, particularly in the Inner Route, where some pilots stated that they briefed the crew at the change of each watch. Changing the plan or implementing a plan after pilot boarding increases the workload of bridge team members who start attending to tasks that should have been completed earlier and these tasks may distract them from core duties. For example, in addition to laying off courses on paper charts, the changed waypoints may need to be input to GPS, ECDIS or radar(s). Discarding the ship's plan, particularly without explanation, also has the potential to induce a feeling amongst the crew that their input is not relevant. This may discourage them from fully participating as bridge team members.

Figure 21: Frequency of changing ship's plan to implement pilot's plan



On any ship, the period of time immediately after the pilot arrives on the bridge is one of intense activity. The pilot has to acquaint himself with the bridge, and its equipment, and make an assessment of the bridge team and of any language difficulties. The crew have to brief the pilot about the ship, its characteristics, equipment and defects. There may be time pressures due to the ship's schedule, tidal windows or navigational hazards. The pilot is obliged to brief the bridge team on the intended passage, although this could be done in stages. Regardless, implementing a passage plan during this time is an unnecessary risk that could be avoided by having a standard passage plan for each route. A number of factors that contributed to *Atlantic Blue*'s grounding were related to passage planning matters.

In the past, there have been some positive but isolated instances where standard plans for coastal passages have been used. In 2003, ASP Ship Management (ASP) obtained a standard passage plan from its usual provider, Torres Pilots, for use on board its ships regularly transiting the Inner Route. The plan, compiled by a group of pilots, was implemented by the ships' crews for every passage. With regard to that plan, ASP has stated:

> It was found that when a standard passage plan was introduced on the [ships] trading from Weipa to Gladstone, a shared model of the proposed passage was provided. This enhanced approach further integrated all bridge members into the bridge management team by providing the mates [officers] on watch with a broader appreciation of the agreed passage plan. Importantly, the information was available before the vessel entered pilotage waters and prior to the pilot boarding.
>
> There were many advantages of the standard passage plan. Once the pilot boarded, it allowed the pilot and master to discuss and confirm the intended transit without delay. Once the passage commenced, factual familiarity created by the standard plan encouraged the OOW [officer of the watch] to check and constantly monitor the vessel's progress, thus acting as a safeguard against one person errors.

The Australian master and crew on board those ASP ships usually had significant local area experience and English as a first language. Therefore, foreign crews, unfamiliar with coastal pilotage areas and having limited English would probably find having a plan in advance of the pilot boarding even more beneficial.

In about 2010, some Mackay based pilots contracted to Torres Pilots and Hydro Pilots began using the same passage plan waypoints in the Hydrographers Passage. However, this and the ASP example above have been isolated cases.

While standard passage plans for all coastal pilotage areas and for all ships, which are readily available to ships' crews, have been considered for a number of years, their development has not been straightforward. After much delay, an industry passage plan (IPP) model produced and issued by AMSA was posted on its website when issue 5 of MO 54 came into force in July 2011. All pilots are required to prepare detailed passage plans that use the IPP model and carry hard and electronic copies of the plan (this would probably need to be checked under the check pilot system). Ships can request their pilotage provider for the latest edition of the IPP.

The IPP initiative is very positive and its use as the standard for all pilotages should significantly improve safety. Importantly, the IPP will form the basis of a ship's plan that the pilot can follow with no or minimal change in most circumstances. In particular circumstances where a pilot considers it necessary to change the plan, amendments can be made in a structured manner and agreed with the master/crew.

In submission to the draft report in February 2012, Torres Pilots advised that the near-complete IPP was available online and, notwithstanding its long development and the exclusion of pilotage providers from the process, Torres Pilots intended to include the plan in its SMS when the plan was complete. The provider pointed out that nearly half its service users had regularly transited the Torres Strait using the same passage plans each time. Torres Pilots also noted that all deep draught ships were provided tidal windows in advance.

A number of pilots submitted comments in relation to the IPP. One of them stated that when used by all users, the IPP would be very useful because the pilot and ship's crew would have the same plan. Another pilot noted that once the IPP was fully implemented, providers could send the passage plan for a ship's transit to its master when accepting the pilot booking. This, he felt, could ensure a berth-to-berth plan was prepared before the pilot boarded and allow the crew to focus on their core duties after the pilot boarded. One pilot observed that, subject to all pilots using the IPP, there would be the added benefit of reduced collision risk because IPP tracks offer some separation between ships moving in opposite directions.

In summary, the different plans of individual pilots and the absence of an SMS that contains standard plans are amongst the main reasons passage plans have not been readily available to ships' crews before a pilot boards. The effective implementation of the IPP should address this issue. By mid-2012, implementation of the IPP as the standard and take up of its December 2011 edition by users was well advanced.

3.5.2 Plan execution and piloting

The individual passage plan and piloting practices of a pilot determine the conduct of a particular pilotage. There is wide variation in the piloting practices employed by different pilots. Their practices depend on their previous experience, the period when they trained and the influence of other pilots. For example, some have more detailed passage plans, checklists and guidance notes suggesting they may have worked within an SMS before becoming pilots.

While piloting practices are similar, individual differences (in the same circumstances) create unnecessary difficulties in executing the plan, including

collision avoidance and pilot rest periods. For example, the survey indicated that some pilots did not amend the ship's plan but either attempted to follow that plan or followed their own plan after advising the crew that the courses followed differed because they were piloting, not navigating, the ship. Either way, risk is increased because in the first case, the pilot would not be piloting using his marks or cues while in the latter, the crew would have a different mental model of the plan.

Check pilot records (discussed in section 3.7) show that a significant difference between the numerous passage plans of pilots was whether or not the courses lay on or virtually on, the centreline of the charted two-way routes and shipping channels. Some pilots preferred to follow the centreline to remain further away from adjacent dangers while others preferred to remain slightly to starboard of the centreline to make it easier to safely pass oncoming traffic on the port side. Pilots' plans also varied in the level of detail such as limits and no-go areas that define safety margins and the number of waypoints. Some pilots included all the limits and every leg of the passage, no matter how short, while others did not.

Another difference amongst pilots' passage plans was the allowable 'cross track error'[114] or off-course limits. This limit is particularly important and should be an essential part of any plan to allow the bridge team to effectively follow the plan and to detect any human error early. However, check pilot records show that cross track error limits defined by different pilots for the same tracks varied significantly. Some pilots had a general limit (usually between 0.2 and 0.5 of a mile). Others had a limit for each track and still others required the ship to be kept on track at all times (i.e. a zero limit). A few pilots did not specify any limits.

As discussed in section 3.4.4, the use of a laptop computer-based ECS by pilots is widespread. Some pilots use these aids for most or all of the pilotage while others mainly use radar. Some make much greater use of visual marks and cues than others. While there will always be differences in piloting techniques, appropriate training and standard procedures are necessary to set a minimum safe standard.

To assist the master and crew, pilots usually provide them with guidance notes to supplement verbal briefings. These notes outline what a particular pilot considers important information for the crew. The subjects covered by such notes usually include establishing the ship's position, off-course limits, ship's speed and engine status, keeping a lookout and fishing traffic, VHF radio watch channels, areas the pilot may leave the bridge to rest and how he expects to be recalled to the bridge. Effectively, these notes are the procedures and guidance for that particular pilotage.

However, there are wide variations in the content and detail of the guidance notes of different pilots. The guidance is not necessarily consistent with good practice and some of it may be ambiguous. For example, the written instructions provided by *Atlantic Blue*'s pilot required the crew to alert him if 'the vessel is sufficiently off-course so as to run into danger'. Since the pilot had not defined 'sufficiently' and the crew were not familiar with either the area or the pilot's passage plan, he was not alerted by the crew as he had expected.

As discussed in section 3.4.6, collision avoidance in certain areas has been an issue. While traffic density in the coastal pilotage areas is generally low, ships may meet in confined areas such as the Prince of Wales Channel. In these areas, protocols

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[114] The distance that a ship is to the right or left the planned track, i.e. off-track, is displayed on many GPS units as the cross track error or XTE.

have been established to inform approaching traffic via VHF radio broadcasts. However, again there are no documented standard procedures that pilots use in particular circumstances to supplement collision regulations to avoid close-quarters situations in very confined areas, particularly when overtaking is involved. The lack of such standard procedures has probably been a contributing factor in many of the collision risk encounters reported between piloted ships.

Another issue is the different practices of pilots with respect to leaving the bridge in certain areas to rest (fully discussed in section 3.6.4). There are no standard documented procedures for pilots to rest during a pilotage and ship crews may be faced with significantly different practices on consecutive voyages with different pilots in the same or similar weather and traffic conditions.

The need for standard systems and procedures was highlighted when a dynamic under keel clearance (UKC) management system[115] was proposed for the Torres Strait after pilotage there became compulsory. In 2007, much discussion took place between pilots, providers and AMSA and topics such as the allowance for squat[116] was debated. Both Australian Reef Pilots and Torres Pilots intended to develop their own dynamic UKC management systems, potentially allowing ships in identical circumstances to have different tidal windows for a transit. However, AMSA took up the recommendation of the 2008 review panel (section 2.6 refers) for a single dynamic UKC management system. In December 2011, this system was declared operational.[117] A number of pilots submitted that, as of January 2012, the system was being utilised only for some deeper draught ships.

3.5.3 Summary

Essentially, coastal pilotage services at the time of the ATSB survey in 2011 were provided through as many different systems as there were pilots. While many of these systems were similar, their differences, inconsistent wording in guidance notes and possibly ambiguous directions have the potential to significantly increase risk. The absence of standard pilotage procedures and passage plans has the very real potential to increase uncertainty in the minds of ships' crews, increase the bridge team's workload at a time of already intense activity, generally increase the probability of error and introduce unnecessary risk.

The different piloting systems and variations in those systems also increase the potential for sub-optimal pilotage procedures and practices. Monitoring and assessing the standards of numerous systems with no defined standard or best practice procedure to assess against is also difficult.

Properly implemented standard procedures and passage plans are fundamental to improving coastal pilotage safety, and this is both reasonable and practicable. The objective should be safe pilotage though a systems-based approach employing best practice. The introduction of the IPP model by AMSA in July 2011 has been a significant step in improving safety in coastal pilotage.

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[115] A system that takes into account the dynamic conditions that affect a ship's under keel clearance, including real-time data for tides, waves, currents, ship's speed and other characteristics.

[116] The increase in the draught of the ship, and the change in its trim, that occurs when the ship moves through shallow water.

[117] AMSA Marine Notice 17/2011, *Under Keel Clearance Management (UKCM) system declared operational in Torres Strait*, 16 December 2011.

3.6 Pilot rest, work and fatigue

The long passage distances, particularly in the Inner Route, and the type and conditions of work of coastal pilots mean that their working hours need to be carefully managed to avoid fatigue and minimise the risk of an incident.

3.6.1 Fatigue

Fatigue has been defined by the joint IMO/ILO (International Labour Organization) working group on human factors as follows:

> A reduction in physical and/or mental capability as a result of physical or emotional exertion which may impair nearly all physical abilities including strength, speed, reaction time, co-ordination, decision making and balance.

In the context of human performance, fatigue is a physical and psychological condition that is primarily caused by prolonged wakefulness and/or insufficient or disturbed sleep. Fatigue can result from a number of different sources, including time on task, time since awake, acute and chronic sleep debt, and circadian disruption (factors which affect the normal 24-hour cycle of body functioning).

A review of fatigue research relevant to aviation has noted that fatigue can have a range of influences, such as decreased short-term memory, slowed reaction time, decreased work efficiency, reduced motivational drive, increased variability in work performance and increased errors of omission.[118] This fatigue review also made the following observations with respect to aircraft pilots:

> A common symptom of fatigue is a change in the level of acceptable risk that a person tolerates, or a tendency to accept lower levels of performance and not correct errors.
>
> Decrements in alertness and performance intensify if the time awake is 16 to 18 hours. Performance decrements of 'high time-since-awake' pilots tended to result from ineffective decision-making rather than a deterioration of aircraft handling skills.
>
> There is a discrepancy between self-reports of fatigue and actual fatigue levels, with people generally underestimating their level of fatigue.
>
> Most people need eight hours sleep each day to achieve maximum levels of alertness and performance.
>
> Fatigue is cumulative.
>
> The physical environment in which people operate, in terms of factors such as noise and vibration, can also contribute to fatigue.

In coastal pilotage, pilot fatigue has been the subject of much discussion and, as described in section 2.6, a number of studies or reviews into fatigue have been conducted. In 2001, AMSA formalised the requirement to manage pilot fatigue through MO 54 (issue 3). Fatigue management measures were implemented through pilot advisory notices (PANs). These measures were incorporated by AMSA into a fatigue management plan in 2007.

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[118] Battelle Memorial Institute, *An Overview of the scientific literature concerning fatigue, sleep, and the circadian cycle*, Report prepared for the Office of the Chief Scientific and Technical Advisor for Human Factors, Federal Aviation Administration, United States of America, 1998.

3.6.2 Fatigue management plan

The fatigue management plan[119] was developed by AMSA based on the existing practices of pilots and the findings or recommendations of the various pilot fatigue reviews and studies (section 2.6 refers). The plan was developed with the agreement of the pilots and pilotage providers. While providers could develop their own plan and submit it for AMSA approval, all of the providers agreed to follow AMSA's plan. Therefore, the ATSB survey responses refer to this plan.

Procedures in AMSA's fatigue management plan specify minimum mandatory rest periods for pilots between each pilotage passage, between tours of duty (based on number of days and voyages) and between consecutive periods of work without defined leave breaks. Pilots and providers are jointly responsible for complying with the plan which includes procedures for monitoring work and rest hours, and fatigue risk mitigation guidelines. In addition, AMSA monitors compliance with the plan by examining REEFVTS records for pilot boarding and disembarking and auditing relevant records kept by providers.

The minimum mandatory rest period for a pilot before undertaking an Inner Route pilotage is 24 hours, including an 'optimal night's rest'.[120] When three consecutive Inner Route pilotages have been undertaken with only one optimal night's rest before each successive pilotage, the pilot must have two optimal night's rest before undertaking a further Inner Route pilotage. Rest periods (in any pilotage area) must not include travel of any kind, including pilot transfer times.

The minimum rest period between pilotages in both the Great North East Channel and Hydrographers Passage is 12 hours, including at least 6 hours of uninterrupted rest before the pilotage. The 12 hour rest period can be reduced if the pilot has had an optimal night's rest before the first pilotage and will achieve such a rest period after the second pilotage. Consecutive pilotages in the Great North East Channel and Hydrographers Passage may be performed without any rest period in between if the interval between starting the first pilotage and completing the second is not expected to exceed 18 hours.

As outlined in section 3.4.3, a pilot's maximum tour of duty is 28 days away from home. At least five consecutive optimal night's rest at home must be taken after each tour. If a tour of duty is 21 days or less, then this period may be reduced to four consecutive nights. In addition, the plan specifies pilot 'leave' requirements.

A pilot's tour of duty is also limited by the number of pilotages performed. This is managed though a 'points' accrual system. A pilot accrues 2.5 points for each Inner Route pilotage performed and 1 point for each pilotage performed in the Great North East Channel or Hydrographers Passage. A pilot accruing 15 points must return home for five consecutive nights. If, during a 15 point accrual period, the pilot has a planned break of three consecutive nights at home on two occasions, his points score returns to zero. If only one such planned break has been taken while accruing 15 points, then the pilot must return home for another three night break to reset his point score to zero. Pilots and providers are responsible for keeping track of points and AMSA monitors compliance by auditing records.

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[119] *Queensland Coastal Pilotage Fatigue Management Plan*, Version 1.0, March 2007.

[120] An 'optimal night's rest' is defined in the AMSA fatigue management plan as a night's rest including an uninterrupted optimal 8 hour core rest period from 2200 to 0600.

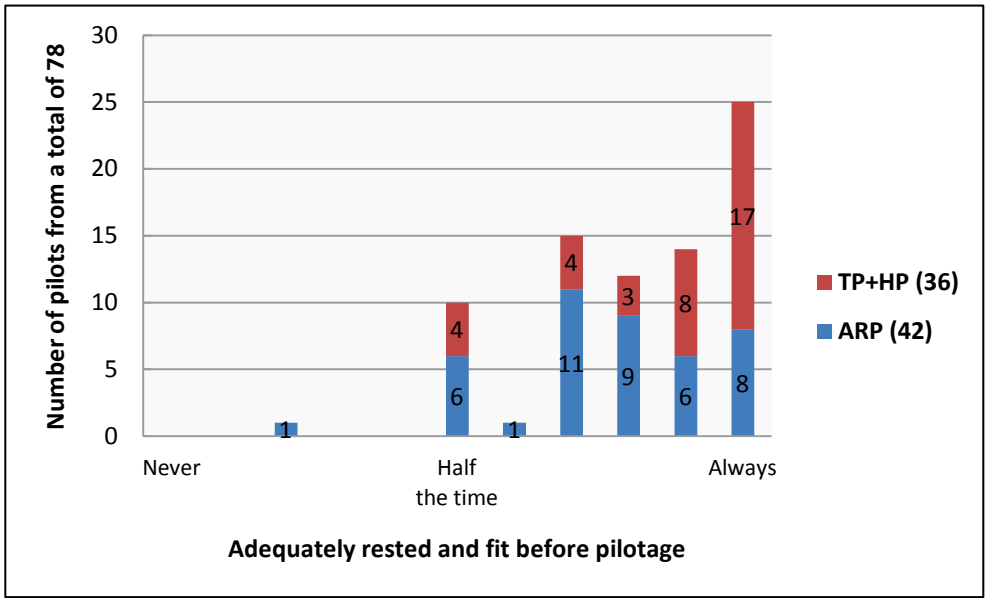
The fatigue management plan is not specific about managing fatigue levels during pilotage. Instead, the plan requires pilots to manage any rest breaks available during a pilotage. Other than an individual pilot's own evaluation, there is no monitoring of this rest break management although a pilot's rest practices are checked during check pilot assessments. Rest breaks are an important element of all Inner Route passages but in the Great North East Channel and Hydrographers Passage most pilots usually do not leave the bridge to rest.

Therefore, to a large extent, pilots manage their own fatigue. Providers have significant input in this area because they manage the day-to-day scheduling of pilot transfers, keep track of pilot tours of duty and administer pilot rosters. In addition to regular compliance checks, AMSA audits of a provider for DOC verification have included a review of fatigue management. As outlined in section 2.6, the fatigue management plan was independently reviewed for AMSA in 2010. The review was based on evidence provided by pilotage providers, pilots and AMSA. The findings of the review are consistent with the ATSB survey responses and pilot interviews, in general, and the discussion below refers to these findings.

3.6.3 Rest before pilotage

The mandatory rest period before pilotage is intended to ensure that pilots are adequately rested before they board ships. However, in the survey, more than two-thirds of pilots indicated that they were not always adequately rested and fit before a pilotage (Figure 22).

Figure 22: Adequately rested before pilotage as indicated by pilots



The most common reasons given by pilots for inadequate rest were excessive pilot transfer time, excessive air or road travel, substandard pilot transfer vehicle, unsuitable rest or sleep conditions (in some cases at pilot houses) and the need to maximise earnings (Appendix A, item 26). A larger proportion of pilots with Australian Reef Pilots than Torres Pilots indicated these reasons. Many pilots indicated having less than the defined rest period as a factor although this is closely related to the other factors. The factors related to transfer time and transfer vehicle were identified as having the greatest impact on rest before pilotage.

Pilot transfer and travel related factors have the potential to significantly affect how rested a pilot is before boarding a ship. A number of pilots advised that they have regularly had to wait in pilot boats for many hours (examples included 6 hours or more). Given the sheer number of transfers, it is hard to determine if such examples are anomalies that occur from time to time, particularly in remote areas such as the Torres Strait, or whether such situations occur frequently. However, waiting for a couple of hours seems to have been common. More importantly, the transfer and travel times have not always been excluded from rest periods as required.

The usual reasons for prolonged transfer times are long distances and multiple pilot transfers as described in section 3.4.5. Delays are reportedly also caused by pilot boat breakdowns, slow speed due to weather/sea conditions, helicopter availability and landing a helicopter to refuel it during a Blossom Bank transfer operation. Notwithstanding the practical transfer logistics and these factors, the result is that prolonged transfer times, particularly in rough weather, will adversely affect a pilot's ability to be in a fully rested state at the start of a pilotage. Therefore, managing transfer times and comfort level during transfers is a critical issue that should be addressed to reduce fatigue risk during pilotage.

In general, AMSA maintains oversight of a pilot's fatigue management through the requirement for pilots to report to REEFVTS. At the time of the survey, pilots reported their boarding and disembarking times, and the times when they started and completed pilotage duties. Usually the pilotage duty times are not significantly different to the times of pilot boarding or disembarking. A few days after a pilotage, the provider also forwards a copy of the pilotage certificate received from the pilot to AMSA. The certificate includes the times of starting and completing the pilotage. None of this monitoring takes account of pilot transfer and travel times. The times reported are used to check compliance with the fatigue plan requirements rather than predicting or assessing fatigue levels that may be experienced.

In addition, the motivation of some pilots and providers in particular circumstances can affect the accurate reporting of times required by AMSA. In the survey, pilots indicated that a reason for inadequate rest has been the need to maximise earnings. These pilots may consider that a mandatory rest period is, at times, an unnecessary impediment to performing a pilotage. For example, a night's rest counts only if it starts no later than 2200. Hence, if the rest period starts a minute after 2200 and the pilot then has 8 hours of good quality sleep, theoretically he must still rest for the following night. This is probably why transfer and travel times have sometimes been ignored. Similarly, some pilots may consider it advantageous to record the earliest start of a rest period and the latest time for starting a pilotage.

In submission to the draft report, Australian Reef Pilots advised that it had a robust monitoring system which records pilot house to pilot house times which was used to monitor rest periods under the fatigue management plan.

Similarly, Torres Pilots submitted that its system, where staff calculated pilot rest periods with allowances for travel, did not allow pilots to manipulate the fatigue management plan. With regard to claims of 'excessive pilot transfer times', the provider stated:

> The claimed excessive pilot transfer times on pilot launches would be a safety issue if it compromised the pilots' rest times ashore and compliance with the pilotage provider's fatigue management plan. Torres Pilots monitors pilot rest periods and compliance with the fatigue management plan to ensure the rest break includes time ashore before the next pilotage.

In addition, Torres Pilots submitted the following with respect to managing fatigue:

> The draft report does not differentiate between different circumstances of pilot transfers and different conditions, which need to be considered for a proper evaluation of any safety consequence. For example:
>
> If the pilot is boarding an eastbound GNEC vessel, then an extra 1.5 hours on the pilot launch is generally not considered by Torres Pilots to be critical for fatigue management as the time the pilot can expect to spend on the piloted vessel is 9 hours or less. It is relevant that pilots often experience 3 hour pilot transfer times before boarding westbound vessels in the GNEC due to the long transfer from the pilot base on Coconut Island to the Dalrymple Island pilot boarding grounds, as identified in the draft report.
>
> If the second or any subsequent movement in the same transfer voyage (the trip undertaken before returning to Thursday Island jetty) is for the pilot to disembark, then the fatigue aspect of the 'excessive pilot transfer time' in a launch is not a safety issue in terms of adequacy of the pilot's rest before a pilotage.

However, rest periods can be difficult to monitor because they rely on accurate reporting and a clear understanding of, and compliance with, fatigue management plan requirements. In May 2011, and again in June, Australian Reef Pilots advised its pilots of the increased focus on compliance with the plan's requirements once issue 5 of MO 54 was implemented. The provider's memo on the subject asked pilots for cooperation in reporting relevant times so that travel could be excluded from rest periods. The memo noted that matters which are sometimes overlooked include 'the requirement for travel time (pilot boat and helicopter transfers and air travel between jobs) to be excluded from rest break considerations'.

In the survey and at interview, some pilots claimed that providers have at times ignored fatigue plan requirements, such as excluding transfer times from rest periods. However, the evidence they provided in support of their claims can have other interpretations.

A pilot engaged by Torres Pilots submitted that while he personally did not accept the deliberate and improper recording of rest periods, he believed that ambiguous wording in the fatigue management plan had resulted in pilots improperly recording rest periods. Similarly, one of Australian Reef Pilots' senior pilots submitted that travel time, including air travel and waiting in pilot boats is frequently treated as part of a rest period.

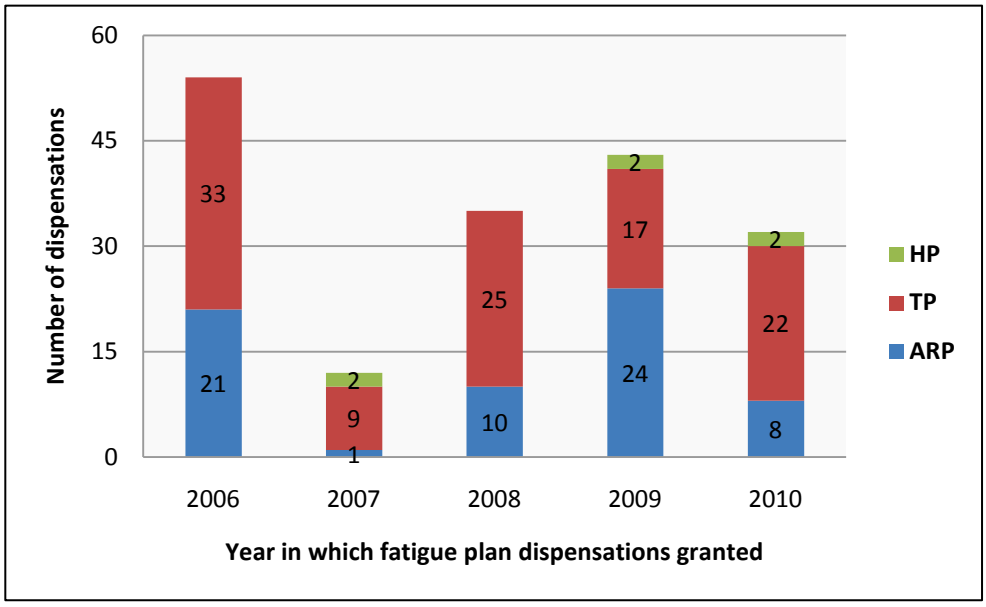
These comments by pilots and the efforts by Australian Reef Pilots to monitor rest periods serve to highlight that AMSA's monitoring (recording the times for boarding/disembarking ships and starting/completing pilotage duties instead of starting/ending travel) does not capture travel/transfer time. Torres Pilots' comment above regarding 'rest times ashore' also suggests confusion about rest periods, which can only be had ashore as per the fatigue management plan (as opposed to rest breaks during a pilotage). Moreover, the provider's views/policies in relation to managing fatigue risk cited above need to be consistent with the agreed fatigue management plan. In any case, transfer time after a pilotage is relevant because it impacts the pilot's rest period before his next pilotage.

Mandatory rest periods can create difficulties for a provider when they do not have a rested pilot available to service a ship booking. When a provider does not have a pilot available, the usual practice has been to apply for a dispensation of the required rest period from AMSA rather than offer a competing provider an

opportunity to service the ship. Providers have formally applied to AMSA for dispensations by confirming that a rested pilot is not available, that the pilot proposed for the pilotage is in agreement and that a qualitative risk assessment has been conducted. At times, a FAID[121] or similar fatigue analysis has been completed.

In the 5 years from 2006 to 2010, AMSA granted 176 dispensations from fatigue plan requirements, an average of 35 per year (Figure 23). In this period, three dispensation requests were refused. The 32 dispensations granted in 2010 represent about 0.7 per cent of the pilotages conducted. A finding of the 2010 review of the fatigue management plan, referred to above in section 3.6.2, was that the process for dispensations required significant revision. While AMSA advised that the process was clarified and that dispensations since have been rare, a pilot's agreement as part of the process is of limited value because of potentially conflicting priorities of safety and loss of income (Appendix A, item 19). Frequent dispensations from requirements also tend to suggest that the requirements need to be reviewed.

Figure 23: Dispensations from fatigue plan requirements



The ATSB also examined the pilot boarding and disembarking times for a total of 1658 pilotages reported to REEFVTS in October, November and December 2010 (Figures 24A and 24B). Other than some peak times for boarding or disembarking, and that the times recorded take no account of pilot transfer times and travel, these records did not indicate any obvious breaches of mandatory rest periods.

The ATSB survey revealed that it was not just the boat or helicopter transfer time that compromised a pilot's level of alertness. Some pilots indicated that rest was seriously compromised when prolonged air/road travel or waiting at airports/hotels is involved before a pilot transfer. An example of travelling from Cairns to board a ship off Booby Island at 2100 on the same day was given. By the time the pilot had boarded the ship, he had been travelling for most of the day before the pilotage. According to him, similar instances regularly occur where pilots undertake many hours of travel before a pilotage. It is inevitable that a prolonged period of

[121] The AMSA fatigue management plan states that FAID (Fatigue Audit Interdyne) is a computer based program for comparing peak fatigue scores, accumulated fatigue hourly scores and peak risk levels measured for an individual compared to targeted risk levels.

wakefulness will affect the pilot's alertness and decision making ability by the time he boards the ship. Notably, the 2010 review of the fatigue management plan found that the issue of travel time had not been clearly addressed in the plan.

Figure 24A: Pilot boarding times reported to REEFVTS

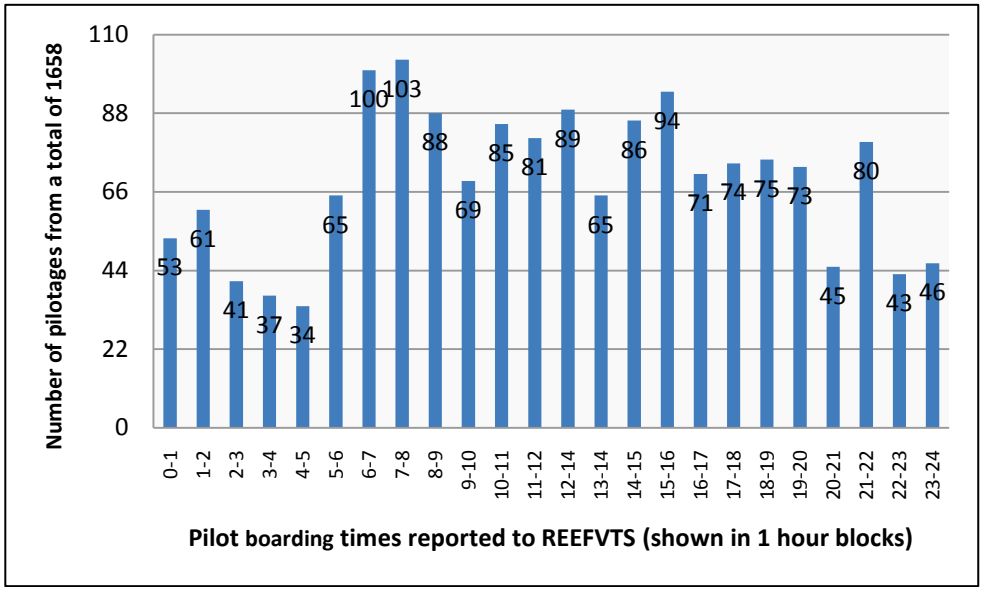
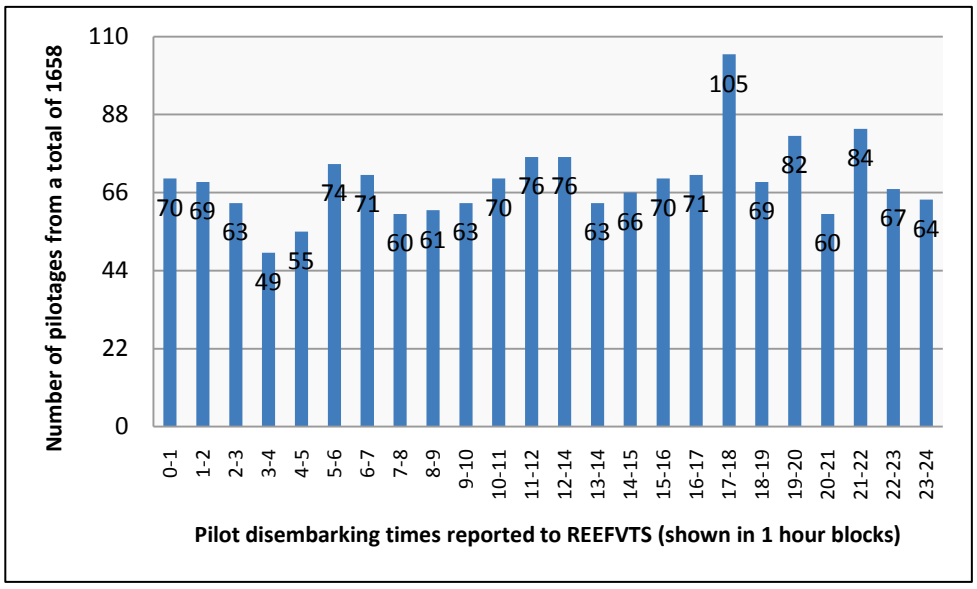


Figure 24B: Pilot disembarking times reported to REEFVTS



In the survey, pilots indicated that the effectiveness of the 12 hour rest periods between the pilotages in the Great North East Channel and Hydrographers Passage was greatly reduced when prolonged pilot transfers or adverse weather conditions were involved. Successive pilotages at night were identified as another factor reducing the adequacy of rest. In any case, prolonged irregularity in working hours and irregular sleep patterns contribute to the build-up of fatigue.

In recent years, it has been common for pilots to perform consecutive pilotages in the Great North East Channel or in the Hydrographers Passage during a single work period. It is worth noting that an optimal night's rest was required for a Great North East Channel pilotage before pilotage there became compulsory in 2006. A number

of pilots indicated in the survey that performing consecutive pilotages significantly reduced rest and sleep, particularly when the pilotages were performed mainly during the night. As described in section 3.4.5, it is common to wait in a pilot boat or helicopter carrying out multiple transfers. Such operations prolong a pilot's time on board the ship and increase their transfer time.

The consecutive pilotages above involve working up to 18 hours without taking into account the transfer time in assessing fatigue risk. Research in the aviation industry has shown a significant increase in accident rates for commercial pilots as their duty time increases, particularly when their duty times are more than 12 hours.[122]

In submission to the draft report, a Cairns based pilot noted the often busy Great North East Channel traffic sometimes resulted in a pilot working there for weeks and increased fatigue. He suggested fatigue risk could be reduced by capping the number of consecutive pilotages there to four or a maximum of 1 week. He stated such limits would reduce the period a pilot was away from home and felt a tour of duty of 3 or 4 week was excessive. Another pilot submitted that repeated, night time Great North East Channel pilotages significantly impacted pilot fatigue. One pilot submitted that helicopter transfers in the Torres Strait could address the issue of long transfers. According to him, winch down helicopters had been considered before 1993 but the greater focus on costs since 1993 resulted in no further action.

The following findings of the 2010 fatigue management plan review are particularly relevant with regard to rest before pilotage.

> The current commercial pressures and organisational structures create an environment which can work at odds to the effective management of fatigue-related risk.
>
> The practice of 'double headers' [multiple pilotages within a single work period] represent an area of elevated fatigue-related risk for Queensland coastal pilotage. The current QCPFMP [fatigue management plan] does not provide adequate risk management for these operations.
>
> The current definition of 'rest' is open to misinterpretation and in some instances is taken to include time on the pilot launches [and] other forms of work-related activity.
>
> The current system does not take into consideration the inherent variation in sleep opportunity that results from different lengths of pilotages, or pilotages at different times of day, even though these sleep opportunities are a critical component of fatigue risk management.
>
> There is evidence of non-compliance with the QCPFMP. There is no mechanism to establish or monitor compliance beyond random audits.
>
> The process for dispensations requires significant revision such that robust and auditable risk mitigation is evident, and so that specific individuals' expertise within AMSA does not form the sole basis for decision-making around extensions to duty.[123]

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[122] Goode JH 2003, 'Are pilots at risk of accidents due to fatigue?', *Journal of Safety Research*, vol. 34, pp. 309-313.

[123] UniSA, Centre for Sleep Research, *Review of the Queensland Coastal Pilotage Fatigue Management Plan-2010*, Findings one, four, six, nine, ten and eleven, September 2010, Australia,

These findings, the ATSB survey and pilot interviews indicate that pilots are not always adequately or fully rested (as specified in the fatigue management plan) before pilotage. In many cases, travel and pilot transfer time has incorrectly been included in mandatory rest periods. At times, long transfer/travel times and arduous conditions during the transfer reduce the adequacy of the rest periods.

3.6.4 Rest during pilotage

The inherent fatigue risk of a long single-handed pilotage is exacerbated if the pilot is not fully rested when starting the task. Fatigue during a pilotage is significantly influenced by the conditions on board ships, such as the equipment, crew, cultural differences and the condition of the accommodation, and external conditions, such as weather and traffic. If these factors are unfavourable, they have to be somehow managed by the pilot who may have little, if any, control over them.

Unless a pilot rests from time to time during the 25 to 40 hour Inner Route pilotage, it cannot be completed without the pilot being affected by a dangerous level of fatigue. Traditionally, pilots have taken short rests in certain areas of the Inner Route which they consider can be safely navigated by the ship's crew without continuous pilot advice. The opportunity to rest in these areas is dependent upon the ship's transit speed[124], and suitable prevailing weather, traffic and other conditions such as the ship's crew and equipment.

In 2004, the Fairway Channel and LADS Passage within the Inner Route was opened for use by all ships. There are sections of this new route totalling about 80 miles, most of which can be used by pilots to rest during a stage of the pilotage where previously the old route had offered an opportunity to rest over a leg of about 15 miles. The additional rest opportunity occurs about halfway through the transit, making it very useful. The new route also shortened the pilotage by about 20 miles. It has been estimated that use of this route by ships reduced navigational risk in the area by approximately 30 per cent.[125] However, while the new route has provided pilots more rest opportunity, it has not eliminated fatigue risk for the Inner Route.

The amount of sleep and rest available to a pilot during Inner Route pilotages can vary significantly. For example, a northbound transit on a deep draught bulk carrier is typically 40 hours (at 12.5 knots with no stoppages) that, in ideal conditions, may include a total of about 14 hours of rest opportunity over about eight separate rest breaks. This is the total time that a pilot may be away from the bridge and, depending on the time of the day and other variables, this time can be used to sleep. A fast ship (about 20 knots) means a 25 hour transit with shorter and fewer rest breaks. In ideal conditions, these breaks may total 7 or 8 hours for meals, rest and sleep. However, often little or no sleep can be achieved during this quicker transit.

In submission to the draft report, a pilot stated that Inner Route transits on fast ships effectively reduced the number of sleep breaks to three. According to him, subject to the prevailing conditions, one break could be about 2.5 hours and two breaks about 1 hour each. Another pilot cited a recent example of a 38 hour Inner Route transit during which he achieved 3 hours of sleep due to adverse conditions, stating

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[124] The transit speed depends not only on the ship's designed service speed but on speed instructions from the ship's owners/charterers, its port schedule, under keel clearance and weather conditions.

[125] Hydro International, *LADS Passage and Fairway Channel*, May 2006, Vol 10, No 4 (citing Det Norske Veritas (DNV) analysis of navigational risks).

that such a level of reduced sleep was not uncommon. He noted that on that particular transit the ship deviated from the planned track while he was away from the bridge resulting in a risk of grounding but there was no intervention from REEFVTS (he did not indicate if he reported this matter).

In general, rest areas are navigationally less challenging than various confined passages and sections of the Inner Route. When referring to these confined parts, a pilot who joined the pilot service before 1993 described the Inner Route as 'many pilotages linked together'. The areas linking these 'many pilotages' are generally known as rest areas. These areas are referred to by pilots and providers variously as 'recognised', 'designated', 'usual' or 'possible' rest areas. However, no issue of MO 54 refers to rest areas and AMSA does not officially recognise any rest areas.

In addition, rest areas are not defined in any standard procedures and a PAN states that there are no officially approved rest areas.[126] However, this PAN notes that rest may be taken in some areas if the pilot conducts a risk analysis and considers it safe to rest. The check pilot assessment checklist refers to factors including traffic, hazards, visibility and tides that should be taken into account for a risk analysis but there is no specific guidance on acceptable rest areas. There is no measurement or assessment of actual fatigue levels or sleep that a pilot achieves. Nor is any method used to predict potential fatigue levels during a particular pilotage (best and worst case scenarios) despite a previous ATSB recommendation.[127] Therefore, rest break management depends on an individual pilot's assessment of prevailing conditions (on board the ship and externally) and his usual practices.

There can be marked variations in the rest breaks availed by different pilots. For example, in the LADS Passage (usually a rest area) in the Inner Route some pilots return to the bridge for every planned course alteration while other pilots may not. Similarly, practices vary in the Great North East Channel, where some pilots remain on the bridge throughout while others leave to rest for an hour or two in areas such as between Twin Island and Kirkcaldie Reef. In the Hydrographers Passage, most pilots remain on the bridge throughout although some may leave the bridge for a period in the area between Tern Island and Creal Reef. Pilots also have their own individual procedures, not necessarily similar, for recall to the bridge.

While rest on board a ship is critical for a pilot, particularly in the Inner Route, its effectiveness can be limited. In the survey, more than 92 per cent of pilots indicated that at times they were very tired during, or at the end, of a pilotage (Figure 25). The reasons most often cited by pilots for getting tired were unsuitable rest or sleep conditions, poor ship equipment or crew, adverse weather or visibility, single-handed pilotage and inadequate sleep opportunities with the first three of those reasons cited as having the greatest impact (Appendix A, item 27). This indicates that these variable factors can create significant problems in managing fatigue.

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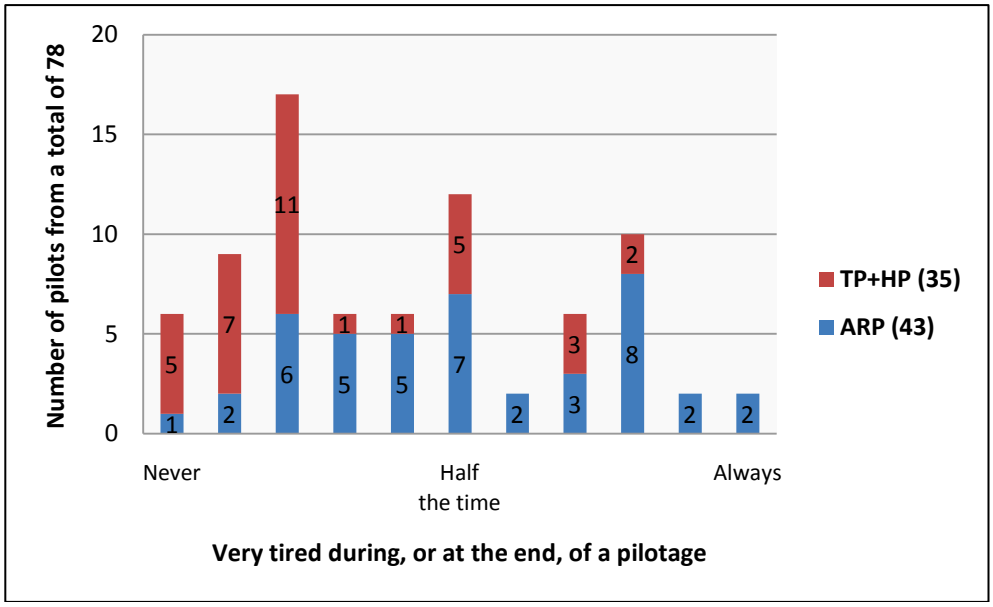
[126] AMSA, Pilot Advisory Note (PAN) 11/06, *Rest areas within the Great Barrier Reef and Torres Strait*, 4 October 2006.

[127] ATSB recommendation MR20030033 (Report number 182, Grounding of *Doric Chariot*, Piper Reef, 29 July 2002) stated: The Great Barrier Reef pilotage services should consider adopting a fatigue management policy that predicts potential fatigue levels at key positions in the pilotage task. Rather than only examining a pilot's fatigue level after a passage, the pilotage provider should, prior to allocating the job, use the FAID program to ensure that a reasonable projection of the pilot's fatigue score would not exceed a predetermined value at any point during the pilotage.

Figure 25: Tiredness during, or at the end, of a pilotage as indicated by pilots



In submission to the draft report, at least 18 pilots made specific comments in relation to fatigue risk during Inner Route pilotages. Many comments included similar themes and thoughts. Several pilots consider that the number of working hours involved in Inner Route pilotages cannot be managed by one pilot consistent with any recognised method to manage fatigue. A number of comments referred to the increased risk of an incident whilst a pilot was resting and, while several felt that having a rested pilot on the bridge at all times was necessary, they noted that this was impossible in the Inner Route. One comment related to an inability to rest or sleep properly when away from the bridge because of a lack of confidence in the ship's crew. Examples to support these comments included past incidents, unreported near misses in rest areas, comparisons with limitations on the working hours of seafarers and that long pilotages in Canada were conducted by two pilots.

One pilot submitted that fatigue was the core safety issue in coastal pilotage but ignored by AMSA, impeded by the competitive model due to costs and disregarded by pilots competing with each other for work. Another pilot stated that costs, not proper fatigue management, were the focus of commercial interests in the sector. The fatigue management plan, a pilot stated, did not manage fatigue but attempted to manage rest before or after a pilotage, leaving the pilot to somehow manage fatigue during 30 to 40 hours of pilotage by resting after assessing risk. Another pilot noted that the plan could not manage fatigue during a long pilotage.

At least three pilots made the observation that the stress caused by the competitive environment amongst pilots (a reference to their turn for the next job) unnecessarily exacerbated fatigue. Long working hours and mental stress from issues related to remuneration, working conditions, inadequate training and pressure from pilotage providers was claimed to result in a state of being constantly fatigued. One pilot stated that single-handed pilotage was extremely dangerous in terms of both the risk of a serious shipping incident and the long term health of pilots.

Some pilots made suggestions to manage fatigue risk. One suggested that a single pool of pilots available to any pilotage provider would better utilise available resources to service shipping traffic and reduce pilot fatigue. As an example, he pointed out that it was not uncommon for the pilots of competing providers to

concurrently be boarding flights in opposite directions (between Thursday Island and Cairns) to meet the service demand of their respective provider in the Torres Strait and Cairns. Another pilot suggested the use of the Outer Route to/from the Torres Strait, which some ships already use. He considers this would reduce fatigue risk and help manage the greater demand for pilots as traffic increased although it would mean higher costs (to ship owners or operators) due to the increased distance. He believes ports within the Inner Route, for example Cape Flattery, could be accessed via established openings in the GBR, such as those near Lizard Island.

Some of these suggestions could be used to improve fatigue management. However, each matter would need to be appropriately assessed. For example, use of the Outer Route may reduce fatigue risk but a large number of ships transiting that route would mean considering risks due to increased traffic at key entry/exit points and the greater likelihood of a disabled ship off the outer edge of the GBR.

Maritime Safety Queensland (MSQ) submitted that there was a need to comprehensively review fatigue management, particularly in the Inner Route. According to MSQ, the custom of single-handed pilotage in this route is at odds with contemporary practice in other modes of transport. It noted that the issue of fatigue was exacerbated by the international trend of declining crew competency (MSQ did not offer any evidence to support its view on crew competency).

Almost all the reasons given for experiencing a level of tiredness which may impair judgement or ability are associated with single-handed pilotage. The main reasons for single-handed pilotage lie in tradition, cost and the absence of an intermediate economical or convenient transfer point between Cairns and Thursday Island. It is likely that such considerations played a part when the Inner Route was defined as a single compulsory pilotage area. Subsequently, when AMSA's fatigue management plan was formally implemented, the plan simply included mention of the usual practice of rest breaks as a strategy to manage fatigue during pilotage.

The designation of a pilotage area as 'compulsory' raises the expectation that a pilot will conduct the ship throughout its transit. In the survey and at interview, a number of pilots suggested two pilots for an Inner Route pilotage would resolve the issue of working hours. However, practical matters such as pilot accommodation on board the ship, handovers between the pilots jointly conducting a pilotage and pilots' fees, remain. While it has been suggested that check pilot assessments (where two pilots are on board) show that such matters could be managed, it should be noted that less than 2 per cent of Inner Route pilotages have been check voyages.

Anchoring for a rest break (even if sleep/rest has been impossible) is difficult for a pilot to contemplate as the master would need to agree as there are significant commercial implications involved in delaying a ship. The option of the master overseeing the navigation while the pilot rests also presents practical difficulties. In submission, a pilot stated that masters expected the pilot to be on the bridge at all times. He also pointed out that some masters remained on the bridge at all times while a pilot was on board, whether or not the pilot was on the bridge.

The following findings of the 2010 fatigue management plan review provide further insight into pilot fatigue.

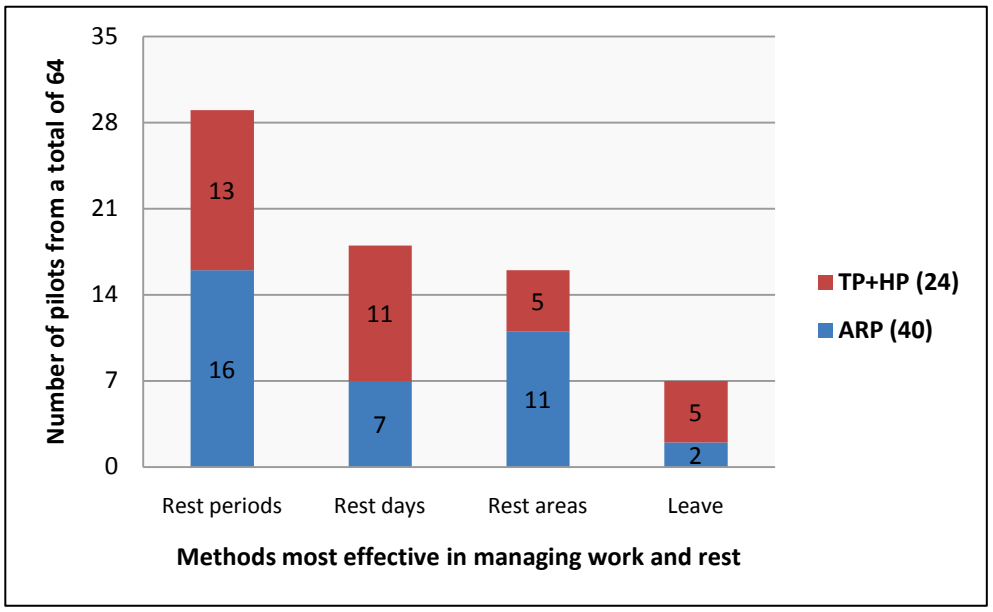
> Without creating a culture of effective fatigue risk management, little improvement is likely.

> The Inner Route operation is an area of elevated fatigue-related risk for Queensland coastal pilotage. The current QCPFMP [fatigue management plan] does not provide adequate risk management for these operations.
>
> The current training provided to staff of providers and to individual pilots themselves is insufficient.
>
> The QCPFMP is not responsive to a range of factors that can mediate or elevate fatigue-related risk.
>
> The QCPFMP does not take account of the actual sleep achieved by pilots prior to, or during, a work period. Actual sleep obtained is perhaps the most important variable with respect to fatigue-related risk.[128]

Some action has been taken or proposed by AMSA to address the findings of the 2010 review (refer section 5.1.3). The survey data and information could be useful in progressing action to address the review's findings.

In the survey, pilots indicated that they found the rest periods before a pilotage, rest days after a tour of duty, rest areas during pilotage and defined leave periods, in that order, the most effective methods in managing their work and rest (Figure 26). Amongst other methods identified by pilots were rosters and accurate ship arrival and departure times.

Figure 26: Methods pilots find most effective in managing work and rest



3.6.5 Summary

The ATSB survey, pilot submissions and the findings of the independent review into pilot fatigue in 2010 indicate that pilot work and rest hours have not been effectively managed and high levels of fatigue-related risk exist.

The fatigue management plan relies on mandatory rest periods before pilotage but the actual fatigue levels experienced during pilotage are not monitored. Pilot fatigue

[128] UniSA, Centre for Sleep Research, *Review of the Queensland Coastal Pilotage Fatigue Management Plan-2010*, Australia, Findings two, three, five, seven and eight, September 2010.

levels are affected by the period and quality of rest/sleep achieved before pilotage. Travel related matters, including the duration of pilot transfers, and weather/other conditions, are a factor reducing the adequacy of pilot rest before pilotage. This is complicated by the disincentive of loss of income or time to pilots for compliance with plan because they are paid per pilotage 'job' rather than for their time.

The fatigue management plan's effectiveness is further limited because it does not take into account variations in sleep patterns due to irregular working hours, actual sleep achieved by pilots and the effect of multiple consecutive pilotages. Since the pilotage is single-handed, pilots self-manage fatigue by resting or sleeping when possible during a pilotage, although there are no approved rest areas or standard procedures for rest breaks. The opening of the Fairway Channel and LADS Passage in 2004 reduced fatigue risk by increasing pilot rest/sleep opportunity in the Inner Route but it has not eliminated fatigue risk.

Pilots regularly experience high levels of fatigue during Inner Route transits (25 to 40 hours). The rest/sleep available to pilots depends on factors such as weather, traffic, ship's speed, equipment, crew and other conditions. Longer transits (i.e. slow ships) offer greater rest/sleep opportunity but this may sometimes be greatly reduced. Examples include 3 hours of sleep during a 38 hour transit due to unfavourable conditions. The 25 hour transits on fast ships offer shorter and fewer sleep opportunities even in favourable conditions. Achieving 4 hours of sleep over three or four breaks during these shorter transits would be considered a good result although often little or no sleep is possible.

Adequately managing fatigue is critical to reducing the risk of a serious shipping incident. Therefore, the shortcomings of the fatigue management plan need to be addressed.

3.7 Check pilot system

In 2002, AMSA introduced the check pilot regime[129] stating that it was intended to continuously improve pilotage procedures and techniques. This check pilot system was described by AMSA as 'one of the most important initiatives undertaken and extremely important for the ongoing professional development of pilots'.[130] Implemented in 2003, the system is aimed at assessing the initial and continuing aptitude and competency of pilots, and the adequacy of their individual piloting systems.

By 1 January 2011, a total of 550 check pilot assessments had been conducted. In the 8 years of the system's operation, no pilot's performance has been assessed as 'overall unsatisfactory' (i.e. failing the assessment); rather the records indicate that the overall assessment has been 'satisfactory' in every single check pilot assessment (i.e. a 100 per cent success rate). This success rate suggests that all pilots and their systems adequately met the required standard and the rate, by itself, would not be an issue if assessment records indicated continuous improvement in pilotage standards.

However, rather than finding evidence of continuous improvement, the ATSB investigation into the 2009 grounding of *Atlantic Blue* identified the following significant safety issue with respect to the check pilot system.

> The pilotage system used by *Atlantic Blue*'s pilot did not define off-track limits or make effective use of recognised bridge resource management tools in accordance with the Queensland Coastal Pilotage Safety Management Code and regular assessments of his procedures and practices under the code's check pilot regime conducted over a number of years had not resolved these inconsistencies.

Consequently, the check pilot system was a focus area for this safety issue investigation. The ATSB survey sought responses to nine specific questions in relation to the system and more information was obtained through interviews. The ATSB also examined the records for check pilot assessments.

3.7.1 The check pilot concept

The check pilot concept has its origins in the aviation industry. In general terms, the aviation model in Australia allows a suitably qualified and experienced pilot to be approved by the Civil Aviation Safety Authority (CASA) and appointed by the airline company to carry out proficiency training and checking of other pilots. Checks may be conducted in-flight, or using a simulator. Proficiency in operating a particular type of aircraft and adherence to standard procedures is assessed. The procedures and standard parameters are defined in the company's documented systems and aircraft operation manuals. There is a documented post-check process that includes corrective action and/or re-training of the checked pilot, if necessary. Hence, the check pilot assesses a pilot against a company's and CASA's approved set of standards and proficiencies.

The use of check pilots in the marine industry has progressively increased during the last decade. The NMSC guidelines for pilotage standards in Australia and the

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[129] AMSA, *Marine Orders Part 54, Coastal Pilotage*, Issue 3 (Amendment), 2002, Appendix - Annex B, *Check Pilot Regime*.

[130] AMSA, Pilot Advisory Notes 10/03 and 01/04, *Check Pilots* and *Check Pilot Voyages*.

ISPO guidelines referred to in section 3.1 also cover the subjects of check pilots, pilot training and continued proficiency. A number of ports in Australia have included check pilotage in their SMSs. In this regard, the following is relevant:

> The role of the check pilot is to conduct periodic audits of pilots while they are executing an actual pilotage and observe that established procedures are correctly followed. The purpose of such audits is to ensure that competency levels are being maintained or that a pilot is fit to be issued with a licence at a higher level.[131]

The standard procedures of an SMS comprise the 'established procedures' referred to above against which a pilot can be assessed (i.e. a benchmark). Therefore, a check pilot system's effectiveness relies on the SMS of which it should be a part.

3.7.2 AMSA process and assessment criteria

The AMSA approved check pilot assessment document lists 14 broadly defined performance criteria against which pilots are assessed.[132] The performance criteria include passage planning, bridge resource management, contingency planning, information exchange, VHF communications, fatigue management, carriage of publications, piloting techniques and general execution of pilotage (Appendix D, item 1). Each criterion comprises a number of checks listed in the 'check pilot's aide memoire' (checklist) provided with the assessment document. This checklist contains more than 80 specific checks.

The AMSA assessment document also provides instructions and guidance notes for check pilots. Assessment strategies are required to include short written tests and check pilots should give the pilot being assessed written instructions on the conduct of the assessment. On completion, the assessment is reviewed with a discussion and debrief and feedback sought from the assessed pilot. The 'pilot audit and check list' page of the document summarises the assessment findings as satisfactory or unsatisfactory (Appendix D, item 2).

The AMSA assessment procedure provides that:

> A pilot that has been assessed is to be de-briefed. A full discussion of any perceived shortcomings should be undertaken and remedial action agreed. It should be noted that there could be a number of check boxes marked as NO on the Aide Memoire and the *Pilot Audit and Check List* still be marked *satisfactory*. Any unsatisfactory check box on the *Pilot Audit and Check List* is to be supported by written comment. An *unsatisfactory* finding in one or more check boxes does not indicate that a pilot being assessed is not competent or capable, it is only the opinion of the check pilot that there is room for improvement in that specific area and should be regarded as such.
>
> In the event that the check pilot marks the *overall assessment* box as unsatisfactory, AMSA will immediately arrange to interview the check pilot and the assessed pilot regarding this overall assessment. AMSA will also arrange for another assessment voyage to be undertaken with a check pilot selected by AMSA and dependent on the outcome of this assessment will decide on what further action may be required.

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[131] Australian Transport Council, *National Marine Guidance Manual- Guidelines for Marine Pilotage Standards in Australia, Edition 2*, Chapter 3, Section 13.3, NMSC, November, 2008.

[132] AMSA, *Check Pilot Assessments*, Versions: August 2004, March 2007.

After the completion of an assessment, the aide memoire checklist, supporting evidence and the pilot audit and checklist is submitted by the check pilot to AMSA in confidence. The assessed pilot and the pilotage provider are given a confidential copy of only the pilot audit and checklist, not the entire assessment documentation.

The check pilot assessment process indicates that it is a combination of a pilot competency test, the usual function of such systems, as well as an audit of the assessed pilot's system. Therefore, AMSA's check pilot system attempts to also achieve the objectives of a line or system audit, not unlike the audits to assess the implementation and effectiveness of an SMS.

However, unlike the aviation industry model, where an aviation company has a set of standards for each aircraft type, coastal pilots may be piloting any ship from a tug and tow, through the wide variety of ship types, to a modern passenger cruise liner. Furthermore, there are no standard procedures (i.e. a pilotage SMS) and a check pilot may be checking any one of dozens of piloting systems, all with subtle or not so subtle differences to the check pilot's own system, and which he may consider as professionally valid and as safe as his own system.

3.7.3 Assessment practices and outcomes

At the time of the survey, there were 24 licensed check pilots, 17 engaged (or last engaged) by Australian Reef Pilots and seven by Torres Pilots. Hydro Pilots has not had any check pilots since 2008. The AMSA principal pilotage officer (PPO) was also licensed as a check pilot and conducted a few assessments to maintain his local area knowledge, when requested by a pilotage provider or if considered necessary by AMSA.[133]

A main qualification for a check pilot is significant experience, including minimum recent experience (within the past 12 months) in the pilotage area.[134] A check pilot must also have an incident free record, which is defined as never having been involved in a serious pilotage incident. The selection process includes an AMSA interview, psychometric testing and workplace assessor training. In the absence of a uniform standard or pilotage SMS, heavy reliance is placed on a check pilot's experience, mentoring skills and judgment.

By 1 January 2011, the number of check pilot assessments conducted for the pilots engaged by each pilotage provider was 331 (Australian Reef Pilots), 210 (Torres Pilots) and 9 (Hydro Pilots). The check pilot and the assessed pilot were almost always contracted to the same provider. The exceptions have been Torres Pilots' check pilots assessing pilots engaged by Hydro Pilots since 2008, and the assessments conducted by the PPO. All assessments are arranged, or mainly arranged, between the pilot to be assessed and the relevant provider who assigns and remunerates the check pilot.

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[133] The PPO conducted four assessments each in 2006 and 2007, three in 2008 and two in 2009, the last assessment being for the re-instatement of the licence of *Atlantic Blue*'s pilot.

[134] Check pilot licence requirements for the Inner Route are an unrestricted pilot licence for the last 10 years and 500 pilotages or 200 in the last 5 years; for the Great North East Channel, 200 transits of the Prince of Wales Channel and 50 Great North East Channel pilotages; for the Hydrographers Passage, 50 pilotages.

Some check pilots use their own assessment checklist which covers AMSA required criteria through somewhat different checks. However, most check pilots use the AMSA aide memoire as their checklist. The supporting evidence submitted to AMSA with the checklist and the pilot audit and check list usually includes the assessed pilot's passage plan and related documents, and the written competency tests. It is not unusual for the documentation submitted to exceed 40 pages.

The check pilot assessment records examined by the ATSB for the period from late 2004 onward comprise the bulk of the assessments submitted to AMSA and contain a vast amount of information. This information, together with pilot interviews and survey data, provided an invaluable insight into pilotage practices, individual pilot systems and the check pilot system.

Overall, the evidence raised several issues of concern with the check pilot system and the main ones can be summarised as being the:

- absence of a defined standard against which pilots can be assessed,
- conflicts of interest related to the independence of check pilots, and
- lack of evidence of corrective action or improvement.

These issues are discussed in detail below.

Assessment standards and practices

The assessment records confirm that individual pilots' piloting systems varied in content and quality. There was a wide variation in pilots' passage plans, checklists, forms, crew guidance notes and other documents. While there was similarity in the waypoints and some commonality in the guidance notes, it was evident that no two pilots' practices and systems were identical in every respect. This is entirely consistent with the absence of standard piloting procedures.

While there have been some moves made within groups of pilots to develop standard passage plans and forms and, more recently, the IPP, there remains no uniform standard for all pilots (as discussed in section 3.5.2) despite many years of the check pilot system's operation. The absence of consistent standards severely limits the effectiveness of any assessments because there is no one standard to assess against. Unless some reckless procedure is followed by the pilot being assessed, there could be a number of ways to perform tasks listed in the assessment checklist, all of which may be acceptable to the check pilot although his own methods may differ. The point here is that while the delivery of a pilotage service may vary between individuals and still produce a safe outcome, the aim is to have a single product against which pilots can be assessed and one that is understood on board the ship employing the pilot.

In the absence of defined standards, the individual practices, opinions or ideas of check pilots naturally led, as could be expected, to inconsistent assessments. The records show that the same pilot could be assessed quite differently by different check pilots. A particular check pilot may focus on particular criteria to the detriment of a balanced overall assessment. Other check pilots may assess the same pilots for those criteria in a different manner. Therefore, the assessment unavoidably depends very much on the individual check pilot's opinion and his own piloting practices and system. While the exchange of different piloting methods and ideas amongst pilots is important and provides input to improve

pilotage standards, there is no reason that defined standards (and objective assessments) would prevent such exchanges in a continually improving system.

Issue 5 of MO 54 states that AMSA will ensure consistency in the assessment of pilots by reviewing assessments conducted by a check pilot, being present during an assessment or through a competency assessment. However, none of these methods address the issue of the absence of a single common standard to check against. The absence of a common standard inevitably results in a variation in quality and inconsistencies in the check pilot system. In such a system, a check pilot can only aim to achieve consistency across his own assessments.

The assessment procedure guidance (quoted in section 3.7.2) has probably made it difficult to determine what constitutes an 'unsatisfactory' assessment. For example, the records indicate that many of the checks (in some cases half or more) to assess a performance criterion in the aide memoire checklist were checked 'no' but the pilot was still assessed as 'satisfactory' with regard to that criterion. This should be of particular concern where a critical criterion, such as passage planning, is assessed without any evidence of corrective action. However, such 'satisfactory' assessments are entirely consistent with AMSA's guidance notes for check pilots.

Similarly, occasional 'unsatisfactory' assessments of any particular performance criteria (listed on the pilot audit and checklist) in the 550 assessments conducted since the system was implemented did not result in any 'overall unsatisfactory' assessment. It is worth noting here that a pilot assessed as unsatisfactory against a particular check or criterion by one check pilot could be assessed as satisfactory by another with different priorities and a particular focus. Such inconsistencies are mainly but not only the result of the absence of defined standards.

In submission to the draft report, a check pilot stated that check pilots could only assess adherence to procedures but had neither the training nor the expertise to assess competency. An assessment for adherence to procedures is, in any case, not possible because there no standard procedures.

Another pilot submitted that deep divisions between the pilots, centred on whether they started before or after 1993 and other personal differences, adversely impact assessments. This is another way of describing the different priorities, focus and ideas of check pilots in a system with no uniform, defined and accepted standard.

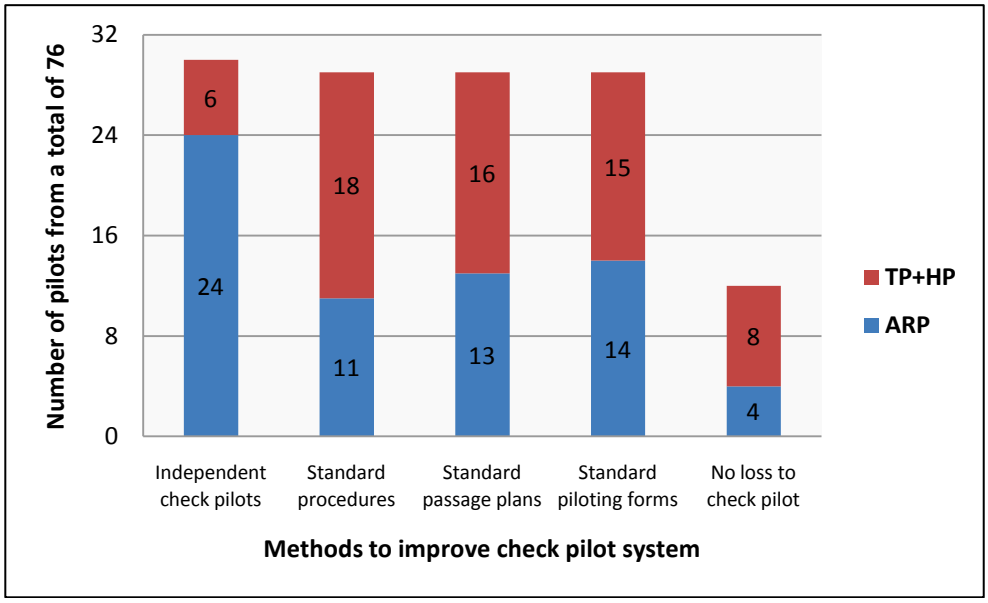
Some recently recruited pilots submitted that (based on their knowledge and experience of safety systems) many check pilots had neither the attitude nor the necessary knowledge to train or assess pilots, which in the absence of standard procedures made assessment and training very inadequate and further eroded pilotage standards.

The lack of uniform standards also means more checks in the assessment checklist. This makes the process unnecessarily tedious and confusing because the check pilot is generally not familiar with the plans, documents and practices of the pilot that he is assessing. For example, the use of a standard passage plan by all pilots would render the checking of more than 20 separate items (Appendix D, item 1, PC 5) in each pilot's individual passage plan redundant.

In the survey, nearly 40 per cent of pilots, including about half the check pilots, suggested that the check pilot system could be improved with standard passage plans, forms and procedures (Figure 27). Other suggestions included independent check pilots, better check pilot selection and training, assessments ashore (desktop

audits and/or simulators), fewer assessments (not necessary for every area for which a pilot is licensed), reduced assessment duration (not necessary for entire Inner Route) and reduced paperwork. Those suggesting 'no loss to check pilot' were referring mainly to disadvantages a check pilot may face in terms of income, time or turn as explained in the next sub-section (titled 'conflicts of interest').

Figure 27: Methods suggested by pilots to improve the check pilot system



At interview, Australian Reef Pilots (the provider) acknowledged that check pilots may not be marking the assessment checklist properly. Similarly, Torres Pilots (the provider) noted that pilots being assessed may be on their 'best behaviour' to hide bad habits and poor practices. These views were supported by some check pilots of both providers. However, it is normal for anyone being assessed anywhere to put their best foot forward and this is a separate matter from the need to have uniform standards and procedures. The latter make objective assessments possible and allow everyone involved in the process to have confidence in it.

In the survey, 13 of the 24 check pilots indicated that, in the last 2 years, they had not assessed any performance criterion or check as unsatisfactory or deficient. Of the check pilots who found one or more criteria deficient or unsatisfactory, six selected bridge resource management, five selected information exchange and four selected VHF communications. A couple of check pilots also selected criteria related to traditional piloting techniques, publications, contingency planning, personal protective equipment and general execution of pilotage.

The criteria which check pilots indicated that they most often found unsatisfactory or deficient were bridge resource management (four responses) followed by information exchange, general execution of pilotage and publications (two responses each). While these numbers are small, overall the survey data indicates that bridge resource management is regularly an issue. No check pilot indicated adverse findings in relation to passage planning or fatigue and rest management.

In general, the assessment records indicated that Torres Pilots' check pilots identified more deficiencies and had more comments than Australian Reef Pilots' check pilots. This difference appears to be largely because of the general views of each provider's check pilots, their assessment standards and background, and the

general profile of assessed pilots in terms of their background, rather than a matter of the competency of the assessed pilots. For example, Australian Reef Pilots have a larger number of former service pilots, most of whom are check pilots.

The survey also sought responses from all pilots in relation to being assessed. Sixty three pilots from a total of 76 (83 per cent) indicated that there were no criteria where they had been assessed as deficient or unsatisfactory and three pilots could not remember any findings. The collective responses of the other 10 pilots included findings in relation to bridge resource management (six), traditional piloting techniques (four) and publications (three). One response each identified five other performance criteria.

The ATSB compared survey data with the corresponding assessment period. In 2009 and 2010, the number of assessments conducted in the three pilotage areas for each provider's pilots was 87 (Australian Reef Pilots), 72 (Torres Pilots) and two (Hydro Pilots). About a quarter of the assessments contained comment mostly about bridge resource management with one pilot assessed as unsatisfactory against this criterion. However, no pilot was assessed as 'overall unsatisfactory'. The comments indicate that each check pilot has a particular view on how a pilotage should be conducted. Some comments are critical of the lack of use of transits, leading lights and visual marks while others focus on defining off-track limits (cross track error) and emergency anchorage provisions. The comments reflect a rather piecemeal approach to assessment rather than a uniformly applied check system.

A good illustration of potential issues and inconsistencies with assessments is evident in checks for 'the allowable cross track error for each track' (Appendix D, item 1, PC 5) where a pilot must define these limits in his passage plan and discuss them with the master and crew. As discussed in 3.5.2, issues in this area of passage planning contributed to *Atlantic Blue*'s grounding.

Atlantic Blue's pilot was assessed on six occasions by three check pilots during the 4 years before the ship's grounding. For all those assessments he used his usual guidance notes and plans. In each assessment, the check for cross track error was assessed 'yes' indicating that nothing was seen as deficient. However, check pilot records show that the same or similar issues existed in the systems of some other pilots and such inconsistencies in assessment were common. As described in section 3.5.2, individual pilots define different off-track limits for the same tracks. It is also worth noting that some check pilots regularly assessed the check for cross track error as 'no' but this did not necessarily result in the assessed pilot addressing the issue for his next assessment.

The key point here is that in identical circumstances, a number of pilots could have been just as unfortunate as *Atlantic Blue*'s pilot because they had some similar practices with regard to defining allowable cross track error. At least one pilot's guidance notes were identical in this respect and the notes of some others were similarly ambiguous. While defining this limit is particularly important, there are many other important considerations in every pilotage. The inconsistencies in assessments indicate that unresolved deficiencies in pilots' systems probably exist.

At the time of the survey, about one in three pilots (overall) were check pilots and nearly half of the pilots engaged by Australian Reef Pilots were check pilots. In the absence of uniform standards, this check pilot to pilot ratio introduces a wide variability into the system because each check pilot has a natural tendency to base assessments on his own individual piloting system and practices and his understanding of the performance criteria. This increases the potential for

inconsistent assessments and is not conducive to a consistent approach when interpreting a safety system. However, this is largely attributable to the absence of uniform pilotage procedures and standards rather than a large number of check pilots. The assessment of uniform standards using identical criteria would mean that the number of check pilots, by itself, would not be an issue.

The absence of uniform standards leads to a fundamentally weak check pilot system. Currently, about 80 assessments are conducted each year on about 80 different piloting systems. One uniform standard (i.e. a pilotage SMS) followed by all of a provider's pilots, would strengthen the check pilot system while improving the uniform standard. Effectively, that uniform standard would be checked multiple times a year and continuously improved through reviews.

Conflicts of interest

In the survey, 30 pilots (40 per cent of respondents), including 12 of the 24 check pilots suggested independent check pilots would improve the check pilot system. The current lack of independence of check pilots introduces potential conflicts of interest.

Check pilots, although remunerated by the provider to check their peers, are delegates of AMSA to which they confidentially submit all assessment documents. This means that it may not be clear to a check pilot who he is working for. When the system was introduced, providers were only notified that an assessment had been completed. Subsequently, AMSA decided to allow providers access to the pilot audit and checklist but they have had little to do with the process other than arranging for assessments to be carried out.

If a pilot was assessed as 'overall unsatisfactory', another assessment would be required and this would, naturally, impact the assessed pilot, the check pilot and the provider to varying degrees. The situation could be exacerbated where AMSA determined that remedial action, including training for the assessed pilot, was necessary.

The 100 per cent overall pass rate, a consistent feature of the check pilot system, suggests that, in the opinion of the check pilots, the numerous individual systems of pilots are satisfactory. However, it could also indicate a dysfunctional system where there is a reluctance to assess a peer as 'overall unsatisfactory'. That peer could also be a check pilot and the situation might be reversed in the future.

At interview, a check pilot indicated that it was not possible to assess a peer, who was an experienced pilot and licensed by AMSA, as unsatisfactory. Another stated there was a general reluctance to mark down a pilot being assessed. One pilot stated that check pilots merely ticked boxes, which suggests that an assessment is no more than a compliance exercise. These statements indicate that some check pilots have little confidence in the system and may have lost motivation.

In the survey and at interview, some pilots suggested that check pilots are pressured by providers to assess trainees as satisfactory. Others commented that there have been financial disagreements between pilots engaged by Torres Pilots because a check pilot's remuneration can be less than that of the assessed pilot. In submission, a pilot cited markedly lower fees for the check pilot in some cases. Such comments erode any confidence in objective assessments, particularly because the potential for conflict does exist. For example, a check pilot assessing a pilot as unsatisfactory will effectively incur upon his provider the costs of reassessing the failed pilot. In

cases where a check pilot's fees are lower than the pilot he is assessing, the check pilot may lack the motivation to conduct the assessment properly.

There are a number of other situations where the different priorities of check pilots can impact assessments. A potential weakness in the system is the practice of two check pilots undertaking a passage with one checking the other, and reversing their roles on the next passage. While this may make sense in terms of logistics, it has the appearance and the potential of meeting the mutual interests of the pilots involved.

Another regular practice is that of a pilot being assessed in different pilotage areas in quick succession, all by the same check pilot. While this practice may be convenient for licence renewal, in terms of exchanging ideas, it provides little more benefit than a single assessment would, particularly in the absence of uniform standards. Any benefits are restricted to matters specific to a pilotage area.

The large number of check pilots makes pilot allocation for ship movements easier for providers and provides flexibility with logistics. Since the check pilot keeps the same hours (on board the ship and transfers) as the pilot being assessed, these must be managed within the fatigue management plan. However, different priorities mean that the system has been used in various ways to achieve other assorted objectives. For example, during periods of reduced ship traffic, check pilots can be employed assessing and earn a fee instead of waiting ashore where they have no income. They can also be economically relocated to a place where they can either resume pilotage work earlier or return home for a rest period.

In submission to the draft report, at least 10 pilots made comments related to conflicts of interest impacting the check pilot system. A check pilot stated that it was almost impossible for any check pilot to make a fair assessment that may seriously impact the assessed pilot's livelihood. He suggested this and other conflicts could be resolved through independent, external check pilots. He noted, however, that check pilots would need to have recent local area experience. Another check pilot stated that AMSA had never received an unsatisfactory assessment because 'the propensity for corruption is significant'. One check pilot submitted that it was well known for a pilot assessed as unsatisfactory to be reassessed by another check pilot without any consequence (or formal record).

Others who were not check pilots cited other issues and conflicts. A pilot engaged by Australian Reef Pilots stated that the practice of the check pilot and the assessed pilot sharing the pilotage by piloting alternate sections of the passage was so common that he could only recall one case where the check pilot had not shared the pilotage with him. Another pilot with the provider stated that it was 'ridiculous' to expect check pilots to be totally impartial when assessing peers, particularly long standing peers. A pilot engaged by Torres Pilots described the check pilot system as 'totally corrupt'.

In submission, Torres Pilots rejected that conflicts of interest exist because a check pilot was remunerated by his provider, and that the claim demeaned the professional standards that Torres Pilots and its check pilots adopted. The provider noted that there was no evidence to support the claim because check pilots elsewhere in Australia, including in the aviation industry, were also employed by their service provider or airline.

However, Torres Pilots' argument addresses neither the reasons for potential conflicts of interest as described in this section nor the pilots' statements indicating the existence of those conflicts. It is not simply a matter of the source of a check

pilot's remuneration, but a range of factors complicated further, at times, by a lower remuneration for the check pilot than the assessed pilot. It is also not a matter of the professional standards of check pilots but a case of placing these professionals in situations where not only is it impossible to make objective assessments, they also need to consider their disadvantage (income, turn, time) and potential impacts of their decisions on the assessed pilot and their provider. A comparison with the aviation industry, in any case, is not relevant because airlines employ and pay pilots, including check pilots, and fund their training (or retraining if required) and the conflicts described above are not present. This is a key point because borrowing the check pilot concept from the aviation industry should have involved an assessment of the differences between aviation and the coastal pilotage sector. Such an assessment could have ensured that differences between the two were taken into account to achieve the same desired objectives.

At interview, a check pilot suggested that the check pilot system could be operated with a total of six check pilots (three each from Australian Reef Pilots and Torres Pilots). This suggestion appears practicable since Torres Pilots has managed with a relatively small number of check pilots. However, both main providers, and some of their pilots, energetically dismissed the use of the other provider's check pilots citing conflicts of interest, commercial issues and pilots' fees.

None of those involved in coastal pilotage object to AMSA employed check pilots and Hydro Pilots (the provider) was strongly in favour. However, while this may overcome some conflicts of interest, it cannot resolve inconsistent assessments. While there may be value in AMSA having its own check pilots, this depends on whether they assess only pilot competency or audit the pilot's system as well. If AMSA check pilots assessed only pilot competency, providers could use those assessments, and their involvement in post assessment remedial action could enhance the process. In any case, providers could still have their own check pilots and, if they developed a pilotage SMS, employ their check pilots/auditors to audit the implementation of their SMSs and improve standards.

In submission to the draft report, a pilot engaged by Torres Pilots suggested that a pilot's competence could be independently and objectively assessed by having a specific bridge simulator course with shortcomings being resolved at the same time. He believes this environment would eliminate conflicts of interest documented in the report and consistent with his experience, including the practice of check pilots gaining an advantage in the turn lists. Similarly, a pilot engaged by Australian Reef Pilots submitted that the check pilot system could improve with the use of bridge simulators, independent assessors and assessments conducted at short notice to better assess pilots and identify bad habits.

Post assessment reviews and outcomes

Another deficiency in the check pilot system is the absence of evidence of effective corrective action. While the post assessment review process is meant to address this matter, there is no documented process for corrective action and all the evidence indicates that a large proportion of deficiencies (real or perceived) identified in the aide memoire checklists are probably not corrected. The assessment documents are to be reviewed by AMSA only in the event of an overall unsatisfactory assessment. Such an assessment has never been submitted and, hence, the assessment records have not been reviewed and have just been filed away.

The assessment records do not indicate significant improvement in the practices and systems of pilots. Successive pilot assessments do not indicate with certainty either improvement or deterioration in competency or practices. An assessment could suggest improvement only to indicate regression at the next assessment. The deficiencies and comments, or the lack of these, in assessments are largely a function of the individual check pilot. The use of their own assessment checklist by some check pilots instead of the standard checklist results in further variability in assessment (this also makes any review of assessments difficult).

There is no process for a check pilot to review past assessment records of a pilot before assessing him to identify areas to focus on, other than perhaps speaking with the check pilot(s) who previously assessed the pilot. The post assessment review and debrief is an informal discussion between the two pilots; any findings or observations are merely optional suggestions to the assessed pilot.

As described above in the 'assessment standards and practices' sub-section, the survey data indicates that check pilots and assessed pilots recall very few assessment findings (or suggestions). Overall the data suggests that most pilots probably consider that their systems are adequate and improvements are not necessary. It is worth noting here that *Atlantic Blue*'s pilot, himself a check pilot at the time of the ship's grounding, had assumed (mistakenly) that his piloting system was an AMSA approved system because he had been assessed by check pilots on behalf of AMSA.

After the post assessment debrief and discussion between the pilots (usually on board the ship), there is no review of assessment records by anyone to identify general or specific areas of concern. Nor is the performance of a pilot over successive assessments monitored. As noted earlier, the records indicate that actual or perceived deficiencies identified in assessments may not be rectified and continuous improvement in pilotage standards is not evident.

The main reason for the general lack of corrective action being initiated is probably a result of the guidance given to check pilots by AMSA. As noted in section 3.7.2, the guidance states that an assessment is only the opinion of the check pilot and indicates that it is acceptable for a number of checks and criteria to be negative or unsatisfactory. As a result, it is very difficult for a check pilot to objectively assess if a pilot is unsatisfactory in a certain area. It is even more difficult and, except in exceptional circumstances, practically impossible, to assess and record a pilot as 'overall unsatisfactory' (i.e. fail).

The absence of a routine process for continuous improvement is similarly related to AMSA's guidance. Since the guidance states that assessment findings are areas where 'there is room for improvement' and, as such, not deficiencies or non-conformances, there cannot be a process for corrective action. Essentially, if something is neither correct nor incorrect then there can be no remedial action or continuous improvement.

The survey and pilot interviews indicate that there have been a few isolated cases where a check pilot has found a pilot to be 'overall unsatisfactory'. However, in all of those cases either the assessment was not documented or the documents were not submitted to AMSA. Check pilots provided a variety of explanations, most notably avoiding embarrassment and/or unnecessary hardship to the assessed pilot. It is only in such instances that the provider has had some involvement in corrective action. These cases further highlight the conflict of interest issues and indicate that AMSA has not received reports where it would have had to take remedial action. Although

this suggests that check pilots have only sent AMSA the good news, in fairness to the check pilots, they have submitted over 550 assessments that contained findings which could have been reviewed to identify areas for improvement.

In response to a survey question whether the check pilot system had improved their pilotage procedures and practices, most pilots felt that it had (Appendix A, item 28). The overall positive response indicates that the system has benefited most pilots to varying degrees. However, their comments indicate that they see check voyages as opportunities to interact professionally and exchange ideas, benefits normally associated with, and economically achieved through, professional workshops and seminars. The check pilot system, on the other hand, needs to be much more than such professional development because it is aimed at assuring acceptable standards of pilotage in the absence of a uniform standard. Furthermore, the significant resources expended to operate the system demand commensurate benefits.

Summary

In the absence of an SMS promulgating uniform pilotage procedures and practices, AMSA's check pilot system is relied on to assure acceptable pilotage standards. This system attempts to combine a pilot competency assessment, the normal function of a check pilot system, with an audit of the individual pilot's system of pilotage in accordance with AMSA-defined criteria. However, with so many different piloting systems, including those of check pilots, it is difficult for check pilots to make objective and consistent assessments. The task is further complicated by AMSA's guidance, which states that an assessment is only the check pilot's opinion, not an indication of the assessed pilot's competence or capability.

The system's fundamental weakness described above is exacerbated by conflicts of interest. Conflicts arise because the check pilot is engaged by the provider, assesses his peers and is, in turn assessed by them in an environment where an 'overall unsatisfactory' (i.e. fail) assessment can severely affect the failed pilot's livelihood and reduce the provider's capability to meet the demand for pilotage services and disrupt the provider's operations. While check pilots are effectively AMSA's delegates for assessments, they are remunerated by their provider to assess other pilots contracted by the provider, and those peers may themselves be check pilots. Assessing a check pilot objectively in this system presents difficulties because the roles may be reversed in the future. There is further conflict of interest related to pilot working arrangements with 'per job' instead of 'time' based remuneration and in some cases, lower fees for the check pilot than the assessed pilot.

Finally, there is no routine review process to guide continuous improvement. The only formal process to rectify deficiencies is an AMSA review in case of an 'overall unsatisfactory' assessment. In the 550 assessments conducted until 2011, no such review was undertaken because no pilot was assessed as 'overall unsatisfactory'. Analysis of these assessments by the ATSB showed that there can be a significant number of unsatisfactory findings with respect to different criteria without an 'overall unsatisfactory' assessment. The wealth of information gathered through check pilot assessments has not been used by anyone to continuously improve pilotage practices and standards or to analyse the training needs of coastal pilots.

The check pilot system has not effectively ensured that the systems and methods used by pilots are of the safest standard that can reasonably and practically be achieved. Deficiencies (unidentified or unresolved) in individual piloting systems can contribute to serious incidents such as the grounding of *Atlantic Blue*.

3.8 REEFVTS

As outlined in section 3.2, REEFVTS is the next 'layer of defence' (after pilotage) against a serious incident in the GBR and Torres Strait PSSAs. While REEFVTS is not, and was never intended to be, a service to direct and control traffic like air traffic control, its resources provide significant capability to enhance safety. The service's ability to monitor and interact with shipping, and to quickly respond if an incident does occur, makes it invaluable.

The surveillance and monitoring functions of REEFVTS are made possible by its traffic information module (TIM), which displays real-time or near real-time ship position and other information on raster navigational charts (RNCs)[135] in a similar way to an ECDIS or ECS. This information is based on ship information, including GPS data, obtained via the automatic identification system (AIS) and/or automatic position reporting (APR) via Inmarsat-C satellite polling. In addition, key entry/exit points are covered by radar.

The REEFVTS area is generally well covered by VHF radio. However, in some remote locations there may not be any VHF radio coverage and the coverage in areas further away from the coast relies on relay stations located there. In such areas, the radio coverage may be patchy and unreliable, posing difficulties in voice communication. For example, a pilot working exclusively in the Hydrographers Passage estimated that the VHF radio working channels in the pilotage area were inoperative or unreliable about 30 per cent of the time, particularly in the vicinity of the Blossom Bank pilot boarding ground.

The systems described above provide REEFVTS with surveillance and monitoring capability across much of its coverage area. Most coastal shipping routes are covered by AIS base stations and repeaters, allowing real-time monitoring of the position and progress of ships. Where AIS and radar positions are not available, APR via Inmarsat-C provides a ship's position (every 45 minutes by default or on demand). The near real-time monitoring means that if a ship leaves its intended route or enters an area of shallow water, REEFVTS can provide information which may help onboard decision-making to avoid an incident (termed 'navigational assistance services'). Such action has been taken on a number of occasions.

However, the REEFVTS area is geographically very large (about 350,000 square km) and the single vessel traffic service operator (VTSO) on duty cannot monitor every ship simply by observing the TIM display. To effectively monitor traffic, certain limits (e.g. areas that ships can safely transit) have been defined in the TIM and an alarm is triggered if a ship breaches a limit. This makes it possible for the VTSO to identify the relevant ship, initiate contact and provide it navigational assistance in accordance with defined procedures. The primary means of communication is VHF radio and, if this is not possible, other means such as satellite telephone or Inmarsat-C message can be used.

The TIM-defined limits are mainly based on charted routes and areas of shallow water. 'Two-way routes'[136] cover the Torres Strait and the Inner Route as far south as the waters to the northwest of Townsville and the route boundaries are, in effect,

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[135] AHS Seafarer RNCs are high quality electronic reproductions of paper navigational charts.

[136] The charted note states: The two-way route shown on this chart is a ships routing measure. Its use is not mandatory, however, it does indicate the best and safest route for all vessels having regard to charted depths and dangers.

limits. In most other areas within the GBR region, including the Hydrographers Passage and the Whitsundays pilotage area, 'recommended tracks'[137] and 'preferred routes'[138] exist. All of these routing measures can be useful when defining limits in the TIM because they represent standard safe routes. There are three types of automated alarms that may be triggered if a TIM-defined limit is breached. The 'exiting corridor alarm'[139] indicates a ship has breached the limit of the navigational corridor, for example the boundary of a two-way route. A 'shallow water alert' indicates a ship has entered an area of shallow water and a 'critical turn alarm' is triggered when a ship arrives at a defined distance from the next critical course alteration point (critical waypoint). A review of TIM-defined limits is undertaken by REEFVTS annually, which includes considering the circumstances of the cases where an alarm has been triggered.

Effectively used, REEFVTS's monitoring and navigational assistance services can prevent a serious incident. For example, *Atlantic Blue* could have been alerted in time to prevent its 2009 grounding had an 'exiting corridor alarm' triggered an hour before the incident when the ship exited the two-way route that it was transiting. At the time, that two-way route in the Torres Strait was not defined as a navigational corridor (it was defined as a corridor post-incident). Similarly, the 2000 grounding of *Bunga Teratai Satu* could have been prevented by a 'critical turn alarm'. The unpiloted ship grounded about 20 minutes after failing to alter course at a critical waypoint. The waypoint was then identified for setting up a critical turn alarm.

On 1 July 2011, as recognition of REEFVTS's effectiveness in reducing risk, its coverage was extended further south to 24.5º S, the southern limit of the GBR PSSA. The extension was a safety action in response to the 2010 grounding of the unpiloted *Shen Neng 1* in a location approximately 60 miles outside the previous limit of the REEFVTS area.[140] As with *Bunga Teratai Satu*, the ship grounded about 20 minutes after failing to alter course at a critical waypoint. However, in a situation similar to that of *Shen Neng 1*, the effectiveness of navigational assistance would rely on properly defined TIM-limits and appropriate automated alarms.

While REEFVTS's navigational assistance can be very useful, it is important users do not place undue reliance on always receiving such assistance and understand its limitations. Chartlets in the REEFVTS User Guide[141] indicate sections of shipping routes where ships may receive these services and sections where they may not

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[137] The charted note states: This track has been surveyed in accordance with the IMO/IHO (International Hydrographic Organization) standards for recommended tracks. The attention of vessels meeting on recommended tracks is drawn to the International Regulations for the Prevention of Collision at Sea (1972), particularly Rules 18 and 28 in regards to vessels constrained by their draught.

[138] The charted note states: This is a preferred route and has not been surveyed in accordance with the IMO/IHO standards for recommended tracks, but is the preferred route for vessels having regard to charted depths. The attention of vessels meeting on the preferred routes is drawn to the International Regulations for the Prevention of Collision at Sea (1972), particularly Rules 18 and 28 in regards to vessels constrained by their draught.

[139] Electronic corridors defined in the TIM are described as 'intelligent' lines and areas to represent key navigation areas used by transiting ships in the VTS area.

[140] ATSB report number 274, Grounding of *Shen Neng 1*, Douglas Shoal, 3 April 2010.

[141] AMSA and MSQ, *Great Barrier Reef & Torres Strait Vessel Traffic Service (REEFVTS), User Guide*, Fifth Edition, July 2011.

receive the services (probably because AIS, radar or VHF radio coverage there is limited or absent). A number of the route-sections where navigational assistance may not be received coincide with pilot rest areas in the Inner Route (section 3.6.4 refers). Therefore, the additional layer of defence provided by REEFVTS may not be available in some pilot rest areas. Furthermore, in areas where only Inmarsat-C APR is available, by default a ship's position is updated every 45 minutes and there can be some delay in detecting an unsafe or developing situation.[142]

In September 2011, the TIM setup was reviewed for consistency with the industry passage plan (IPP) model. The universal use of standard passage plans through the IPP model can further enhance REEFVTS's monitoring capability because more effective TIM electronic corridors could be defined. For example, the width of corridors in some areas, particularly where the corridors are based on past tracks instead of charted routes, could be reduced to increase the distance from adjacent dangers. By extending the IPP concept to non-compulsory pilotage areas in the GBR, similar enhancements could be applied to traffic monitoring in these areas.

Another area where improvements could be considered is the communication of navigational assistance information. Factors to take into account include VHF radio coverage, alternative means of communication, whether a pilot is on board the ship, possible language difficulties and, based on these, the time available to pass on urgent information to the ship's bridge team.

Nevertheless, the existing and potential capability of REEFVTS to prevent a serious incident makes it invaluable. The assistance that the service can provide if an incident does occur adds further value as demonstrated by the response after *Atlantic Blue* grounded. However, comments in the ATSB survey indicated that pilots generally did not recognise the service's actual capability as discussed above. For example, some pilots indicated that they did not find the ship traffic encounter predictions (section 2.5 refers) very useful since the advent of AIS. While AIS has reduced the importance of ship encounter information, navigational warnings and other information can still be useful. Moreover, information such as weather is available whenever requested. In any case, overall REEFVTS is a valuable and independent resource for a ship's bridge team.

In submission to the draft report, the Great Barrier Reef Marine Park Authority (GBRMPA) indicated support for REEFVTS as an additional bridge resource and its capability to issue warnings to help prevent groundings. In addition, GBRMPA suggested the use of vessel management systems to lower the risk of collisions by separating ships in time and space in a similar way to air traffic control.

However, implementing GBRMPA's suggestion of separating ship traffic is not straightforward. There are no automated alarms in the TIM to warn of collision risk, and no charted traffic separation schemes (TSS)[143] in the GBR. Without a defined system for traffic separation (such as a TSS), it would be almost impossible for a VTSO to make even a basic assessment of collision risk (e.g. a ship moving in a direction opposite to that of the traffic lane). Despite modern VTSs, only a ship's bridge team is in a position to determine collision risk and take avoiding action in accordance with the collision regulations. These tasks cannot be performed by observing two ships approaching each other on a display ashore due to fundamental

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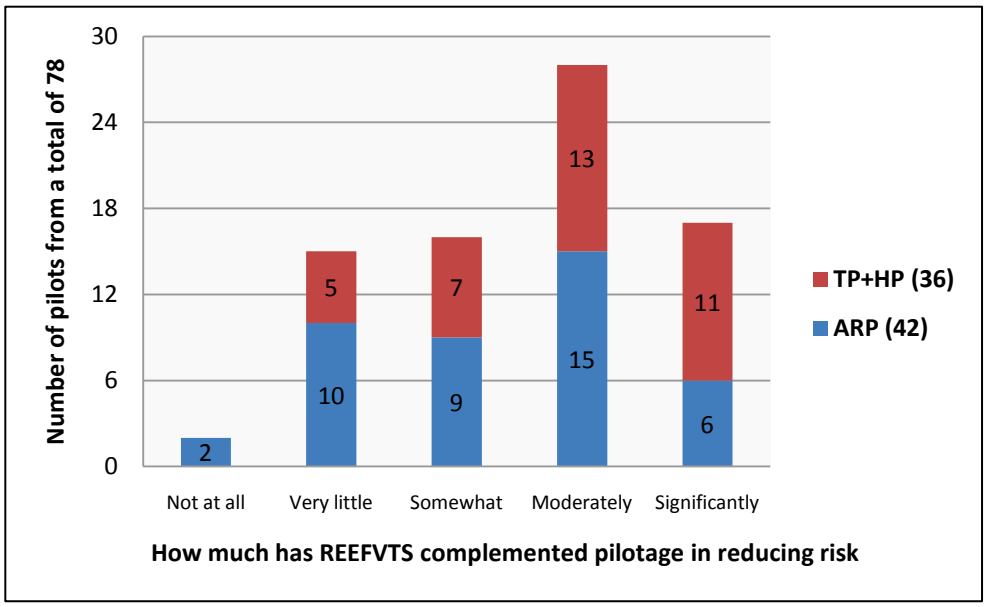
[142] At one stage in the past, the Inmarsat-C APR default interval was 15 minutes.

[143] A traffic separation scheme (TSS) is a routing measure aimed at the separation of opposing streams of traffic by appropriate means and the establishment of directional traffic lanes.

differences between the shipping and aviation industries, which must be managed accordingly. For example, in the shipping industry, the local area knowledge, experience and skill of marine pilots provides additional safeguards against collision risk in pilotage areas. With respect to reducing collision risk in coastal pilotage areas, it should be noted that the standard tracks in the IPP model provide some separation between ships travelling in opposite directions.

In the ATSB survey, pilots were asked how much REEFVTS had complemented pilotage in reducing the risk of an incident (Figure 28). While the overall response suggests that pilots have a positive view of the service, their comments indicate an inadequate understanding of its capability and limitations in terms of navigational assistance. Their suggestions on how REEFVTS could better complement pilotage (Appendix A, item 30) also indicate that the operation of the service's monitoring systems is not well understood. About half of the pilots indicated that the service could be improved if VTSOs had seagoing experience and undertook observer transits, and by pilots observing VTSO shifts, all of which they considered the most practical methods to make improvements. Eighteen pilots indicated that VTSOs should have experience as pilots.

Figure 28: REEFVTS complementary to pilotage in reducing risk of an incident



It is worth noting here that past reviews have documented the suggestions and views of coastal pilots similar to those expressed in the ATSB survey. In 2000, the subject of pilots and REEFREP operators developing a better understanding of their respective roles by interacting and observing each other's working environment, and similar matters were documented.[144] In 2005, a number of pilots indicated that REEFVTS had no useful role, VTSO training was deficient and that they should possess a master's certificate of competency.[145] While some pilots did not share those views, the fact that similar ones were prevalent in 2011 indicates that the value of REEFVTS as another bridge resource could be better understood.

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[144] Holden D, Ross K, Mansell J 2000, pp.7-10, *The Great Barrier Reef Review of Safety Initiatives*, April 2000.

[145] McCoy, J 2005, pp.17-18, *AMSA Coastal Pilotage Regulation Review*, December 2005.

Although it is recognised that many VTSOs around the world do not necessarily have seagoing experience or qualifications, given the pilots' suggestions, the REEFVTS VTSO training could be reviewed to ensure that they are best equipped to support pilotage while performing their roles with their existing qualifications (Certificate III or Certificate IV (advanced) VTS operations).

The improvements suggested by pilots also indicate a perceived incompatibility between the ship's bridge and REEFVTS. The views of pilots are probably based on routine interaction with the service, mainly to report boarding or disembarking. The traffic encounter reports received every few hours via Inmarsat-C may appear unnecessary to pilots because accurate ship information is readily available via the ship's AIS unit. Therefore, it is important that steps be taken to ensure that pilots understand the service's capability and limitations in providing navigational assistance and a VTSOs role and ability to assist the bridge team.

In submission to the draft report, a pilot stated that REEFVTS could be utilised to its full potential if the current 'ships for REEFVTS' culture changed to one of 'REEFVTS for ships'. Another pilot submitted that while REEFVTS had enhanced safety, it needed to be adequately manned at all times in view of its increased coverage. According to one pilot, VTSOs could benefit from a greater awareness and knowledge of shipboard and bridge operations, particularly in the use of key words and maritime terminology to avoid confusion when communicating with pilots or ship crews. He noted the incorrect perception of some foreign crews that REEFVTS issued orders (the service actually provides advice or information).

In summary, REEFVTS can significantly reduce the likelihood of a serious incident and complement pilotage. However, the service can be a better defence if its traffic monitoring capability is better utilised (e.g. TIM-defined limits based on the IPP model) and pilots fully understand its purpose and capability, including any limitations, through their training and professional development. A better understanding by pilots and VTSOs of their respective roles and tasks is also necessary and can improve the service's responsiveness and its capability to support pilotage. Effectively, REEFVTS is an additional bridge resource, and it should be recognised as such and used by the ship's bridge team to its full potential.

3.9 Working relationships in pilotage

The 82 contractor pilots, the pilotage providers and AMSA are the principal players in coastal pilotage. The safety of pilotage services depends largely on how each of these individuals and organisations interact with each other in the performance of their roles and responsibilities (described in section 3.3.2). Therefore, it is necessary to understand these relationships and the factors that have adversely impacted them.

The ATSB's investigation process actively solicited views and evidence on a range of issues from all of the pilots without the fear of identification or sanction. The survey and pilot interviews indicated that, overall, pilots were dissatisfied with their contractual working arrangements (Appendix A, item 7). Their dissatisfaction covered a range of issues, including the safety and quality of pilot transfer services; the funding for training and professional development; the inability to project an income stream; the uneven distribution of work between pilots; and a pilot's status under the contract.

While the survey of pilots and interviews led to the identification of a range of safety issues, the circulation of the ATSB draft investigation report for comment and submissions clearly crystallised the opinions of the majority of the pilots and the providers. Of all the subjects covered in the draft report, the issue of the working relationships underlying coastal pilotage services generated the most comment from individual pilots in their submissions, generally indicating dissatisfaction. The sheer number and content of pilots' submissions, with many expressing a very high level of discontent with both the main providers and critical aspects of the safety regime administered by AMSA, is indicative of a sector considered by more than half the pilots as suffering from significant underlying issues and that a small number of pilots perceive to be in crisis.

In the 12 months following the ATSB survey, at least 13 of the 82 pilots, including all the three trainees who participated in the survey, left coastal pilotage (five pilots retired). A number of those that left submitted critical comments of their experience in coastal pilotage, further evidence of the level of discontent amongst coastal pilots. For example, one of those pilots stated 'thankfully, I have escaped GBR pilotage'. Another noted that 'drastic change needs to occur to the organisational structure of the profession so it can improve its culture which is toxic and a huge barrier to reform, training and recruitment'. A third individual observed that he had prioritised his health and wellbeing and found employment elsewhere.

In their submissions, five serving pilots attributed the high proportion of coastal pilot recruits from overseas to their lack of prior awareness of the sector's safety and working conditions. It was noted that many applicants from within Australia applied for harbour pilot positions in Queensland but few applied for coastal pilotage. They highlighted that employment in harbour pilotage and the maritime industry in general, particularly the offshore oil and gas sector, offered overall better terms than coastal pilotage. A pilot noted that some new entrants were of an age normally associated with retirement which together with the age profile of existing coastal pilots made the sector a 'graveyard' for pilots (in terms of their career). The recruitment of a 67 year old was cited as an example of the scarcity of younger applicants viewing coastal pilotage as an attractive career path.

The main issues adversely impacting the working relationships between pilots, providers and AMSA are discussed below.

3.9.1 Pilot transfer related issues

Many pilots cited issues surrounding pilot transfer as a significant negative factor affecting their working relationship with their respective pilotage provider. These issues included multiple pilot transfers and long waiting periods and the standard and quality of the transfer service (as previously discussed in sections 3.4.5 and 3.6). Some pilots claimed that they face recrimination from their provider if they report these issues.

In addressing the standard and quality of pilot boat transfers, a number of pilots from both Australian Reef Pilots and Torres Pilots cited the findings of an inquest into a man overboard accident from the Torres Pilots pilot boat *Alert* during a pilot transfer on 27 October 2004 in the Torres Strait. The boat's deck hand was lost overboard and his body was never recovered.

The Queensland State Coroner's inquest[146] found that the death was preventable and in addition that boat had several serious deficiencies and, although not contributory to the accident, they had made the boat unseaworthy.

At the time of the inquest, the Coroner inspected the pilot boat and was satisfied that many of the safety concerns associated with it had been addressed. He also noted with concern that the 'seriously unsafe vessel' had been allowed to operate undetected by a number of safety authorities.

Although this unfortunate accident took place a number of years ago, it remains a prominent issue in the minds of many pilots. Serious safety issues had existed with the provider's transfer operations for a long period of time and there was a lack of safety management combined with ineffective regulatory oversight at the time.

However, this case also shows that safety improvements can be made when it becomes the priority of all those responsible. Since 2006, Torres Pilots has put a number of new pilot boats into service. As noted in section 3.4.5, the provider has also undertaken independent surveys of its pilot boats and external audits of its pilot boat transfer procedures on an annual basis. While improvements to boats resulting from these initiatives were acknowledged by some of the provider's pilots, they claimed that long waits during transfers were still common.

There is also evidence from one pilot that more than 5 years after the accident the same inappropriate, unsafe pilot transfer procedure was still in use elsewhere, indicating that safety lessons are not necessarily shared in coastal pilotage.

In addition to the concerns set out in section 3.4.5, a number of pilots contracted to Australian Reef Pilots stated that in recent years the condition of their provider's pilot boats had deteriorated and compared it to the past condition of Torres Pilots' boats. Some were concerned about the safety of charter flights between Port Moresby and Misima Island, Papua New Guinea (PNG), when travelling to or from the provider's Torlesse Island base. In support of their concerns, they cited an accident in which a coastal pilot lost his life.[147] A pilot submitted that although the

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[146] Office of the State Coroner, Queensland, *Findings of the inquest into the death of Phillemon Edward Mosby*, Queensland Courts, 23 May 2008.

[147] On 31 August 2010, a light aircraft overran the runway in Misima Island, impacting trees and terrain. The aircraft was destroyed, four of the five persons on board were fatally injured and the co-pilot was seriously injured. <http://www.atsb.gov.au/publications/investigation_reports/2010/aair/ae-2010-068.aspx>

PNG operation was deeply unpopular amongst pilots for safety/other reasons, they could not refuse to work there for fear of financial or other retribution by the provider.

A number of pilots engaged by Torres Pilots feel that the charges for pilot transfers retained by the provider from pilotage charges are unfairly high. Further ill feeling amongst them is the result of a perception that the provider should not retain the full pilot transfer charge for each pilot when more than one pilot shares a transfer.[148] A couple of pilots engaged by Australian Reef Pilots indicated that their provider retains an unfairly high proportion of pilotage charges for transfers and other costs.

While only the providers know the actual costs of operating pilot transfer services, the pilots have no choice but to accept the transfer services provided. This lack of choice has probably also influenced the views of pilots in relation to boat safety standards and long transfer times.

Operating a pilot transfer service is a provider's business that is costly and must be covered within the pilotage charge structure, which is constrained by competitive pressure. Nevertheless, it has attracted considerable ill feeling amongst pilots.

The views of pilots and providers are complicated by many factors, including the logistics of pilot transfer operations. Pilots and providers have contrasting views on what constitutes an acceptable, safe standard for transfer services and how the associated costs should be borne. However, the providers control the transfer services, albeit under regulatory oversight, and the services are a major source of discontent for many pilots.

3.9.2 Funding for training – the training levy

Although in theory pilots are independent professional contractors and separate from their providers, which implies that they are responsible for funding their own training and professional development, the issue of funding for training is a major source of discontent amongst the majority of pilots (section 3.4.4 refers). In this regard, the so called 'training levy' has been the subject of much conjecture and misunderstanding. This particular issue is an appropriate illustration of the complex working relationships in coastal pilotage that define the culture within this sector.

In 2001, when AMSA indicated its intention to introduce a check pilot system, it did not indicate how the system would be funded. Since a pilot would be assessed while conducting a pilotage, he would naturally be entitled to the normal pilot's fee. The check pilot, however, would not be engaged in pilotage but would provide a service and his time. The issue of remunerating the check pilot had not been addressed. The pilotage providers raised the issue with AMSA and proposed adding a small amount to each pilotage charge to cover the costs of the check pilot system. There was no objection to the proposal and AMSA confirmed this in a letter to the providers.

On the basis of the AMSA letter, providers negotiated marginally higher pilotage charges with their clients to cover the cost of the mandatory assessment of pilots under the check pilot system, which in part, was an element in the training of pilots. The providers took the broader view that the revenue collected was to fund training

[148] According to Torres Pilots, the standard transfer fees are based on average costs which take into account the shared transfers that occur from time to time.

in general and, as it was part of a commercial negotiation, the item would be shown separately on invoices. By mid-2002, an amount labelled 'training levy' was included as a separate item in pilotage invoices that Torres Pilots submitted to its clients on behalf of pilots. The check pilot system was implemented in 2003.

When a check pilot assessment is conducted, the assessed pilot receives the pilot's fee for the pilotage while the check pilot receives an assessment fee. The assessment fee is set by the provider and can be lower than the pilot's fee, and in some cases it may be significantly lower. While the pilots have been remunerated in this manner, there have been conflicting views about both the purpose and the allocation of the funds collected through the training levy.

Although a check pilot assessment is part of training, the term training levy did not clearly indicate that it was meant to solely or mainly fund the check pilot system. At interview and in the survey, a number of pilots stated that the training levy should have been used to fund all their training needs. Some of them believe that AMSA authorised the levy and, hence, should have administered it or monitored how the providers used the levy funds.

However, AMSA considers that pilotage providers imposed the levy as part of their commercial arrangements with clients and, therefore, administering it was the responsibility of a provider.

The providers have different views with regard to the training levy. Australian Reef Pilots considers that the levy can be used for training any personnel, not just pilots. Torres Pilots did not express a firm view on the allocation of the levy other than advising that, in 2011, the levy was removed as a separate item on invoices (the total amount invoiced remained the same) and the provider would continue to pay check pilotage and professional development (PD) course fees as it had in the past. The Hydro Pilots SMS states that it will provide check pilot assessments but does not refer to pilot PD and the provider does not contribute towards it.

While there was no contractual obligation for a provider to transparently administer the training levy, pilots interviewed and responding to the survey raised concerns over how the levy monies were accounted for as part of the total pilotage charge. Over time, many pilots formed the view that all the funds collected through the levy were not being allocated to check pilot assessment fees and/or training.

Pilots contracted to Torres Pilots were privy to the training levy being collected (from pilotage charge invoices). Some clients were invoiced for the levy, others were invoiced for part of it and some were not charged at all. The variations were probably the result of phasing in the levy and negotiating pilotage charge contract rates with clients. Nevertheless, they raised questions in the minds of pilots.

In 2005, Torres Pilots renamed the training levy as the 'training and fuel levy'. The amount of the levy remained the same, which suggested that the funds collected previously under the line item for training had been used for purposes other than training. Furthermore, this took place at a time when the provider was not contributing towards the cost of PD courses. To further complicate matters, the Cairns launch fee referred to above, was already a separate item in invoices, an item that apparently related to the cost of operating pilot boats.

In 2006, Torres Pilots discontinued providing its pilots with a copy of the pilotage charge invoices submitted to clients on their behalf but other documents indicated that the training and fuel levy was still being charged. The training and fuel levy has

continued to raise suspicion, and been a source of discontent, amongst pilots engaged by Torres Pilots.

In general, there seems to be a general misunderstanding amongst many pilots about the nature of the training levy. The levy is essentially a commercial arrangement between providers and their clients to which AMSA has no objection. Many pilots perceive this as AMSA's acceptance of the levy and its administration by providers, which most pilots consider has been improper. The matter of the training levy has had a very adverse impact on working relationships in coastal pilotage, and the levy and funding for training remain a major reason for pilot discontent.

3.9.3 Work allocation and contract related issues

Other recurrent sources of pilot discontent evident from the survey and interviews were the effective control that pilotage providers had over them and a lack of recognition of their professional status and experience. At interview, at least six pilots expressed concerns about the potential of a provider to under-employ, or even un-employ, a competent pilot. This reflected on their 'feeling of worth', which was exacerbated by the absence of any process of appeal or review by a neutral umpire, other than seeking expensive legal redress. Some pilots also reported a 'take-it or leave-it' attitude by providers and gave examples related to transfer services or potential conflicts with fatigue plan requirements. While a number of these statements were accompanied by email correspondence to support individual assertions, these documents could be interpreted in other ways and were, therefore, ambiguous.

The level of effective control that providers have over the services of their contracted pilots is inconsistent with the model of technically independent contractors envisaged by the 1993 PSA inquiry (section 2.6 refers), where pilots would be able to offer their services directly to any ship. There is no limit on the number of pilots that can be licensed by AMSA. The providers decide the number of pilots that they contract, the pilots to whom they assign jobs, the number of jobs they assign to each and when and where those jobs will be. Hence, there is no guarantee that a self-employed contractor pilot will be engaged as a pilot. Only one pilot engaged by Hydro Pilots was contractually assured of a minimum number of jobs. At interview, four pilots advised that although they had been under contract and their competence or ability had not been questioned, they had not been offered work. On the other hand, a number of pilots indicated that their contracts were not current, yet they were assigned ships.

The contractual work arrangements mean that there is nothing to prevent a provider contracting an unlimited number of pilots, should such a number be available. As self-employed contractors, the pilots are responsible for their work costs, insurance and superannuation. Hence, providers can contract pilots at minimal cost without needing to concern themselves with an employer's usual responsibilities such as pilot welfare, payroll tax and superannuation. In the survey, many pilots expressed much dissatisfaction with their contracts, including being controlled by the provider like an employee but with none of the rights or benefits available to employees.

In submission to the draft report, Torres Pilots advised that in January 2012 it had offered pilots the option of employment with salary packages that would have cost the provider an amount equivalent to the fees it was paying self-employed pilots on

a ‘per job’ basis.[149] The provider indicated that all 21 pilots offered employment chose to retain their contractor status and no pilot elected to be employed.

According to Torres Pilots, it is highly likely that the pilots who indicated employment as their preferred working arrangement in the survey expected the same level of income they were receiving as contractors. The provider pointed out that it was not possible to offer pilots a salary that was equivalent to their contractor income without increasing pilotage charges to cover the overheads associated with employment, such as additional taxes, government charges and other fixed costs.[150]

In their submissions, more than 10 pilots engaged by Torres Pilots made specific comment about the employment options offered and expressed dissatisfaction with their contractual working arrangements. Their comments covered similar themes, including that all of the employment options offered advantaged only the provider, that pilots were not in a position to negotiate the offers and that the provider’s correspondence accompanying the offers was intimidating. These were their main reasons for not accepting the employment offer which did not offer them the income, terms and roster flexibility which they expected. The offer was described as a ‘cunning ploy’ since rejecting it would indicate that they preferred being contractors, contrary to the overall response of pilots in the survey. However, they would rather be employees with more job security and less tax-related administrative work.

Some of the pilots provided email correspondence they had received from Torres Pilots, including some related to the employment offers, which they considered aggressive and intimidating with the implied threat of dismissal. They pointed out that the provider had informed pilots that it would no longer consider their self-employed status an ‘entitlement’ but a ‘privilege’ and offer it only to those who had proven themselves and desire this status. They noted that terms such as agitators, malcontents and persons lacking integrity were used to refer to some pilots.

A pilot engaged by Australian Reef Pilots submitted that the offers of employment by both the main providers were not conducted in good faith and increased distrust and antagonism between pilots and their providers.[151] Another pilot engaged by the provider described the contracts offered by providers as ‘sham contracts’ because of the exclusivity and other restrictive clauses which ensure that a pilot can only work for one provider and is not in a position to negotiate contractual terms.

An optimal pilotage service relies on safety being the highest priority of a pilot organisation and its pilots. However, coastal pilots are not part of their pilotage provider or any pilot organisation. They are independent contractors, in theory like freelance operators but offering their services to, or through, a single entity, their provider. While every pilot indicated in the survey that safety was their highest priority, only half of them indicated that safety was their provider’s highest priority (Appendix A, item 20).

Given the level of reported discontent pilots have with their working arrangements, in general, and their remuneration and the quality, safety, cost and scheduling of

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[149] Salary options offered (depending on days available on a 24 hour basis) included $170,000 (200 days), $190,000 (220 days) and $180,000 (240 days - Hydrographers Passage only).

[150] Torres Pilots estimated these costs would be about 20 per cent of the indicative salary equivalent.

[151] Employment options offered by Australian Reef Pilots in late 2011 (depending on days available on a 24 hour basis) included a salary component of $157,500 (180 days) and $212,000 (252 days).

pilot transfers, in particular, it would be reasonable to expect pilots to either take up other employment or contract with another provider. However, with the latter option, the choice is limited because effectively there are only two providers. Moreover, a provider has to agree to contract the pilot and offer him work. In the survey, eight pilots indicated that they had previously contracted with another provider. One of those pilots changed providers because his contract was not renewed and the others did so of their own accord.

Pilots contracted to Australian Reef Pilots and those contracted to Torres Pilots, have both formed associations in an attempt to address professional and safety issues affecting their particular provider's pilots. These associations have spokesmen elected by the pilots to progress any issues raised and to represent the pilots in discussions with their provider. However, according to many pilots, the effectiveness of these associations is minimal because the spokesmen can do little to influence providers. Moreover, the spokesmen are essentially volunteers who may not feel adequately recognised or rewarded for their time and effort. These associations have not developed any uniform piloting standards either.

In submission to the draft report, at least 29 pilots made comments critical of their provider and noted that all providers in general were operating in a structure that detracted from safety. Some noted that pilots compete with each other through the providers whom it suited to have divisions between pilots. It was claimed that the aim of providers was to maximise their profits by generally ignoring safety issues because protecting the GBR environment, the main objective of compulsory pilotage, was not their primary goal.

A number of the pilots noted the absence of an SMS for the task of pilotage in coastal pilotage in contrast to many ports in Australia. They felt that significant safety improvements could be achieved in standardising pilotage procedures and passage plans, training, check pilotage, fatigue management, incident reporting and working relationships if coastal pilots were part of one organisation or a collegiate body dedicated to safe pilotage in cooperation with AMSA and consultation with the Australasian Marine Pilots Institute (AMPI). They consider the current structure for the delivery of coastal pilotage services does not support safe pilotage because of the deep divisions between individual pilots, providers and AMSA, and their conflicting priorities.

The lack of personnel management and intimidation by providers was noted as a significant factor impacting other issues and resulting in 'chronic mismanagement' of coastal pilotage services. Some pilots submitted that in this environment few pilots can muster the courage to speak up occasionally while most remained silent because they feared being dismissed by their provider. It was claimed that a small number of pilots had aligned themselves with their respective provider to receive preferential treatment, which created or increased divisions between pilots. The two pilot houses used by pilots with Torres Pilot were cited as an example of such divisions.

There have been at least two attempts by coastal pilots to set up an organisation to represent and benefit all coastal pilots. In general, these attempts have been aimed at having a body with an over-arching professional voice that could speak for both individual pilots and groups of pilots, with AMSA or the providers as a group or separately, rather than personalising issues at an individual level.

In 2000, Sea Pilots Queensland (SPQ) was formed with the general objective of allowing pilots to work under a common professional umbrella and improve their

working arrangements. The intention was to separate pilots from the direct control of the providers and for SPQ to manage allocation of pilots to providers as required. Almost all the pilots joined SPQ but little progress was made in implementing its working model and a few years after being set up, it became defunct.

In 2009, Sea Torres and Reef (STAR) Pilots was formed with the aim of including all pilots. In the survey, 31 out of 79 pilots (39 per cent) indicated being members of, or associated with, STAR Pilots (Appendix A, item 39). The general objective of STAR Pilots was similar to that of SPQ. However, STAR Pilots intended to employ the pilots who would operate in accordance with its pilotage SMS and be assigned (supplied) to existing providers for pilotage jobs as required. This meant that STAR Pilots would probably become the sole supplier of pilots to providers. It could also become a future pilotage provider in its own right with the potential of becoming the only provider.

Both Australian Reef Pilots and Torres Pilots stated that they actively discouraged their pilots from becoming office bearers or members of STAR Pilots, their prospective competitor. According to Torres Pilots, the competing services clause in its pilot contract (section 3.4.3 refers) was inserted as a result of concerns related to the activities of STAR Pilots.

In submission to the draft report, STAR Pilots stated that its objective is to be a supplier of pilots to existing providers and not a competing pilotage provider. It claims that this objective was based on the concept of a Government contracted pilots' cooperative as suggested by the 2008 review into the delivery of coastal pilotage services (section 2.6 refers). In addition, STAR Pilots submitted that it had promulgated its concept and objective through a number of industry presentations. The presentations included reiterating its role as taking responsibility for managing risk during pilotage on a day-to-day basis through a single pilotage SMS, which it believes addresses the unnecessary risk of inconsistent and potentially conflicting SMSs even if each provider decided to develop a pilotage SMS.

At interview, three pilots indicated that they had not been allocated work because their providers felt that they were associated with STAR Pilots, whether they were or not. However, Australian Reef Pilots indicated that it had suspended two pilots on safety grounds because their disruptive activities impacted on fatigue management at pilot houses but provided no evidence in support of its action.

The two pilots who were suspended acknowledged that they were active in the development of STAR Pilots. They believe that this was the reason they were denied work and pointed out that Australian Reef Pilots had not indicated that they had been dismissed on safety grounds. In support, one of them provided documents related to the legal action (ongoing at the time of his submission) that he had taken against the provider for being denied work. He pointed out that neither AMSA nor any pilot was advised of the suspensions of any pilots on safety grounds. His claim is supported by correspondence, another pilot's submission and other evidence.[152]

In submission, some pilots indicated that they considered the extreme reaction and measures taken by Australian Reef Pilots and Torres Pilots in relation to the matter of STAR Pilots as unfair. They felt that denying work to vocal pilots, threatening others with similar consequences using intimidating correspondence had coerced pilots into outward compliance but led to further deterioration in working

[152] Australian Reef Pilots' record of NCRs and sub-NCRs does not refer to these pilot suspensions.

relationships. The dismissal of the pilot spokesman by Torres Pilots, in 2008, and threats to seek the resignation of pilots supportive of STAR Pilots was claimed to have resulted in some pilots either disassociating themselves with STAR Pilots or concealing their association with it.

A major reason for the lack of cohesion amongst pilots is the ill feeling which had its origins in the 1993 split. A large number of pilots who experienced the split and its aftermath resent the opposing provider, and competition between Australian Reef Pilots and Torres Pilots remains intense. Over time, their resentment has influenced many pilots who started their career after 1993 (including the 60 per cent who began after 2000) and the number of pilots who consider other pilots as competitors is significant (Appendix A, items 17 and 18).

In general, the working relationship between providers and their pilots can only be described as poor. While the circulation of the draft report crystallised the views of pilots, a number of pilots from both main providers had indicated in the survey or at interview of being bullied, intimidated or harassed by their provider for questioning their actions or voicing concerns. A very small number of pilots had indicated support for their provider and their working arrangements. In contrast to these definite and opposing views, some pilots expressed no particular opinion, suggesting either indifference or fear of making adverse comment about their provider.

The ATSB encountered a degree of reluctance or disinterest from pilots in completing the survey. A number of pilots required reassurances with regard to the confidentiality of information and protection of their identities. Despite these assurances and reminders of the survey's closing date, at least 12 pilots had to be followed up to ensure that they completed and submitted their survey responses.

Based on the survey, interviews with pilots and providers and the large number of submissions in relation to the interaction between pilots, providers and AMSA, the only conclusion that can be drawn is that historically their relationships have lacked trust and mutual respect. Such an atmosphere of mistrust carried into the future has the potential to seriously undermine existing and future safety measures.

The overall dysfunctional relationship between many pilots and their providers cannot be conducive to the safe conduct of a pilotage or to safety management.

3.9.4 Interaction with AMSA

Since 1993, a forum for pilots to raise pilotage related matters has been the regular AMSA-convened meetings. These six monthly meetings (previously quarterly) have usually been held in Brisbane with telephone links to places where pilots may be located (Thursday Island, Cairns and Mackay). Pilots and pilotage providers attend the meetings which provide an opportunity for AMSA to bring to their attention regulatory issues, navigation and chart enhancements, and developments in pilotage. Participants can raise any issues that they consider relevant. A number of pilots indicated their view that the meetings were not particularly useful and the presence of the providers impeded any constructive professional dialogue between pilots and AMSA.

In their submissions to the draft report, a number of pilots cited impediments at the AMSA meeting that they attended on 19 January 2012. One of the pilots stated that Torres Pilots (the provider) 'hijacked' the meeting's proceedings by misinterpreting

input from attendees, including pilots, in a 'cynical attempt' to discredit the under-reporting of risk events by pilots indicated in the survey; behaviour that he felt had no place in a safety culture. Another pilot attendee at the meeting pointed out that such behaviour served to highlight the reasons that pilots did not report risk events.

However, as the only such forum for all parties to exchange information, the AMSA-convened meetings have had some positive results. For example, a pilot who has attended many meetings (but not the meeting referred to above) submitted that over the last few years the working relationship with AMSA had improved and the regular meetings it convened had become more productive. The meetings could become more productive if all parties made achieving their common objectives a priority and applied greater discipline and dedication to the process.

Pilots have mixed views about the effectiveness of AMSA's safety management code (Appendix A, item 14). A number of pilots feel that AMSA is ineffective in preventing safety breaches by providers because it has little control over them. In support of their view, they cited the 2004 man overboard accident, the lack of monitoring of pilot transfer/travel times and the handling of the training levy.

In submission, at least another 11 pilots made specific comment in relation to the AMSA-convened meeting and related matters. The former spokesman for pilots engaged by Torres Pilots claimed that the detailed proposal for the funding of pilot training which he submitted at an AMSA meeting in 2006 was met with indifference by the attendees. Others perceived a lack of effectiveness in AMSA's safety oversight, an inability or unwillingness to ensure that providers were responsible for managing a safe pilotage service and audits that had 'proven to be repeatedly ineffective'. It was suggested that AMSA supporting greater involvement from AMPI could improve safety in coastal pilotage.

Other submissions from pilots focused on subjects such as past reviews into coastal pilotage and AMSA initiatives. It was claimed that many of the past reviews had effectively not been independent because they were restricted by AMSA-defined terms of reference. It was noted that the requirement for providers to have a document of compliance under the pilotage safety management code and the introduction of pilot boat standards resulted from SPQ initiatives. The expansion of the check pilot assessment checklist by AMSA in response to *Atlantic Blue*'s grounding was cited as a reactive change that did 'nothing to achieve any better result'. It was claimed that AMSA's attitude to risk event reporting had resulted in pilots fearing 'punishment' (section 3.4.6 also refers).

At interview, some pilots suggested that AMSA's instructions, at times, actually increased risk. As an example, they cited an AMSA pilot advisory notice (PAN) indicating that coastal pilots were not licensed to conduct ships outside compulsory pilotage areas. They specifically noted the passage of passenger ships through non-compulsory pilotage areas such as that between Cairns and Townsville. These pilots also consider the advice or guidance in the PAN indicating that they should not conduct or anchor ships outside the compulsory Hydrographers Passage pilotage area to be an AMSA directive (rather than an advisory). Coastal pilots traditionally performed this task and is one that some believe reduces risk (the anchorages off Hay Point have often been congested).

Given such views and their general discontent and dissatisfaction with their working arrangements, a pilot's support for AMSA's fatigue management and professional development requirements is probably limited.

The working relationship between the providers and AMSA is also perceived as far from ideal. For example, a large amount of email correspondence between AMSA and Torres Pilots since 2006 indicates a number of contentious issues. At interview, each provider indicated their view that AMSA's consultation left much to be desired and cited the implementation process for issue 5 of MO 54 as the most recent example. However, AMSA advised that there was significant consultation with all stakeholders in relation to issue 5 of MO 54 over a number of years. The consultation, AMSA indicated, continued during the 12 month period following the implementation of issue 5 so that its provisions could be reviewed.

The fact that AMSA itself has concerns about the safety of pilotage operations, which in part led to this ATSB investigation is, in itself, a serious matter.

3.9.5 Summary

There are a number of underlying reasons for the sub-optimal working relationships between the pilots, pilotage providers and AMSA. The history of coastal pilotage, the introduction of performance based safety regulation in 1993 with the removal of a regulated pricing system and subsequent events have all had a part to play.

Overall, the manner in which coastal pilotage is still managed in 2012 is open to significant improvement based on a greater collective commitment to safety. The fact that there is no pilot organisation(s) that is responsible for managing a complete pilotage service on a day-to-day basis, nor a regulatory framework to bring this about, lies at the core of the various issues. At the same time, the deep discontent amongst pilots and their general distrust of the providers presents an ongoing risk to the implementation of provider-managed safety systems and the development of an effective safety culture.

3.10 Pilotage sector stakeholder views

A proper understanding of the views of stakeholders in the coastal pilotage sector is necessary to effectively address safety issues in the sector. The stakeholders include not only the organisations who can take safety action to address the issues but those that may be directly or indirectly impacted by the action and their support could make it more effective.

The ATSB survey responses represent the views of all coastal pilots. The collective views of these individual stakeholders have been discussed and analysed in various sections of the report. Specific views are included where necessary without identifying any particular pilot due to their concerns in this regard.

At the outset of this investigation, the ATSB had invited submissions from organisational stakeholders and interested parties. Fifteen organisations, including Government agencies, pilotage providers, pilotage associations and other maritime industry entities provided comment. Salient points from their submissions are discussed below.

3.10.1 Initial submissions

Initial stakeholder submissions included a number of constructive suggestions or ideas to enhance safety, examples to support some ideas, and statements reflecting the overall view and/or general policy of particular organisations. Based on their comments, the organisations can be broadly classed into the following three groups.

- Those that had views on specific issues related to safe pilotage and were generally not focused on the model for the delivery of pilotage services.
- Those that believed the coastal pilotage regulations (i.e. issues of MO 54) had adequately provided for safe pilotage and could continue to do so, if properly enforced, and were generally satisfied (or did not oppose) the current model of parallel competition (i.e. multiple pilotage providers) for the delivery of pilotage services.
- Those that were generally opposed to competition in pilotage and considered the existing model for the delivery of coastal pilotage had not provided a proper safety framework, and favoured a different model.

Amongst the first group, the submission from the Commonwealth Government's Department of Infrastructure and Transport focused on pilotage standards with particular reference to pilot skills, their training and the increasing requirement for more pilots due to increasing shipping traffic. The Department also noted that it was vital for pilots to have been master mariners with adequate sea experience and have sound local area knowledge. With regard to training, it stated that experienced pilots must be retained as mentors and that bridge simulators could be used.

In its submission, AMSA indicated that it had contributed to the Department's submission. It also reiterated the safety concerns it had expressed in response to the ATSB findings into the grounding of *Atlantic Blue*, with particular reference to the confidential, de-identified pilots' reports which were the basis of those concerns.

Maritime Safety Queensland highlighted its concern at the frequency of marine incidents in the GBR. Although MSQ did not quantify the frequency of incidents, the statement implied that the existing rate was of concern. It also noted that projected increases in traffic due to Queensland's port expansions would increase

the risk profile for the GBR region. Under Australia's national plan to combat pollution of the sea, MSQ is the lead agency in the event of a serious incident in the waters off Queensland.

While MSQ acknowledged that pilotage was a critical factor driving safety, it noted there were many other factors and emphasised the 'proven role' of REEFVTS in reducing risk. An area of concern noted by MSQ was the experience and underlying competence of some new pilots over the last decade and the source for future pilots. While supporting new sources for pilots, such as RAN officers, MSQ identified an issue that has become very apparent during this investigation, and stated:

> Coastal pilots should have a reasonable expectation of a remuneration and conditions package which reflects the hours worked and responsibilities shouldered. It is disappointing to note that pilots have largely lost control over how the sector is organised and commercially managed. This is not an issue of competition in the market but more of an issue of the pilots needing a substantial say in how the service delivery is managed and in addressing issues of concern when meeting the reasonable needs of the shipping industry. ...
>
> ... There is little real evidence to show that serial competition would avoid some of the issues of current concern.
>
> However what is equally important is the need for the pilots to have considerable input into service delivery issues including an understanding of the economics of the pilotage operation. Regardless of some urban myths to the contrary it is doubtful if the pilots had any real say in the management of the sole provider business prior to transfer to the Commonwealth. The current pilots are in practical terms in the same position that they were prior to the transfer and in some cases seem to have actively distanced themselves from any potential to have a say in the business issues. ...

In a direct reference to the pilotage providers, MSQ stated:

> Consideration may also need to be considered in authorising those entities that facilitate/supply the provision of pilotage services. Those organisations need to be held accountable for a range of safety and performance issues rather than simply being seen as the "agent" of pilots.
>
> Any process of continuous improvement must be accompanied by a measurement process. Key performance indicators must be defined and agreed and checked against a rigorous audit process and compliance regime. [MSQ] understands this is the foremost area where work is required to yield sustainable and enduring safety outcomes.
>
> MSQ is a strong supporter of the formal safety management systems in the delivery of a pilotage service. ...

The Australian Hydrographic Service (AHS) raised concerns, as noted in section 3.4.4, regarding the use of ECSs by pilots. The AHS also indicated the lack of knowledge exhibited by some pilots in relation to ECSs and ENCs. Noting that from July 2012 ships would progressively be fitted with an ECDIS, the AHS stated:

> To complicate matters, these pilots will be aboard ships with ECDIS from different manufacturers and may be unfamiliar with that ship's particular system, so may not be able to, for example, insert a new track or revised clearing line on the ship's electronic charts. This both increases their reliance on their own portable system, as well as reliance on their own knowledge of their own particular system - the

> ship's crew will be unable to assist. This is a problem that does not exist when using the much lower technology associated with paper charts.

The AHS, therefore, considered that there was a need for pilot training to include the use of emerging technologies in electronic navigation.

A self acknowledged 'traditionalist' pilot stated (in submission to the draft report) that he was opposed to the AHS view which perhaps leaned towards watchkeeping and not piloting. In summary, he felt that pilots would become familiar with ECDIS just as they had with radars leaving the ship's crew to operate the ECDIS where necessary. He believes that pilots should use traditional skills while the master and crew made use of the ECDIS to assist them with navigation.

However, the pilot's view above is based on the premise that a pilot currently does not need to, and therefore should not fully use, emerging technologies.

As discussed in section 3.5.1, ASP Ship Management (ASP) identified benefits from readily available standard passage plans. Other areas identified by ASP were knowledge management, pilot training and development, and risk event reporting. The company suggested that knowledge, including standard passage plans, checklists and other information should be available via a website. With regard to training and development, ASP considered that training could be enhanced, including bridge simulator use, which should possibly be funded by Government. It was also noted that a dedicated risk event reporting system trusted by all parties was lacking. The company stated:

> In conclusion, ASP concurs with the aim of providing a single system of pilotage execution, proper review, the sharing of safety information, professional checking, collegiate support and the management of a positive safety system that provides best practice for all pilots and provider agents.

Another shipping company, P&O Maritime, expressed the view that a single pilot operation for the entire Inner Route passage was not sustainable. Relevant extracts from the company's submission include:

> Some ships take up to 2 days (or more) to transit the reef area and on to the Torres Strait. The responsibilities on the pilot are significant. Some of the ships are sailing with 1 m UKC and travelling at speeds of up to 17 knots. ...
>
> Pilots board these ships sometimes to discover a complete lack of protocol on the bridge, a poor safety culture on board and a poor understanding of navigation in such difficult conditions. All of this, coupled with one pilot for a 2 day trip is simply an accident waiting to happen. The pilot is on call for the entire transit and spends a significant time on the bridge with little or no rest for long periods. ...
>
> At a critical point in the trip, when the pilot has to disembark the ship onto a pilot launch, he has been awake for up to 36 hours. ...
>
> The entire operation along the reef is antiquated and the safety measures afforded to the ships transiting the area are outdated with a high degree of risk evident across the operations.

However, the views of other shipping companies, and organisations representing them, were quite different to those above. For example, BP Australia (BP) noted that while regular claims were made that competition compromised pilotage safety, BP had not seen any evidence in the oil or other industries that safety deteriorates in the absence of a monopoly provider. As the charterer of *Atlantic Blue* when the

tanker grounded in 2009, BP stated that it believes the grounding was the result of a severe lack of bridge resource management.

A number of shipping companies did not make comment or indicated that Shipping Australia (SAL) would respond on their behalf. A body that promotes and advances the interests of primarily overseas-based ship owners and shipping agents, SAL submitted that AMSA was a strong regulator that enforces compliance and that SAL members view the regulator as meticulous in regulating safety. In general, SAL's comments implied that MO 54 (as re-issued from time to time) had improved safety and that the provisions in issue 5 of MO 54, strictly monitored by AMSA, should address any safety concerns.

According to SAL, the safety record of coastal pilotage had been commendable since the introduction of compulsory pilotage in 1991. It stated that 'the risk of a serious incident on a piloted vessel in the GBR had reduced by over 80 per cent during the last decade'. However, SAL's estimate of risk appears to be based only on the number of incidents and does not take any account of 'near misses' as an indicator of risk. Risk cannot be assessed on the likelihood of an incident without taking into account its potential consequences.

The comments provided by the National Bulk Commodities Group (NBCG) were consistent with those of SAL. The NBCG is the peak national body representing Australia's bulk commodity shippers and consignees. It noted that its members supported the current model giving a choice of pilotage providers, that MO 54 (issue 4) was comprehensive and, if adequately regulated, should ensure safe pilotage, and that there were no outstanding safety concerns.

The submissions of a number of pilots on the draft report are relevant here. It was stated that the GBR deserved the best possible protection, was enjoyed by millions of tourists each year and this could all change with a very serious shipping incident. Safety and environmental protection, it was pointed out, needed to be the highest priority of all involved parties. It was noted that the 'excellent opportunity' for improvement offered by the 2008 review into the delivery of coastal pilotage services had been wasted. The costs of pilotage services rather than safety, it was claimed, drove commercial interests. To support this statement, it was cited that Torres Pilots had the largest market share despite the fact that many more of the incidents that had occurred during a coastal pilotage since 1993 had involved a ship for which the provider had supplied pilotage services (through a contracted pilot).

However, it is important to note that the factors that contributed to those past incidents were related to safety management and the circumstances in those cases, rather than to any particular pilot, all of whom were licensed by AMSA, regardless of which provider assigned them to the ships involved.

Amongst the providers, Hydro Pilots did not provide a written submission. The provider's representatives preferred to make comment during a meeting with ATSB investigators.

Australian Reef Pilots (ARP) made a detailed submission and its comments have been taken into account in previous sections of the report. However, the provider did note that all three groundings of piloted ships since 1999 had not involved its contractor pilots. After describing its own processes, the provider differentiated itself from its competitors by stating that 'only organisations which are organised and administered in a similar way to the ARP business model provide the opportunity for development of a systemic safety culture'.

Torres Pilots also made a detailed submission and its comments have been taken into account in previous sections of the report. The provider noted that 'GBR pilotage had an envied safety record' and cited the reduction in the number of incidents since 1991. Torres Pilots indicated that safety is not compromised by the current multiple service provider model and that there were few flaws and risks in service delivery. It noted that there was considerable room for improvement in the implementation of safety regulation by AMSA and that better communication and cooperation between the regulator, pilots and providers would improve safety.

In contrast to the views above, organisations representing pilots submitted that the structure of coastal pilotage and competition, in general, compromised safety. The Australasian Marine Pilots Institute (AMPI) stated that it considers the current coastal pilotage structure fundamentally flawed, comparing it with Australian ports and discussed best practice pilotage and safety culture. Previous sections of the report have covered the issues raised by AMPI. According to AMPI, compulsory pilotage is a public safety service to protect the environment and the safety of life, and likened its function to that of air traffic control in aviation. Marine pilots, AMPI believes, should not be regarded as another commercial enterprise and booked through an agent like actors and media personnel.

Comments in STAR Pilots' submission were similar in theme to those of AMPI. Its submission included a number of claims about flaws in the structure of coastal pilotage. While examples were provided, no quantifiable evidence was presented. According to STAR Pilots, it had the support of 70 per cent of coastal pilots, well above the 39 per cent indicated by the ATSB survey, as noted in section 3.9.3.

Brisbane Marine Pilots commented on the importance of standard procedures, passage plans and systems, and best pilotage practice. It noted these processes were hampered by the current arrangements in coastal pilotage and stated that:

> Experience throughout the world supports the fact that a sole provision of pilotage results in the best possible safety outcomes.

The International Maritime Pilots' Association (IMPA) submitted that pilotage was an essential public safety service and that it should not be solely market-driven. A professional technical body concerned with pilotage safety and navigation practice, IMPA has about 8,000 members in 55 countries (10 coastal pilots indicated being members). It stated that problems in Queensland coastal pilotage such as frequent groundings, high staff turnover, lack of training, and inadequate support services were a result of its market driven structure. The reference to 'frequent groundings', IMPA noted, was the view of the International Group of P&I Clubs (IGP&I).[153]

The ATSB contacted IGP&I which provided the report[154] that was probably the basis for IMPA's assertion. This report on pilot error covered a 5 year period (1999 to 2004), during which there were 262 insurance claims internationally, including seven in Australia. As the groundings of *New Reach* in 1999 and *Doric Chariot* in 2002 occurred in the Inner Route of the GBR, the other five incidents would have

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[153] The thirteen principal member clubs of the International Group of P&I Clubs between them provide liability cover (protection and indemnity) for approximately 90 per cent of the world's ocean-going ship tonnage. Each member club is an independent, non-profit making mutual insurance association covering a wide range of liabilities from crew injury to wreck removal.

[154] International Group of P&I Clubs, Pilotage Sub-committee, *Report on pilot error related to claims over US$100,000 from 20.02.99 to 20.02.04*. IGP&I, December 2006.

occurred in Australian ports. It should be noted that the assessment of pilot error influence was made by IGP&I based on the opinion of an appointed expert or its own technical staff.

The IGP&I pilot error report indicated that Australia, with one error every 15,543 pilotage movements, had the second worst record of the 34 countries included. By comparison, Norway had the best record with one error every 215,510 movements and Japan was eighteenth (about the halfway mark in the list) with one error every 49,083 movements. However, this data from the 1999 to 2004 period is based on only seven incidents in Australia cannot be used to draw any conclusions in relation to Australian pilots in general or coastal pilots in particular. Moreover, IGP&I pilot error data for the 1999-2007 period indicated a considerable improvement in Australia's position with one error every 43,363 movements. It is worth noting here that the introduction of compulsory coastal pilotage in 1991 did not result in any changes to P&I insurance terms.

Of much greater relevance from a safety perspective were the observations and recommendations included in the IGP&I report. The recommendations identified that effective bridge team management, passage planning, master/pilot information exchange and a proper lookout could have prevented those pilot error incidents.

According to IMPA, the principal customer of a pilot service is the public interest. Pilots who compete for work, IMPA submitted, do things they would refuse to do for safety reasons in a non-competitive setting. It emphasised that public interest was best served by a single, fully regulated, transparent, accountable and cohesive pilotage service, free of commercial pressure.

3.10.2 Submissions to the draft report

In December 2011, a draft of this investigation report was provided to all stakeholders and interested parties and they were invited to make submissions. All submissions received were carefully considered to finalise the investigation report. Salient points from submissions that have not been addressed in other sections of the report are discussed in this section.

It is relevant to mention here that the findings of the investigation, including the safety issues identified in the draft report were essentially the same as those presented in section 4 of this report.

Seventy one pilots made individual submissions to the draft report. Fifty one pilots stated or implied their support for the report and/or its findings while two indicated they were opposed to the report/its findings. Eighteen pilots advised that they had no comment on the draft report without qualifying their response. Eleven of the 82 pilots (including three retirees and three trainees who left) that completed the ATSB survey chose not to make a submission.

The report was amended where necessary to reiterate or clarify certain points to reflect pilots' comments. The general view of many pilots is effectively captured in a pilot's submission where he stated that events which he personally witnessed in 2011 whilst the investigation was ongoing reflect the situation described in the report. He pointed out that near misses, professional incompetence, unethical behaviour, pilot fear, widespread bullying and conflicts of interest impact pilotage and it is easier for pilots to remain silent while pilotage providers continue with business as usual, tacitly endorsed by AMSA through weak audits.

Twelve of the 51 pilots supporting the report/its findings made no substantive comment other than indicating their support. For example, one pilot submitted that he had no comment because 'it [the report] tells it like it is' while another stated that he agreed with the report's findings.

The comments of two pilots (both engaged by Torres Pilots) opposed to the draft report contrasted with others. One stated that safety was the ultimate goal of all concerned parties [in coastal pilotage] and commercial gains were only secondary issues. He noted that pilots had been masters with ultimate responsibility for the safety of lives, ships and the environment and, as pilots, this remained their priority, and that the issues identified in the report are 'too drawn out and exaggerated'. The other pilot found the report findings offensive to his own and all pilots' professional integrity. He does not believe most pilots prefer to be employees because several whom he had spoken with had indicated a preference for their contractor status.

Eighteen organisational stakeholders made submissions on the draft report. Some expressed views which contrast with those in their initial submissions when the investigation began (section 3.10.1 refers).

The Department of Infrastructure and Transport advised that it had no comment in relation to the draft report. The Department's initial submission had input from AMSA, which made a detailed submission to the draft report.

Importantly, AMSA's submission included a range of safety action to address the safety issues identified. The safety action is detailed in section 5.1 together with ATSB's assessment of various action and its recommendations. Some concern was expressed by AMSA with regard to the use of pilots' views (from the survey) as part of the investigation's methodology. Particular reference was made to the survey question about measures to improve REEFVTS (Appendix A, item 31) leading respondents in a specific direction.

However, as discussed in section 1, the survey questions were in large part based on the de-identified, pilot reported safety concerns provided by AMSA to the ATSB. The survey responses served to indicate the extent of those pilot concerns which, while serious enough, were somewhat less widespread than the AMSA supplied information had suggested. A number of survey questions, including those related to REEFVTS, were based on past reviews as noted in section 3.8. Other specific comments from AMSA have been addressed in relevant sections of the report.

Maritime Safety Queensland stated that it had a strong strategic interest in the GBR, given its unique environmental value, its importance to Queensland and the State's economy and the strategic imperative to maintain safe, sustainable and long term shipping access to Queensland's ports. The development of existing and new ports and increasing public interest, MSQ pointed out, had highlighted the key priority that the long term health and sustainability of the GBR already was. It noted that all these issues made it necessary for all stakeholders to properly manage the safety risks posed by shipping.

In addition to indicating support for the findings in the draft report, MSQ indicated that 'the current business model of coastal pilotage does not allow for the proper ownership of the pilotage services provided'. It also considers this business model does not allow for proper risk management as highlighted in the report, and the focus of the regulatory model was on licensing and other such measures rather than on the intended safety outcome. Therefore, MSQ considers the full benefits of a

comprehensive SMS will not be achieved without changes to address key organisational issues, and stated:

> The 1993 transfer of jurisdictional responsibility for coastal pilotage saw the removal of economic regulation. Similar to other sectors of the economy which have been subject to changes in the regulatory framework it is timely that this position be now reviewed. There may be options available which would see the reintroduction of a light handed economic regulatory approach and so effectively address some of the key organisational issues mentioned in the report. ...
>
> ... MSQ is not specifically advocating economic regulation, a particular business model or a return to the monopoly practices pre-1993. However, this [investigation] provides a unique opportunity to ensure a process which rigorously assesses the strengths and weaknesses of the current system including the overall regulatory framework. It is fair to say that a viable and sustainable business model for coastal pilots is fundamental to achieving the desired safety outcomes.

In conclusion, MSQ indicated that shipping can operate in the GBR in a sustainable way, and necessary safety outcomes can be achieved. It noted that in recent decades, substantial improvements in ship operations, equipment, communication, tracking and navigational systems had been achieved and that that there was a high level of understanding amongst stakeholders of ensuring best practice outcomes.

The Great Barrier Reef Marine Park Authority (GBRMPA) expressed concern with increased shipping traffic through the Marine Park, which it stated was projected to treble in the next 10 to 20 years. The GBRPMA considers the importance of having pilots on board transiting ships has never been greater, and that compulsory pilotage in the entire GBR region with two pilots for long pilotages are measures that should be explored further. It noted the low number of pilots (82) was a particular concern given the predicted increases in shipping.

Shipping Australia advised that it had no significant comment on the draft report other than noting that the dynamic UKC management system for the Torres Strait (section 3.5.2. refers) would enhance safety and efficiency in the GBR.

The NBCG advised that it supported the conclusions reached by the draft report and the need for responsible organisations to address the safety issues. It acknowledged that pilot working arrangements had to be managed to ensure workplace tensions did not compromise safety, noting that tension between pilots would have existed since coastal pilotage began. The NBCG stated that pilot fatigue is a serious issue which must be addressed immediately and remedial action reflected in pilotage costs. While it supports an incident reporting culture, it noted that the number of near misses/incidents, reported or unreported, is no higher in coastal pilotage than in harbour pilotage using piloting hours as the criteria for comparison (no evidence was provided to support this claim). It indicated its support for the use of simulators in pilot training and check pilotage in a similar way to the aviation industry.

However, the NBCG noted that while reform and operational/safety improvements are aspirational goals, the pilotage providers, pilots and AMSA were providing users with a cost competitive service benefitting customers and the community. It also stated that in its experience of coastal pilotage since 1983, the pace of improvement had escalated and that a significant contributor to, and catalyst for, this improvement was parallel competition in pilotage (no evidence was provided to support this claim). The NBCG believes that the response of AMSA and the providers since parallel competition began in 1993 has resulted in the GBR environment becoming safer.

The Australian Shipowners Association (ASA)[155] advised that while it had no comments on the draft report, it was concerned about the number of safety issues identified in the report. The ASA also indicated its interest in the final report which would include the responses and actions of relevant organisations to address the safety issues identified.

Ports Australia pointed out that comments in its submission did not, in particular respects, represent the views of MSQ, which is one of its members. In relation to the ATSB investigation and its outcomes, Ports Australia described its two significant strategic policy interests.

In relation to its two policy interests, Ports Australia stated that while it supports all reasonable measures, such as REEFVTS, to protect the safety of shipping in the region, it considers that a high level of objectivity is necessary in reporting issues affecting safety (a reference to this ATSB report) to ensure that future trade in and out of the affected ports is not subject to unreasonable or undue restrictions. Its other strategic policy interest is to preserve the scope to move to competitive pilotage markets. Ports Australia stated that it had not advocated any ideologically based position on this matter but recognises that the substantial increases in the scale of port throughput meant the emergence of commensurately more scope to introduce competition into pilotage and other markets serving ports.

Ports Australia further stated that it had taken issue with some views reflected in the report that competitive pilotage markets, by their very nature, inherently produce unsafe outcomes. It believes safety outcomes are a factor of regulatory governance and the conditions of accreditation attached to providers of pilotage services, not an outcome of competition. As discussed in section 3.3.2, Ports Australia considers that the key issue for coastal pilotage is related to the regulatory model, and that relationships between key parties need to be defined, with rigorous governance and auditing standards. It sees that the solution lies in vigorous commercial contracts between AMSA and the providers, validated by an appropriate licensing regime.

Ports Australia's specific concerns with the investigation methodology and survey responses have been addressed in the relevant sections of the report.

Australian Reef Pilots stated that the investigation methodology was flawed because it began with a pilot survey that did not extend to other stakeholders that should have been included in the survey. Australian Reef Pilots pointed out that the views of pilotage providers in particular had been incidental to the process and had not been given proper consideration in the report. The provider claimed that questions in the survey were improperly drafted with the intent of obtaining pre-determined responses and many were irrelevant to safety because they related to subjects such as pilot working arrangements and demographics.

A necessary outcome of the survey, from ATSB's perspective, was to ascertain the concerns of all pilots with particular attention to the subjects in the confidential, de-identified reports provided by AMSA. This outcome was achieved and survey data confirmed some concerns were widespread and provided other relevant information such as demographics and background to allow a proper breakdown of responses and issues. As indicated by its title (coastal pilot survey), it was a survey of pilots

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[155] The ASA represents Australian companies that own or operate international and/or domestic trading ships, and employers of Australian and international maritime labour. It promotes the role of Australian shipping providing sustainable shipping and internationally competitive sea transport for the benefit of Australia.

not other stakeholders. At the same time, stakeholder organisations and interested parties were invited to make submissions, provided with a fact and information sheet and given the option of accessing a copy of the pilot survey. Both main providers obtained a copy of the survey before making their initial submissions.

Australian Reef Pilots submitted that competition between the two principal providers is robust and results in lower input costs to shipping.

According to Australian Reef Pilots, whether pilots are contractors or salaried employees does not necessarily affect their level of contentment and hence risk. In support of this argument, the provider stated:

> It is noted that QANTAS [the Australian airline] salaried employees, including pilots, have for many years been in dispute with their employer over a range of issues and this disputation has no doubt led to increased risk. It is obvious that the employment arrangements per se are not the issue. General discontent and low moral [sic] may well impact on risk management but the underlying causes are numerous and most certainly not principally related to contractual matters.

However, this comparison with QANTAS does not consider some key issues. Firstly, QANTAS is responsible for managing all safety risks associated with its operations, unlike coastal pilotage providers who have not been responsible for the overall management of the safe conduct of pilotages. The QANTAS pilots conduct their duties, including in-flight duties, under the airline's safety system and not their own personal, individual systems like those of coastal pilots. Another difference is that the airline's pilots are not paid per job as coastal pilots are. These key factors significantly reduce risk in QANTAS's operations and other differences to coastal pilotage further reduce safety risk for the airline. Therefore, this comparison with QANTAS, and the assertion of Australian Reef Pilots on that basis, is not valid. While some discontent amongst workers anywhere is inevitable from time to time and, at times, may increase risk, it is essential that the organisation responsible for safety management evaluate the increased risk and reduce it to an acceptable level.

Torres Pilots was opposed to the use of pilots' views as part of the investigation's methodology. The provider noted that some pilots may have had a personal interest in a certain outcome, in particular a Government-regulated, pilot owned monopoly that financially rewards them better than the current system. It noted that the potential for such a conflict of interest may have motivated 'some disaffected pilots' to deride safety systems and exaggerate or overstate safety concerns.

However, the investigation took into account the views of all stakeholders, including every pilot. Whatever the perceived motivation of individual pilots, most had a number of issues to point out and the large number of discontent pilots cannot be described as 'some disaffected pilots'. Moreover, the reason given by Torres Pilots for a conflict of interest applies equally to the provider and, in any case, its working relationship with many pilots is clearly poor. Furthermore, each pilot is a stakeholder in his own right who, in the absence of a pilot organisation, takes on the responsibility of such an organisation in the provision of pilotage services to ships that he conducts using his own piloting system. This is in addition to any pilot's professional responsibility, as an individual, to carry out every pilotage task safely. Disregarding or dismissing the individual or collective views of coastal pilots (particularly in the absence of a pilot organisation) would not be responsible.

According to Torres Pilots, the Australia-wide shortage of pilots meant there was no sound reason for pilots to be in competition with one another. The provider pointed

out that it had been innovative in recruiting suitable candidates (directly from overseas in many cases). It considers that most pilots, including coastal pilots, are working at capacity and demand for them means sufficient work for all without any need for competition between pilots.

However, the reasons put forward by Torres Pilots for there being no need for pilots to compete do not take into account the circumstances of coastal pilots who are paid per job. It is worth noting here that these reasons (or a similar argument) were not put forward by any pilot or other stakeholder to suggest that competition between coastal pilots does not exist.

To support its view of competition in pilotage, Torres Pilots cited an Australian Competition and Consumer Commission (ACCC) determination[156], part of which states 'irrespective of how many providers supply pilotage at a port, pilots have the incentive to perform the services with due care and diligence to ensure optimum safety or face disciplinary action and loss of licence'. Torres Pilots noted that any shortfall in the application of safety standards is the responsibility of the safety regulator and requires the regulator to adequately enforce safety regulations.

However, it is important to note that the ACCC was considering an application for exclusive pilotage services at the Port of Brisbane, not for coastal pilotage. It is also necessary to consider the ACCC determination in its entirety to put it in context, and to understand that its purpose was to determine net public benefit, not identify safety issues specifically. Furthermore, a view that optimum safety can be ensured because pilots have the incentive to perform their task properly to avoid disciplinary action and loss of licence (i.e. coercive power) misses a key point in contemporary safety management systems, which require the overall responsibility to manage safety risk to rest with a pilot organisation, not individual pilots.

Torres Pilots noted the potential benefit of the separation of responsibilities that allow each party in coastal pilotage (pilots, providers, AMSA and ATSB) to focus on its area of responsibility without potential conflicts of interests with the others.

However, Torres Pilots' observation above does not take into account that a pilot organisation (e.g. a pilotage provider) must be responsible for safe pilotage, and that pilots are an integral part of the pilot organisation, not separate entities.

Torres Pilots attributes a reduced number of incidents since 2002 to improvements in pilotage due to a higher quality of new pilots, better pilot training, check pilotage, voyage planning and ongoing professional development and training.

In general, organisations representing pilots, such as AMPI, IMPA and STAR Pilots indicated support for the draft report and its findings. While their specific comments have been addressed in other parts of the report, some general points are included here. With regard to the safety issues identified by the ATSB investigation, AMPI encouraged all participants, particularly decision makers, to make positive and necessary changes to coastal pilotage. In its submission, STAR Pilots indicated that it looked forward to working with all parties to address the safety issues and remedy the situation without further delay. According to IMPA, pilotage is a national issue and is best provided by a single entity, free of commercial pressure. It feels that

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[156] ACCC Determination - *Application for authorisation lodged by Brisbane Marine Pilots in respect of an exclusive pilotage services agreement at the Port of Brisban*e, Authorisation no. A91235, 3 December 2010.

Australia needs to provide the critical and sensitive GBR the best possible protection through a proven pilotage delivery model.

Brisbane Marine Pilots (BMP) indicated support for the draft report and its findings, and noted 'the absence of a unified and homogenous SMS' for the coastal pilotage task. It attributed the absence of such an SMS to an adverse impact on safety in a number of areas as identified in the report. According to BMP, the development of a single SMS could be achieved if all coastal pilots were unified in its development through a collegiate body. However, it noted this co-operative approach seemed impossible in the current environment given the distrust between the parties involved, necessitating a wholesale change to the way coastal pilotage is provided.

Submissions from the International Group of P&I Clubs and Marine Consultancy Group have been addressed in other sections of the report.

The submissions from at least 14 pilots included comments and suggestions to improve safety and similar themes, which could be useful when addressing safety issues. The safety issues identified in the draft report, it was noted, had existed for some time in the 'fragmented' sector. A 2006 research paper based on a survey of maritime pilots in Australia and New Zealand was cited to highlight these issues.[157]

While the 2006 paper was based on a survey of a limited number of coastal pilots, it was found that commercial pressure especially affected coastal pilots with a direct effect on risk, safety culture, hazard reporting, fatigue management, and training.[158] The researchers found that the proportion of coastal pilots who indicated that they worked cooperatively with each other was less than half that of other pilots. The paper also documented that coastal pilots complained that there were no formalised safety management procedures and that every pilot followed individual procedures and personal passage plans. The paper recommended developing standard passage plans for coastal pilots and engendering better communication between them.

Amongst other submissions to the draft report by pilots, while the Industry Passage Plan model was acknowledged as positive, it was felt that such initiatives fell well short of effective reform because the coastal pilotage sector was decades behind in contemporary safety management. Some saw a greater role by MSQ and GBRMPA could improve safety in the sector instead of the existing situation where, under AMSA's safety oversight, poorly managed pilotage provider companies delivered pilotage services at the lowest cost through contractor pilots. It was pointed out that providers had no experience in managing pilotage, other than pilot bookings, which left their ability to holistically manage a pilot service in doubt even if they were responsible for the overall safety management of the service in the future.

Other pilots commenting on impediments to reform and improvements in coastal pilotage noted that the sector's economic deregulation in 1993 without necessary controls miscalculated the potential effects on safety. It was pointed out that this change introduced instability and issues, which past reviews failed to adequately identify because of their terms of reference. Some felt that the costs associated with safety reforms were at odds with the priority of certain interests. As an example of this, it was cited that the 2008 review into delivery of pilotage services (section 2.6

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[157] Darbra RM, Crawford JFE, Haley CW, Morrison RJ, 2006, *Safety Culture and Hazard Risk Perception of Australian and New Zealand Maritime Pilots*, Asia-Pacific Pilotage Conference, Sydney, Australia, 14-17 March 2006.

[158] Of the 77 marine pilots that participated in that study, 12 were coastal pilots.

refers) resulted in further regulation instead of effective reform. Others felt that entrenched vested interests in the sector meant that a partial reform was neither feasible nor practical. It was noted that a safety culture could not develop where pilots continually competed against each other, and faced ongoing pressure and conflicts of interest.

At least two pilots stated that effective reform and change was unlikely unless a major shipping incident in GBR occurred. A further two pilots submitted that the number and seriousness of the safety issues identified in the report, collectively if not individually, comprise a critical safety issue (i.e. a safety issue associated with an intolerable level of risk).

However, some pilots were more positive with regard to reform in the sector. It was acknowledged that all stakeholders needed to work together in addressing the safety issues indentified in the report. While the need for extensive consultation between all parties was noted, it was their action that was considered necessary to achieve results. It was suggested that the successful experience of other pilot organisations could be used as a guide, instead of simply patching up some regulations and procedures again. Some noted that although effective reform would take time, it was only way forward.

3.10.3 Assessment of views

A major point of contention evident in stakeholder views is whether or not competition in pilotage detracts from safety. That no quantifiable evidence was provided by any party to support either view indicates this is a difficult argument. However, as discussed in section 3.2, the reduced frequency of incidents in coastal pilotage is, in large part, attributable to technological and other enhancements and not necessarily to any improved management of safety risks directly related to the actual pilotage task (e.g. standard procedures). In any case, rather than focusing only on the rate of incidents, the potentially severe and unacceptable consequences of a serious incident in the GBR always need to be considered.

An objective of the ATSB survey was to determine factors that influence the decisions and actions of pilots that potentially impact on safety. As discussed in previous sections, the survey responses indicated that the structure of coastal pilotage is related to a potential adverse impact on safety. However, other than presenting the survey responses and analysing the issues, the impact cannot be quantified. Nevertheless, given the existing structure and relationships that make up arrangements for the delivery of coastal pilotage services, it is simply not possible to give the Australian public the necessary assurance that the pilotage services would consistently meet its safety objectives.

Much has been documented both for and against competition in pilotage. The following extract from the Florida Statutes has often been cited by pilotage associations in support of their view.

> (1) Piloting is an essential service of such paramount importance that its continued existence must be secured by the state and may not be left open to market forces.
>
> (2) Because safety is the primary objective in the regulation of piloting by the state and because of the significant economies of scale in delivering the service, the requirement of a large capital investment in order to provide required service, and the fact that pilots are supplying services that are considered to be essential to the economy and the public welfare, it is determined that economic regulation, rather

> than competition in the marketplace, will better serve to protect the public health, safety, and welfare.[159]

While the above presents valid reasons against competition, the following from a research paper published in Sweden presents a case for competition in pilotage.

> It should be remembered that competition also exists in the aviation business. Air transport is considered very safe because of competition; competition together with strict regulations is one of the main safety affecter in the aviation business [sic]. In aviation traffic a monopolistic situation would probably be thought to be very risky and it would surely awake concern not only among the authorities but also among the customers [sic]. The rules are supervised by independent authorities who are taking care of that all the airline operators follow the safety issues [sic]. The pilotage could probably get same benefits in safety issues through competition but to be sure about this further research is needed [sic]. Maybe even in the future the thoughts would be more like in the aviation business; that a monopolistic pilotage market would be a risk for the safety [sic].[160]

In their submissions, both AMPI and STAR Pilots noted the hypothetical nature of the Swedish research paper and pointed out that it made a simplistic and misleading comparison between different industries. They offered what they consider is a fairer comparison between marine pilotage and the aviation industry. Parallel competition in coastal pilotage they feel is akin to an airport operating with two competing air traffic control centres. In addition, AMPI pointed out that in the aviation industry it was the airline companies that competed with each other, not the airline pilots who simply worked for the companies. It attributed deficiencies in coastal pilotage to the delivery structure of the pilotage services where pilots competed with each other.

At least two pilots submitted a similar view to AMPI and STAR Pilots with regard to the Swedish paper, noting that marine pilots had local area knowledge and were more like air traffic controllers than airline pilots who had many skills specific to aircraft type. It was noted that it was not just a case of competition, because competition in shipping was probably more intense than in aviation. It was also pointed out that the Swedish paper acknowledged the need for further research, and that the experience gained with the Queensland coastal pilotage services delivery model offered valid material in terms of its shortcomings.

With such opposing views, it is not surprising that wherever competition in pilotage has been permitted, some discontent, at least amongst pilots and their associations, has followed. However, often the discontent stems from factors unrelated to safety. The other side of the equation is whether a monopoly pilotage service is necessarily the safest. This would be a difficult argument to sustain simply on the basis that a monopoly service is not affected by competition, as most proponents put forward.

Therefore, the only conclusion that can be drawn from the different and disparate views is to relate them to the subjects discussed in previous sections of the report. Some of those subjects are associated with the commercial structure for the delivery of coastal pilotage services. However, as discussed in section 3.1.1, the focus in an effective system of safety remains the safety issues.

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[159] Florida Statutes, Title XXII, Chapter 310, *310.0015 - Piloting regulation; general provisions*, Current as of 2010.

[160] Jarnefelt, D 2009, *Possible Benefits of Competing Pilotage in Finland*, p.47, Report No. NM-09/01, Dept. of Shipping and Marine Technology, Chalmers University of Technology, Sweden.

3.11 Coastal pilotage in a system of safety

In recognition of the potentially severe and unacceptable environmental consequences of a serious shipping incident in the Torres Strait or GBR, Australia has a number of defences in the broader system of safety to protect the region. As explained in section 3.2, coastal pilotage is the final layer in defences that include REEFVTS, enhanced ship routing and modern navigational aids, through which AMSA has enhanced the safety of navigation in the area.

However, while coastal pilotage is a critical defence, its safety management has lacked an organisation that is responsible for managing all the risks associated with pilotage operations on a day-to-day basis (i.e. a pilot organisation). This safety issue is central to other issues and impacts all pilotage operations and related activities, as discussed in the report. The defence that a pilot provides against an incident can be much more effective when supported by a systems-based approach to managing risk through a pilot organisation's safety management system (SMS).

Therefore, the first step in improving the safety of coastal pilotage operations must be clearly assigning responsibility and accountability for the overall pilotage safety management to an organisation and move toward an effective safety culture.

In the absence of organisational responsibility for the actual task of pilotage, the organisational influences of pilotage providers affect all their business activities related to pilotage services. Pilot booking and transfer services are the main focus of providers. As discussed in section 3.9, the contractual working arrangements of pilots and generally poor working relationships with their providers are a result of organisational influences. A particular feature that promotes competition between pilots is their system of remuneration (based on the number of jobs performed instead of the time taken up in performing them) and there is a high level of discontent amongst pilots.

In conclusion, the sole objective of compulsory coastal pilotage is to provide assurance that the risk of a shipping accident in the GBR and Torres Strait PSSAs is reduced to as low as reasonably practicable. This can only be effectively achieved by a pilot organisation(s) that actively and systematically manages all foreseeable safety risks in providing pilotage services with an appropriate level of guidance and oversight by the safety regulator. Further, the implementation of an effective safety management system in coastal pilotage can only be achieved by an organisation(s) which promotes and fosters an effective organisational and industry safety culture with a business imperative to provide the safest possible coastal pilotage service.

4 FINDINGS

4.1 Context

Australia introduced a system of compulsory coastal pilotage in Queensland in 1991 to protect the particularly sensitive environment of the Great Barrier Reef.

On 16 December 2010, the ATSB released its report on the safety investigation into the February 2009 grounding of the piloted tanker *Atlantic Blue* in the Torres Strait. The report identified deficiencies in the safety management of Queensland coastal pilotage operations, similar to the safety issues identified by the ATSB in previous safety investigations. As a result of those identified deficiencies, combined with safety concerns expressed by the Australian Maritime Safety Authority (AMSA), the safety regulator for coastal pilotage, the ATSB initiated a systemic safety issue investigation into Queensland coastal pilotage.

The ATSB obtained information through a 92 question survey of all 82 pilots and interviewed 22 pilots. Further evidence was obtained by meeting key stakeholders, including AMSA and the three pilotage providers. Fifteen stakeholders, including both main pilotage providers, made submissions at the outset of the investigation. Further evidence was contained in the 89 submissions to the draft report received from pilots and organisational stakeholders.

From the evidence available, the following findings are made with respect to Queensland coastal pilotage. They should not be read as apportioning blame or liability to any particular organisation or individual.

4.2 Safety factors

Marine Orders Part 54

The safety framework prescribed by successive issues of Marine Orders Part 54 (MO 54) has not assigned the responsibility for the overall management of the safety risks associated with coastal pilotage operations to pilotage providers or any other organisation. *[Significant safety issue]*

This has allowed the following issues to exist:

- the 2001 objective of MO 54 to ensure that all pilotage operations are covered by an approved safety management system has not been achieved;
- the absence of uniform, adequately risk-analysed procedures for the pilotage task and standardised passage plans to allow ship crews to pre-plan passages;
- pilotage provider safety management systems that only address the risks primarily associated with assigning pilots to ships and pilot transfer operations;
- the devolution of the responsibility to manage the most safety critical aspects of coastal pilotage to the individual pilots without direct regulatory oversight;
- the proliferation of individualised systems of piloting with wide variations that make assessment and monitoring of pilotage standards difficult and increase the potential for sub-optimal pilotage procedures, practices and passage plans; and

- the absence of an appropriate industry safety culture, promoted and fostered by an accountable organisation(s), whose first priority and business imperative is to provide the safest possible coastal pilotage service.

Pilot training and professional development

The coastal pilot training program and ongoing professional development is inadequate. *[Significant safety issue]*

Factors that limit the effectiveness of the training program and ongoing professional development include the:

- absence of a pilotage safety management system for trainees to learn standard, risk-analysed pilotage procedures and practices, consistent with best practice;
- the training program's 'self-learning' approach by observing different systems and practices of pilots that promulgates non-standard systems when trainees develop individual piloting systems increases the potential for sub-optimal practices;
- bridge resource management training that is not backed up with a focus on systems-based risk management through standard procedures and systems by using all resources, such as the coastal vessel traffic service's capability;
- absence of coastal pilotage focused bridge simulator training to augment practical shipboard training;
- absence of training in the use of contemporary electronic charting systems;
- motivation for self-funded trainees to complete the training program quickly; and
- over-reliance on the training guide and subjective check pilot assessments to ensure that trainee pilots with little or no local area experience can acquire the necessary knowledge in the prescribed minimum number of transits.

Pilot fatigue management plan

The coastal pilot fatigue management plan is inadequate. *[Significant safety issue]*

Factors that limit the effectiveness of the fatigue management plan amongst the 82 pilots surveyed included the:

- largely self-managed approach where individual pilots may have conflicting priorities relating to remuneration and other working arrangements;
- pilot travel and transfer times regularly being included in rest periods;
- variations in sleep patterns due to irregular working hours and the effect of multiple, consecutive pilotages not being taken into account;
- dispensations being granted from requirements and, when granting dispensations, the pilot's agreement being used to support the fatigue risk assessment despite a clear conflict of interest with the pilot's remuneration;
- lack of effective measures to ensure that fatigue during a single-handed pilotage, particularly in the Inner Route, never exceeds an acceptable level; and
- reliance on self-recorded and self-monitored rest periods instead of actual fatigue levels and assessing sleep achieved.

Risk event and incident reporting

Risk identification and mitigation in coastal pilotage operations is inadequate as a result of the under-reporting of risk events and incidents by pilots. *[Significant safety issue]*

Indicators of the inadequacies in risk management and/or under-reporting amongst the 82 pilots surveyed included:

- significant under-reporting where the number of grounding or collision risk events claimed by pilots in 2010 was about 10 times the number included in AMSA and pilotage provider incident records;
- pilots citing reasons for under-reporting being personal disadvantage, lack of corrective action taken, no risk reduction and remuneration risk/organisational pressure; and
- no process to record and analyse informal reports made by pilots to AMSA.

Check pilot system

As a measure to assess the adequacy of the individual systems of coastal pilotage and pilot competency, the check pilot system is ineffective. *[Significant safety issue]*

Factors limiting the effectiveness of the check pilot system include the:

- absence of uniform assessment standards against which to make an objective assessment because there is no pilotage safety management system with standard, risk-analysed pilotage procedures and practices;
- conflicts of interest as a result of the check pilot being remunerated by the pilotage provider to assess a peer on behalf of AMSA;
- conflicts of interest as a result of the working relationships between the pilots and between pilots and their provider; and
- lack of a formal review process for each assessment to ensure corrective action is taken and for continuous improvement.

Great Barrier Reef and Torres Strait Vessel Traffic Service

The potential for the Great Barrier Reef and Torres Strait Vessel Traffic Service (REEFVTS) to support coastal pilotage and enhance safety is under-utilised. *[Significant safety issue]*

The service can better support pilotage by:

- making all pilots aware of the value of REEFVTS as an additional bridge resource and its capability, including any limitations, to monitor the progress of ships and issue warnings when a hazardous situation is detected;
- ensuring REEFVTS's electronic systems are optimally set up to ensure that a hazardous situation in any area, including areas where pilots usually leave the bridge to rest, is detected in adequate time to issue a useful warning to the ship(s) involved; and
- equipping vessel traffic service operators with the training and knowledge to best use its systems to support pilotage.

4.3 Other key findings

Positive safety measures

A number of safety measures initiated, implemented or improved by AMSA or with which it assisted have enhanced the effectiveness of the broader system of safety to protect the Great Barrier Reef and Torres Strait. These measures include the introduction of compulsory coastal pilotage, setting up a high capability coastal vessel traffic service, implementing enhanced ship routing, continuous improvement to navigational aids, opening of safer passages and improved charting.

Pilotage risk management

The fundamentals of risk management in any pilotage area, including the Great Barrier and Torres Strait, should include the following:

- safety being the highest priority of all those responsible, including the regulator, the pilot organisation and the pilots;
- a broader system of safety comprising a number of defences against shipping incidents, where the key defence of pilotage is complemented by vessel traffic services, navigational aids, ship routing and charts; and
- a pilot organisation(s) which is responsible for the systematic management of all the safety risks associated with day-to-day pilotage operations and for reducing them to a level that is as low as reasonably practicable.

Safety culture

The organisational influences of pilotage providers have not supported the development of a safety culture in Queensland coastal pilotage. The reasons for these influences and, their features and effects include the following:

- pilotage providers have not been assigned responsibility for the overall safety management of pilotage operations and, as a result, they have not needed to make the safety of pilotage operations their highest priority;
- providers mainly manage a pilot booking agency and pilot transfer service to provide a pilotage service;
- actual pilotage services for ships are provided by contractor pilots, as allocated and assigned jobs by their providers;
- pilot working arrangements have an adverse impact on the safety of pilotage operations largely as a result of remuneration based on jobs instead of time, where manipulating circumstances has the potential to increase remuneration;
- safety of pilotage operations is adversely affected by competition between pilots and poor working relationships between providers and many of their pilots with a high level of discontent amongst the pilots; and
- areas of safety management where the prevailing culture increases risk include pilot training and competency assessment, fatigue management, the conduct of pilotages and the reporting of risk events and incidents.

5 SAFETY ACTION

The safety issues identified during this investigation are listed in the Findings and Safety Actions sections of this report. The Australian Transport Safety Bureau (ATSB) expects that all safety issues identified by the investigation should be addressed by the relevant organisations. In addressing those issues, the ATSB prefers to encourage relevant organisations to proactively initiate safety action, rather than to issue formal safety recommendations or safety advisory notices.

All of the responsible organisations for the safety issues identified during this investigation were given a draft report and invited to provide submissions. As part of that process, each organisation was asked to communicate what safety actions, if any, they had carried out or were planning to carry out in relation to each safety issue relevant to their organisation.

5.1 Australian Maritime Safety Authority

5.1.1 Marine Orders Part 54

Significant safety issue

The safety framework prescribed by successive issues of Marine Orders Part 54 (MO 54) has not assigned the responsibility for the overall management of the safety risks associated with coastal pilotage operations to pilotage providers or any other organisation. *[Safety issue]*

This has allowed the following issues to exist:

- the 2001 objective of MO 54 to ensure that all pilotage operations are covered by an approved safety management system has not been achieved;
- the absence of uniform, adequately risk-analysed procedures for the pilotage task and standardised passage plans to allow ship crews to pre-plan passages;
- pilotage provider safety management systems that only address the risks primarily associated with assigning pilots to ships and pilot transfer operations;
- the devolution of the responsibility to manage the most safety critical aspects of coastal pilotage to the individual pilots without direct regulatory oversight;
- the proliferation of individualised systems of piloting with wide variations that make assessment and monitoring of pilotage standards difficult and increase the potential for sub-optimal pilotage procedures, practices and passage plans; and
- the absence of an appropriate industry safety culture, promoted and fostered by an accountable organisation(s), whose first priority and business imperative is to provide the safest possible coastal pilotage service.

Response from the Australian Maritime Safety Authority

The Australian Maritime Safety Authority (AMSA) advised the ATSB that:

> AMSA acknowledges the issues and notes that there are a number of areas that are currently in progress:

- a standardised industry passage plan (IPP) was published on 1 July 2011 to provide all ships a uniform standard to plan for a coastal pilotage in advance;
- the publication of MO 54 issue 5 (implemented 1 July 2011) strives to provide a stronger link between provider and pilotage activities.

The IPP is accessible on AMSA's website via www.amsa.gov.au/pilotage and hard copies of the preamble and chartlets are available for those who cannot access the documents electronically. It is anticipated that the IPP will continue to develop as experience is gained. As identified in the 2008 study 'Delivery of Coastal Pilotage Services in the Great Barrier Reef and Torres Strait', AMSA will commence a review of the revised MO 54 (issue 5) 12 months after implementation (on 1 July 2012).

In accordance with issue 5 of MO 54, all pilots must prepare detailed passage plans that use the IPP model and carry hard and electronic copies of the plan.

In addition, AMSA advised that it recognises the need for pilotage procedures to be an integral part of the safety management systems for organisations providing pilotage services. Consequently, after its audits of the pilotage providers in January 2012, each provider undertook the development of standard operating procedures (SOPs) for conducting the pilotage task under a risk management framework. It is intended that these SOPs will be implemented through the providers' safety management systems, which will be subject to AMSA's annual verification and compliance audits.

Importantly, AMSA advised that the review of MO 54 (from July 2012) will seek to more clearly assign and articulate the responsibility of the pilotage providers for the overall management of safety risks in pilotage operations, including responsibility for the SOPs to be followed by the pilots operating under their safety management systems.

On 13 September 2012, the *Navigation Act 2012* (completely rewritten legislation) received the Royal Assent. This Act provides the following, significantly revised definition for a pilotage provider:

> ***Pilotage provider*** includes a person who is responsible for the following:
> (a) training pilots;
> (b) the safe transfer and operation of pilots;
> (c) assigning or allocating a pilot to the transit of a vessel through particular waters;
> (d) undertaking such other activities in relation to pilotage as are prescribed by the regulations;
> irrespective of the legal relationship, contractual or otherwise, between that person and the pilot concerned.

ATSB assessment of response

The ATSB acknowledges the safety action taken and proposed by AMSA to address the safety issue, in particular the introduction of standard passage plans and the requirement for pilotage providers to develop standard operating procedures for the pilotage task. However, the implementation of a safety management system(s) can only be fully effective if it is supported by the development of an appropriate organisational and industry safety culture promoted and fostered by an accountable organisation(s). In this respect, the much broader revised definition for a pilotage provider in the *Navigation Act 2012* is consistent with an organisation that can be assigned responsibility for the overall safety management of pilotage under MO 54.

ATSB safety recommendation - MI-2010-011-SR-048

The Australian Transport Safety Bureau recommends that the Australian Maritime Safety Authority takes further safety action to address the safety issue by ensuring that the coastal pilotage regulations specifically assign the responsibility for the overall management of the safety risks associated with coastal pilotage operations to the pilotage providers or another organisation. The role, functions, operational and industry responsibilities of any organisation providing a coastal pilotage service should be clearly defined by the provisions of the regulations with a primary focus on the safety of the pilotage service provided.

5.1.2 Pilot training and professional development

Significant safety issue

The coastal pilot training program and ongoing professional development is inadequate. *[Safety issue]*

Factors that limit the effectiveness of the training program and ongoing professional development include the:

- absence of a pilotage safety management system for trainees to learn standard, risk-analysed pilotage procedures and practices, consistent with best practice;
- the training program's 'self-learning' approach by observing different systems and practices of pilots that promulgates non-standard systems when trainees develop individual piloting systems increases the potential for sub-optimal practices;
- bridge resource management training that is not backed up with a focus on systems-based risk management through standard procedures and systems by using all resources, such as the coastal vessel traffic service's capability;
- absence of coastal pilotage focused bridge simulator training to augment practical shipboard training;
- absence of training in the use of contemporary electronic charting systems;
- motivation for self-funded trainees to complete the training program quickly; and
- over-reliance on the training guide and subjective check pilot assessments to ensure that trainee pilots with little or no local area experience can acquire the necessary knowledge in the prescribed minimum number of transits.

Response from the Australian Maritime Safety Authority

In addition to safety action in relation to the implementation of the industry passage plan and the development of standard operating procedures for conducting the pilotage task, the Australian Maritime Safety Authority (AMSA) advised the ATSB that:

> AMSA recognises the opportunities to improve the training and professional development of coastal pilots. As part of the implementation of MO 54 issue 5 training was highlighted and the following initiatives adopted by AMSA:
>
> - workshops focusing on initial training and ongoing professional development were held on 2 February and 19 June 2012, and a pilotage training steering committee has been established to progress work in this area;

- an e-learning portal has been established on AMSA's website to focus on pilot and general training opportunities.

It should be highlighted that the current system depends on reaching stated competence levels, including a number of training runs on piloted vessels. When it is felt that the trainee is ready, then there is an assessment process which includes a minimum number of formal 'check' runs. The current process requires trained and certified check pilots to assess performance.

AMSA agrees that continuing professional development needs to be relevant, and address changes in the industry (for example, development of electronic systems in pilotage and the introduction of the Under Keel Clearance Management system for the Torres Strait). The AMSA training workshops and review process is addressing these elements.

AMSA also notes that simulators could be an effective tool in training and competence assessment. MO 54 issue 5 includes the option to use simulator training.

There is an opportunity to include these points in the scheduled 12 month review of MO 54 issue 5 (commencing 1 July 2012).

ATSB assessment of response

The ATSB acknowledges the safety action taken and proposed by AMSA to address the safety issue and notes that the action will be facilitated by the introduction of standard passage plans and standard operating procedures for the pilotage task. However, the acquisition of local area knowledge, particularly in confined areas, and the use of electronic charting systems by pilots needs to be specifically addressed through focused training that includes the use of bridge simulators.

ATSB safety recommendation - MI-2010-011-SR-049

The Australian Transport Safety Bureau recommends that the Australian Maritime Safety Authority takes further safety action to address the safety issue with regard to the acquisition of local area knowledge, particularly in confined areas, and the use of electronic charting systems by pilots. Focused training and assessments in bridge simulators should be amongst the measures used to achieve competency levels appropriate for coastal pilots.

5.1.3 Pilot fatigue management plan

Significant safety issue

The coastal pilot fatigue management plan is inadequate. *[Safety issue]*

Factors that limit the effectiveness of the fatigue management plan amongst the 82 pilots surveyed included the:

- largely self-managed approach where individual pilots may have conflicting priorities relating to remuneration and other working arrangements;
- pilot travel and transfer times regularly being included in rest periods;
- variations in sleep patterns due to irregular working hours and the effect of multiple, consecutive pilotages not being taken into account;

- dispensations being granted from requirements and, when granting dispensations, the pilot's agreement being used to support the fatigue risk assessment despite a clear conflict of interest with the pilot's remuneration;
- lack of effective measures to ensure that fatigue during a single-handed pilotage, particularly in the Inner Route, never exceeds an acceptable level; and
- reliance on self-recorded and self-monitored rest periods instead of actual fatigue levels and assessing sleep achieved.

Response from the Australian Maritime Safety Authority

The Australian Maritime Safety Authority (AMSA) advised the ATSB that:

> AMSA disagrees that the current default plan is 'inadequate'. This plan was developed based on best practice as provided through consultation with University South Australia sleep experts and the industry. AMSA is continuing to look at ways to improve fatigue issues and has included fatigue as a focus workshop element following the introduction of MO 54 issue 5.
>
> The current research in fatigue, and the focus of the AMSA workshop, is looking to go beyond a 'level 1' fatigue plan (straight rostering/hours on and hours off). This includes looking closely at the opportunity for rest as well as the use of self regulating and the organisational response to self regulation.
>
> Experience in the aviation world was presented at the workshop, including the concept of self and peer regulation of fatigue.
>
> AMSA continues to take pilot fatigue seriously, encouraging providers to develop fatigue management plans (MO 54 issue 5 provision 93.3(a)). A process for assessing fatigue management plans has been developed and one such plan is being assessed.
>
> AMSA provides a fatigue training program through the AMSA pilotage portal and e-learning options. AMSA has also put in place processes to enable approval of provider fatigue plans that meet best practice.
>
> AMSA will also investigate the merits of a requirement for two pilots through the Inner Route and under what conditions this arrangement might be required.

In addition, AMSA advised that it had reviewed the fatigue management plan in light of the issues identified in the plan's independent review in 2010, and worked to address those issues. The action taken includes providing more clarity in the plan, implementing a software program to monitor pilot work periods reported to REEFVTS, providing pilots access to an on-line fatigue training program, encouraging providers to develop their own plans and clarifying the process required for dispensations from plan requirements.

ATSB assessment of response

The ATSB acknowledges the safety action taken and proposed by AMSA to address the safety issue and notes that action by pilotage providers will also be required to adequately address this issue. However, the high level of fatigue risk involved in single-handed pilotage through the Inner Route of the GBR still needs to be specifically and adequately addressed.

ATSB safety recommendation - MI-2010-011-SR-050

The Australian Transport Safety Bureau recommends that the Australian Maritime Safety Authority takes further safety action to address the safety issue with regard to the high level of fatigue risk involved in single-handed pilotage through the Inner Route of the Great Barrier Reef.

5.1.4 Risk event and incident reporting

Significant safety issue

Risk identification and mitigation in coastal pilotage operations is inadequate as a result of the under-reporting of risk events and incidents by pilots. *[Safety issue]*

Indicators of the inadequacies in risk management and/or under-reporting amongst the 82 pilots surveyed included:

- significant under-reporting where the number of grounding or collision risk events claimed by pilots in 2010 was about 10 times the number included in AMSA and pilotage provider incident records;
- pilots citing reasons for under-reporting being personal disadvantage, lack of corrective action taken, no risk reduction and remuneration risk/organisational pressure; and
- no process to record and analyse informal reports made by pilots to AMSA.

Response from the Australian Maritime Safety Authority

The Australian Maritime Safety Authority (AMSA) advised the ATSB that:

> In MO 54 issue 5 reporting has been highlighted. As a result of input from the industry following the implementation of MO 54 issue 5 amendments were made to more clearly identify reporting requirements. In addition, on-line reporting capability has been developed within AMSA (SV-HH I AMSA 355 form).
>
> AMSA recognises that there is an educational and cultural aspect to reporting, and notes similar issues with occupational health and safety reporting.
>
> AMSA reacts to 'informal' reports as appropriate given that such reports can include hearsay, anonymous emails and unverified third party information. In response to this safety issue AMSA will be seeking additional opportunities to encourage pilot feedback and reporting, recognising the increasing use of electronic information exchange systems.
>
> Objective evidence available to AMSA, such as records available from REEFVTS does not indicate as high a level of under-reporting as that found in the ATSB survey of pilot opinions.

ATSB assessment of response

The ATSB considers the safety action taken and proposed by AMSA has the potential to partly address the safety issue in relation to the under-reporting of risk events. However, the effective implementation of pilotage provider safety management systems along with the development of an appropriate safety culture in coastal pilotage is also crucial to addressing the safety issue.

5.1.5 Check pilot system

Significant safety issue

As a measure to assess the adequacy of the individual systems of coastal pilotage and pilot competency, the check pilot system is ineffective. *[Safety issue]*

Factors limiting the effectiveness of the check pilot system include the:

- absence of uniform assessment standards against which to make an objective assessment because there is no pilotage safety management system with standard, risk-analysed pilotage procedures and practices;
- conflicts of interest as a result of the check pilot being remunerated by the pilotage provider to assess a peer on behalf of AMSA;
- conflicts of interest as a result of the working relationships between the pilots and between pilots and their provider; and
- lack of a formal review process for each assessment to ensure corrective action is taken and for continuous improvement.

Response from the Australian Maritime Safety Authority

The Australian Maritime Safety Authority (AMSA) advised the ATSB that common pilotage procedures through the implementation of the industry passage plan and the development of standard operating procedures for conducting the pilotage task will make the check pilot system more effective and transparent. In addition, AMSA advised that:

> A review of the training requirements and check pilotage regime is being carried out. The opportunity to use simulation in training and for check runs will be further investigated, with reference to processes followed in other, related operational industries.
>
> It recognises that the goal is to have pilots who are competent in coastal pilotage procedures. In addition, the check pilot system requires 'check pilots' to undergo additional training, including workplace assessment (e.g. Certificate IV training program).

In response to this safety issue, AMSA also advised that it is considering the issue of the independence of check pilots, including how check pilots are engaged and remunerated.

ATSB assessment of response

The ATSB considers the safety action taken and proposed by AMSA has the potential to address some of the issues in relation to the check pilot system. However, the effective implementation of pilotage provider safety management systems along with the development of an appropriate safety culture in coastal pilotage is also crucial to addressing the safety issue.

5.1.6 Great Barrier Reef and Torres Strait Vessel Traffic Service

Significant safety issue

The potential for the Great Barrier Reef and Torres Strait Vessel Traffic Service (REEFVTS) to support coastal pilotage and enhance safety is under-utilised. *[Safety issue]*

The service can better support pilotage by:

- making all pilots aware of the value of REEFVTS as an additional bridge resource and its capability, including any limitations, to monitor the progress of ships and issue warnings when a hazardous situation is detected;
- ensuring REEFVTS's electronic systems are optimally set up to ensure that a hazardous situation in any area, including areas where pilots usually leave the bridge to rest, is detected in adequate time to issue a useful warning to the ship(s) involved; and
- equipping vessel traffic service operators with the training and knowledge to best use its systems to support pilotage.

Response from the Australian Maritime Safety Authority

The Australian Maritime Safety Authority (AMSA) advised the ATSB that:

> AMSA and MSQ [Maritime Safety Queensland] jointly work to ensure REEFVTS provides an effective service. The vessel traffic service has adopted an ongoing performance monitoring regime to help ensure continuous improvement in a changing environment.
>
> AMSA recognises there may be additional training opportunities with regards to exchange of information to/from REEFVTS which can be addressed by the pilot training review currently in progress. REEFVTS's role is actively communicated to pilots through regular coastal pilot meetings. All pilots are provided with the REEFVTS User Guide and are encouraged to visit the service's operations centre.
>
> In response to the safety issue, AMSA will re-invigorate REEFVTS stakeholder interaction. The goal will be to provide opportunities for greater information exchange, with a focus on the pilots, pilot providers, regulators and other users as appropriate.
>
> The current status of REEFVTS electronic systems are well developed, with annual reviews carried out. Additional electronic warning opportunities will be investigated, in consultation with industry experts.
>
> AMSA notes that the hiring and training of VTSOs (vessel traffic service operators) is carried out by MSQ, as detailed in the Memorandum of Understanding on the functional delivery of REEFVTS. VTSOs are trained to international best practice (IALA V-103) and are employed by MSQ.

In addition, AMSA advised that REEFVTS's electronic systems and mechanisms to detect hazardous situations and provide timely warnings to ships to help avoid groundings have been extended to the service's southern boundary located off Gladstone.

ATSB assessment of response

The ATSB is satisfied that the action proposed by AMSA should adequately address the safety issue.

5.2 Maritime Safety Queensland

5.2.1 Great Barrier Reef and Torres Strait Vessel Traffic Service

Significant safety issue

The potential for the Great Barrier Reef and Torres Strait Vessel Traffic Service (REEFVTS) to support coastal pilotage and enhance safety is under-utilised. *[Safety issue]*

The service can better support pilotage by:

- ensuring REEFVTS's electronic systems are optimally set up to ensure that a hazardous situation in any area, including areas where pilots usually leave the bridge to rest, is detected in adequate time to issue a useful warning to the ship(s) involved; and
- equipping vessel traffic service operators with the training and knowledge to best use its systems to support pilotage.

Response from Maritime Safety Queensland

Maritime Safety Queensland (MSQ) advised the ATSB that it agrees that REEFVTS has the potential to continue to enhance standards in the area. To ensure the best safety outcomes are achieved, MSQ stated that it will continue to work with AMSA. It noted that this will involve greater interaction with the pilotage sector both for induction and training as well as on an operational basis.

ATSB assessment of response

The ATSB is satisfied that the action proposed by MSQ should adequately address the safety issue.

5.3 Australian Reef Pilots

5.3.1 Pilot fatigue management plan

Significant safety issue

The coastal pilot fatigue management plan is inadequate. *[Safety issue]*

Factors that limit the effectiveness of the fatigue management plan amongst the 82 pilots surveyed included the:

- largely self-managed approach where individual pilots may have conflicting priorities relating to remuneration and other working arrangements; and
- pilot travel and transfer times regularly being included in rest periods.

Response from Australian Reef Pilots

Australian Reef Pilots advised the ATSB that it has a robust monitoring system to exclude pilot travel and transfer times from rest periods. Australian Reef Pilots also advised that it recognises the fatigue risk involved with single-handed pilotage in the Inner Route and was working with fatigue analysts to model an improved fatigue management plan for the route.

ATSB assessment of response

The ATSB acknowledges the action taken and proposed by Australian Reef Pilots and notes that it will complement measures taken by AMSA to address the safety issue.

ATSB safety recommendation - MI-2010-011-SR-051

The Australian Transport Safety Bureau recommends that Australian Reef Pilots takes further action to facilitate action taken by the Australian Maritime Safety Authority to address the safety issue.

5.3.2 Risk event and incident reporting

Significant safety issue

Risk identification and mitigation in coastal pilotage operations is inadequate as a result of the under-reporting of risk events and incidents by pilots. *[Safety issue]*

Indicators of the inadequacies in risk management and/or under-reporting amongst the 82 pilots surveyed included:

- significant under-reporting where the number of grounding or collision risk events claimed by pilots in 2010 was about 10 times the number included in AMSA and pilotage provider incident records; and
- pilots citing reasons for under-reporting being personal disadvantage, lack of corrective action taken, no risk reduction and remuneration risk/organisational pressure.

Response from Australian Reef Pilots

Australian Reef Pilots advised the ATSB that it has a strong and consistent 'no blame' policy for incident reporting with no personal disadvantage to pilots reporting incidents. Australian Reef Pilots also advised that its management was in regular discussion with the Pilot Advisory Group, elected by the pilot body, to resolve matters of difference and indicated that it was engaged in dialogue with its contracted pilots regarding working and remuneration arrangements.

ATSB assessment of response

The ATSB acknowledges the action taken and proposed by Australian Reef Pilots but does not consider that it has effectively implemented its no-blame policy.

ATSB safety recommendation - MI-2010-011-SR-052

The Australian Transport Safety Bureau recommends that Australian Reef Pilots takes further action to facilitate action taken by the Australian Maritime Safety Authority to address the safety issue.

5.4 Hydro Pilots

5.4.1 Pilot fatigue management plan

Significant safety issue

The coastal pilot fatigue management plan is inadequate. *[Safety issue]*

Factors that limit the effectiveness of the fatigue management plan amongst the 82 pilots surveyed included the:

- largely self-managed approach where individual pilots may have conflicting priorities relating to remuneration and other working arrangements; and
- pilot travel and transfer times regularly being included in rest periods.

Response from Hydro Pilots

Hydro Pilots did not make a submission.

ATSB safety recommendation - MI-2010-011-SR-053

The Australian Transport Safety Bureau recommends that Hydro Pilots takes safety action to address the safety issue and facilitate action taken by the Australian Maritime Safety Authority to address this issue.

5.4.2 Risk event and incident reporting

Significant safety issue

Risk identification and mitigation in coastal pilotage operations is inadequate as a result of the under-reporting of risk events and incidents by pilots. *[Safety issue]*

Indicators of the inadequacies in risk management and/or under-reporting amongst the 82 pilots surveyed included:

- significant under-reporting where the number of grounding or collision risk events claimed by pilots in 2010 was about 10 times the number included in AMSA and pilotage provider incident records; and
- pilots citing reasons for under-reporting being personal disadvantage, lack of corrective action taken, no risk reduction and remuneration risk/organisational pressure.

Response from Hydro Pilots

Hydro Pilots did not make a submission.

ATSB safety recommendation - MI-2010-011-SR-054

The Australian Transport Safety Bureau recommends that Hydro Pilots takes safety action to address the safety issue and facilitate action taken by the Australian Maritime Safety Authority to address this issue.

5.5 Torres Pilots

5.5.1 Pilot fatigue management plan

Significant safety issue

The coastal pilot fatigue management plan is inadequate. *[Safety issue]*

Factors that limit the effectiveness of the fatigue management plan amongst the 82 pilots surveyed included the:

- largely self-managed approach where individual pilots may have conflicting priorities relating to remuneration and other working arrangements; and
- pilot travel and transfer times regularly being included in rest periods.

Response from Torres Pilots

Torres Pilots advised the ATSB that it rejects the safety issue. The reasons submitted by Torres Pilots in support of this statement included:

- pilot allocation to a ship is determined by the provider's operational staff based on the estimated time of arrival provided by its master;
- pilot transfers are determined by the provider's operational staff and not by pilots;
- pilot rest breaks are calculated by the provider's operational staff, including making allowances for pilot transfer times.
- potential conflicts of interest with some disaffected pilots exaggerating or overstating potential safety issues to increase calls for the creation of a Government-controlled monopoly pilot service;
- no linkage identified in the report to suggest that the financial interests of pilots and pilotage providers have any impact on safety;
- separation of responsibilities between coastal pilots and providers means that each can focus on delivering an independent, high quality and safe service without potential conflicts of interest;
- an Australia-wide shortage of pilots means sufficient work for pilots without any need for competition between them;
- competition in the airline industry has not compromised safety standards; and
- other self employed professionals, such as those in the medical profession, are also paid a fee for service.

ATSB assessment of response

The ATSB has reviewed Torres Pilots' submission, addressed its comments in detail within the report and does not consider that they address the safety issue.

ATSB safety recommendation - MI-2010-011-SR-055

The Australian Transport Safety Bureau recommends that Torres Pilots takes safety action to address the safety issue and facilitate action taken by the Australian Maritime Safety Authority to address this issue.

5.5.2 Risk event and incident reporting

Significant safety issue

Risk identification and mitigation in coastal pilotage operations is inadequate as a result of the under-reporting of risk events and incidents by pilots. *[Safety issue]*

Indicators of the inadequacies in risk management and/or under-reporting amongst the 82 pilots surveyed included:

- significant under-reporting where the number of grounding or collision risk events claimed by pilots in 2010 was about 10 times the number included in AMSA and pilotage provider incident records; and
- pilots citing reasons for under-reporting being personal disadvantage, lack of corrective action taken, no risk reduction and remuneration risk/organisational pressure.

Response from Torres Pilots

Torres Pilots advised the ATSB that it rejects the safety issue. Reasons submitted by Torres Pilots in support of this statement included:

- confusion amongst pilots about what is a reportable incident or near miss or near grounding;
- the absence of a no-blame environment with potential disincentive to pilots reporting incidents to AMSA, which is also responsible for licensing and enforcing safety regulations;
- that claims of risk events and under-reporting in the report were based on hearsay and overstated; and
- the reduced number of collision and groundings incidents since the introduction of safety management systems in 2001 despite an increase in ship traffic.

ATSB assessment of response

The ATSB has reviewed Torres Pilots' submission, addressed its comments in detail within the report and does not consider that they address the safety issue.

ATSB safety recommendation - MI-2010-011-SR-056

The Australian Transport Safety Bureau recommends that Torres Pilots takes safety action to address the safety issue and facilitate action taken by the Australian Maritime Safety Authority to address this issue.

APPENDIX A: COASTAL PILOT SURVEY SUMMARY

General information

As discussed in section 1.1.4, the ATSB completed a survey of all 82 licensed coastal pilots in February 2011. The 92 survey questions were based on pilot demographics, their confidential reports and safety concerns, and aspects of safety management.[161] Pilots were provided with confidentiality of their survey responses under the provisions of the *Transport Safety Investigation Act 2003*.

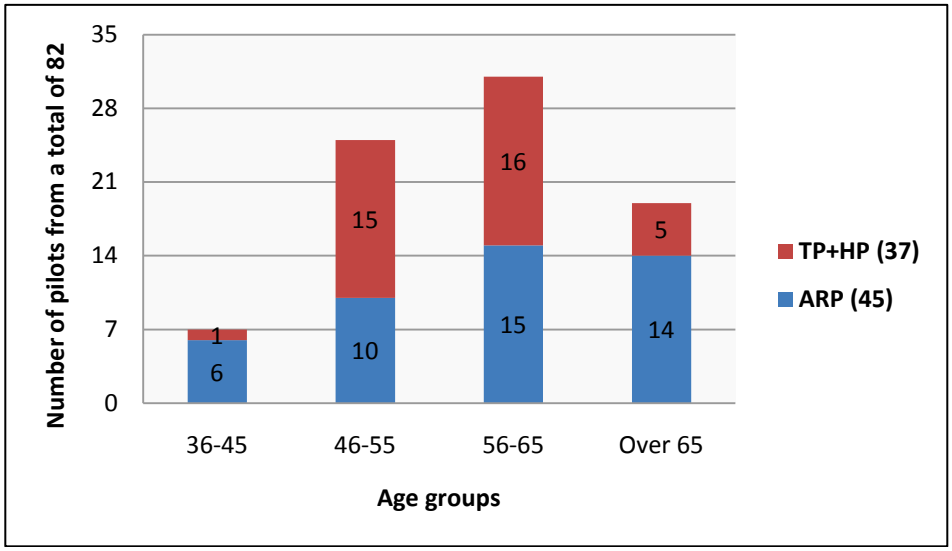
The ATSB checked and validated the pilot survey responses before coding the data, where necessary, and analysing it. The following section contains charts displaying data for selected survey question responses. Most of the charts include data from more than one survey question response and, where relevant, the charts indicate other information, for example, the pilots' pilotage provider. The survey data formed essential evidence for the investigation.

Survey data for the two pilots engaged by Hydro Pilots (HP), where appropriate, is shown separately. However, to make data for these two pilots statistically relevant, it has, in many cases, been combined with that of Torres Pilots (TP). Unlike pilots engaged by Australian Reef Pilots (ARP), the pilots engaged by HP and TP are transferred via Mackay Helicopters, and HP pilots are assessed by TP check pilots. Combining their data also helps prevent HP pilots being individually identified.

Selected survey questions and data

1. Pilot age groups.

Survey Q 1: Which of the following is your age group?
(Options provided: Under 25; 25-35; 36-45; 46-55; 56-65; Over 65)

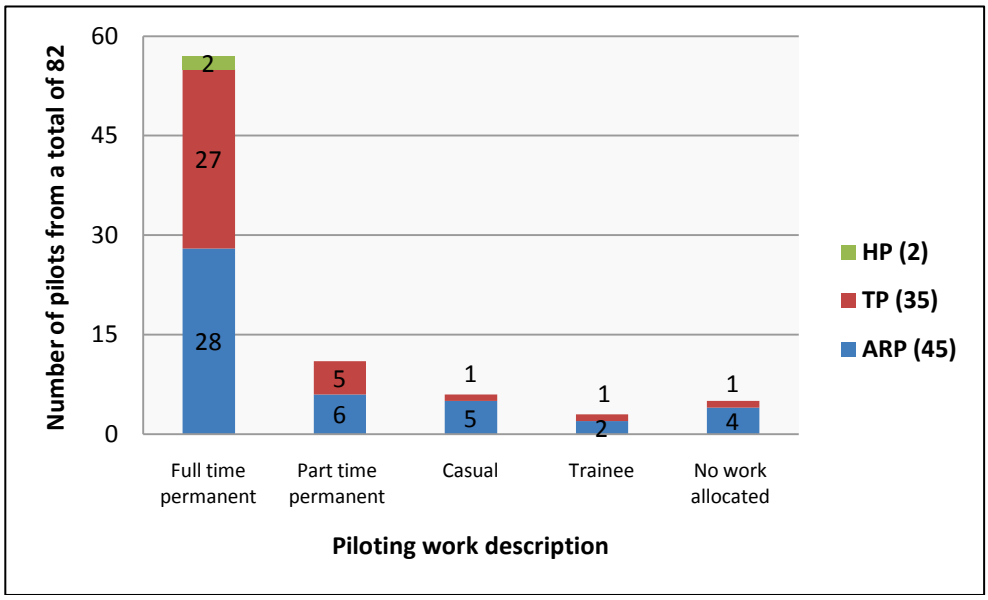


Note: Fifty pilots (61 per cent) were over the age of 55.

[161] Copy available via <http://www.atsb.gov.au/media/3529225/coastal%20pilot%20survey%20questionnair-closed.pdf>

2. Pilot work description.

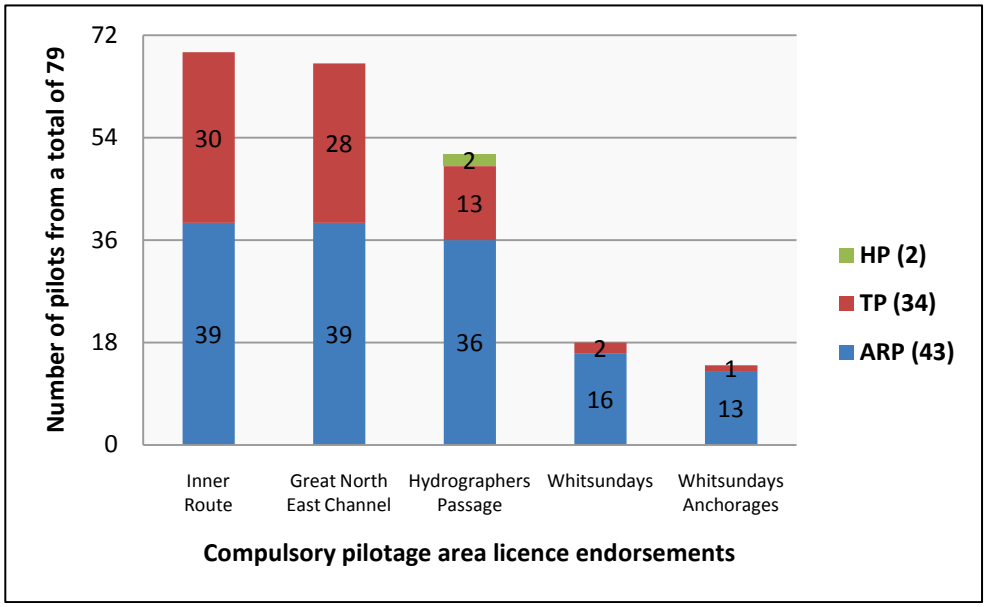
Survey Q 3: Which of the following best describes your work as a pilot?
(Options provided: Permanent full time; Permanent part time; Casual; Other)



Note: Fifty-seven pilots (70 per cent) were working on a full time permanent basis.

3. Pilot licence areas.

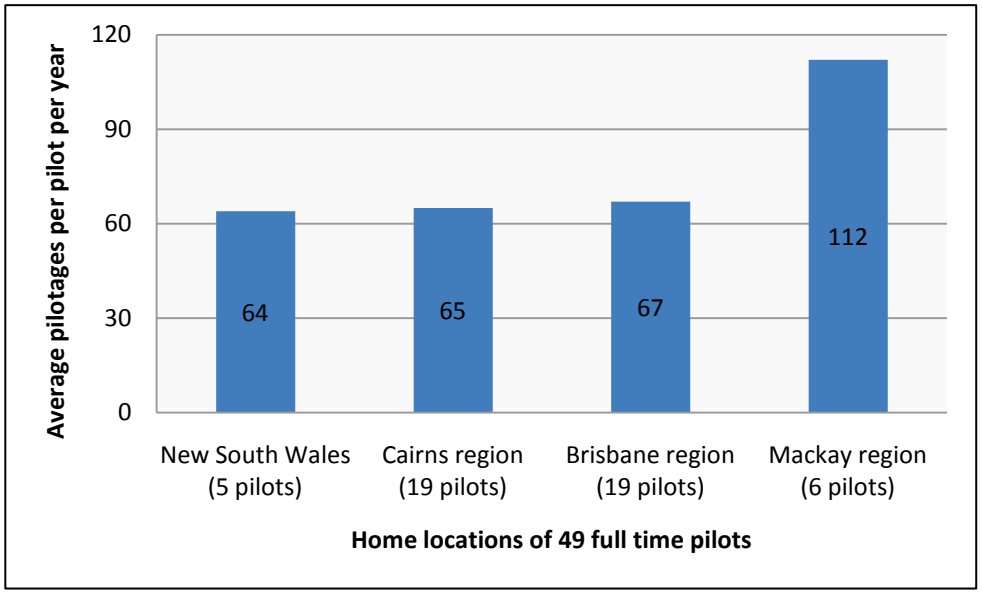
Survey Q 5: Which coastal pilotage areas or routes are you licensed for?
(Options provided: Great North East Channel; Hydrographers Passage; Inner Route; Whitsundays; Whitsundays Anchorages; Not licensed)



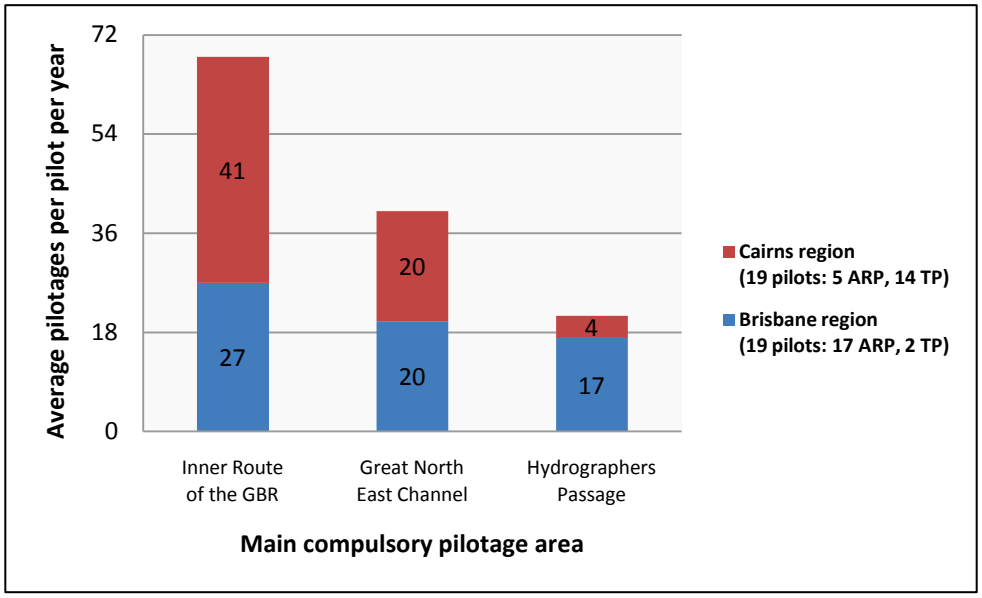
Note: Two of the 69 pilots with an Inner Route licence did not hold a Great North East Channel licence.

4. Pilotages conducted per year.

Survey Q 6: How many pilotages do you conduct in each area in a year?
(Options provided: Great North East Channel (GNEC); Hydrographers Passage (Hydro); Inner Route (IR); Whitsundays; Whitsundays Anchorages)



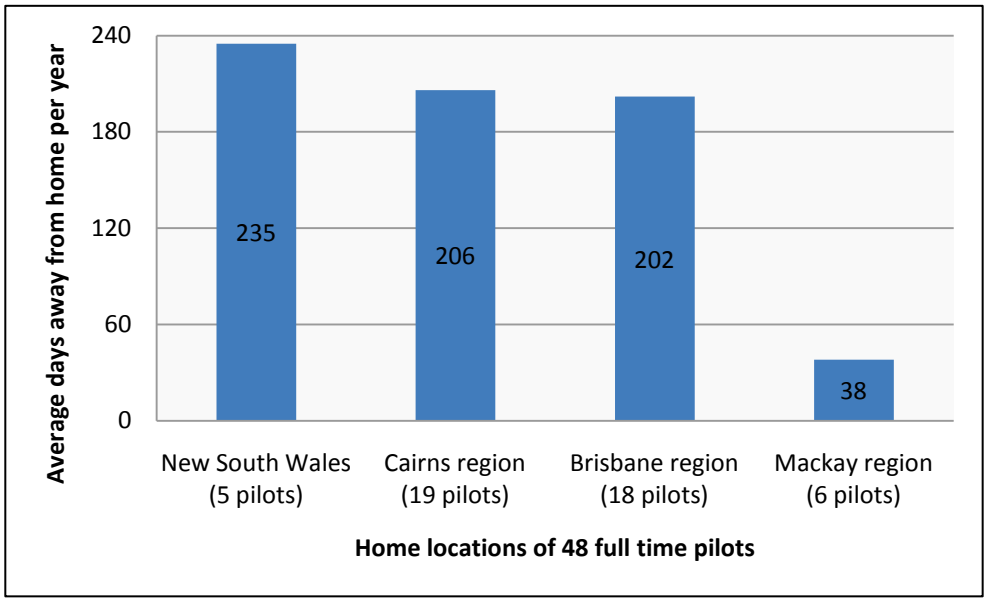
Note: Average annual pilotages conducted by full time pilots from only these locations are shown. Number of pilotages range: 22 to 87 for New South Wales (mainly Newcastle and Sydney), 60 to 88 for the Cairns region (includes surrounds), 12 to 80 for the Brisbane region (includes Gold and Sunshine Coasts), and 80 to 140 for the Mackay region (includes surrounds). Mackay based pilots conducted pilotages only or mainly in the Hydrographers Passage.



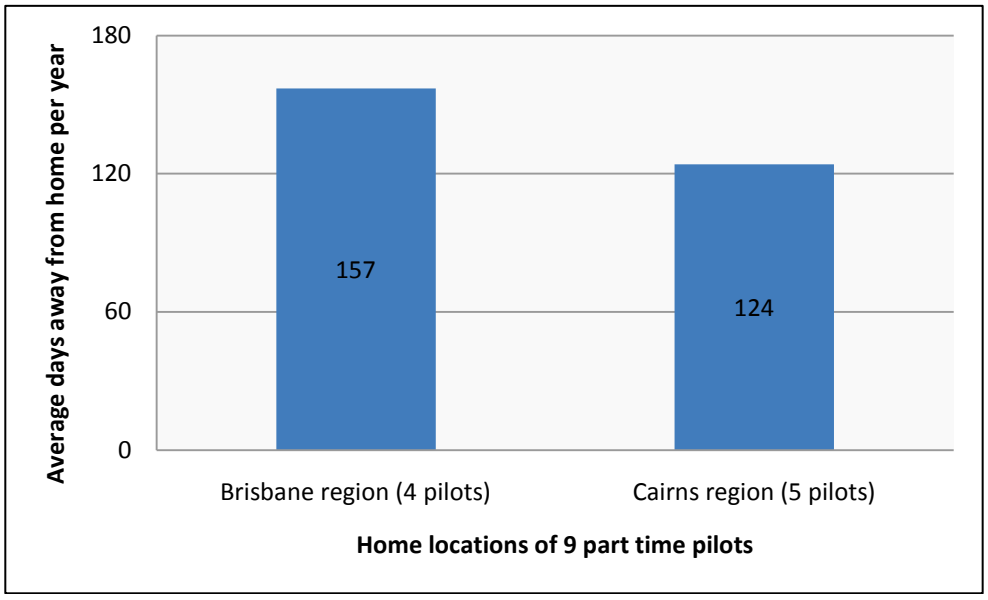
Note: Average annual pilotages conducted only by Brisbane and Cairns based full time pilots are shown. Number of pilotages range: Brisbane - 0 to 55 (IR), 0 to 26 (GNEC), 0 to 46 (Hydro); Cairns - 18 to 65 (IR), 5 to 32 (GNEC), 0 to 34 (Hydro).

5. Days away from home per year.

Survey Q 7: How many days in a year are you away from home for pilotage work?



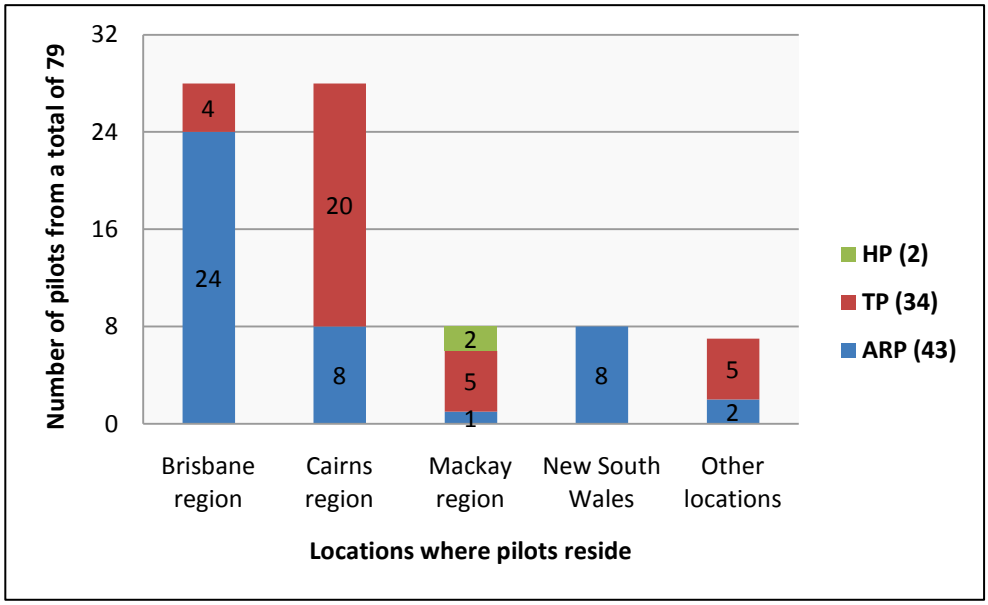
Note: Average number of days that full time pilots from these locations spent away from home per year. Days away range: 215 to 250 for New South Wales (mainly Newcastle and Sydney), 110 to 280 for the Cairns region (includes surrounds), 160 to 240 for the Brisbane region (includes Gold and Sunshine Coasts), and 0 to 90 for the Mackay region (includes surrounds). Mackay based pilots conducted only or mainly Hydrographers Passage pilotages.



Note: Average number of days that part time Brisbane and Cairns based pilots spent away from home per year. Days spent away range: 100 to 200 (Brisbane based pilots) and 78 to 155 (Cairns based pilots).

6. Pilots' home locations.

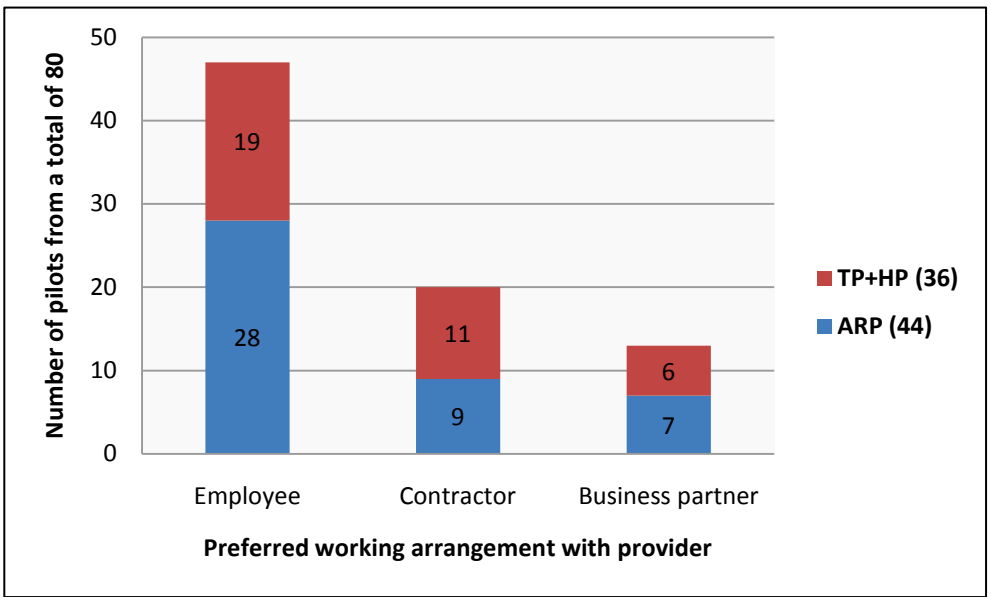
Survey Q 8: Where do you reside?
(Options provided: Thursday Island; Cairns; Townsville; Mackay; Gladstone; Brisbane; Sydney; Other)



Note: New South Wales mainly comprises Sydney and Newcastle, the Cairns region includes its surrounds, the Brisbane region includes the Gold and Sunshine Coasts, and the Mackay region includes its surrounds.

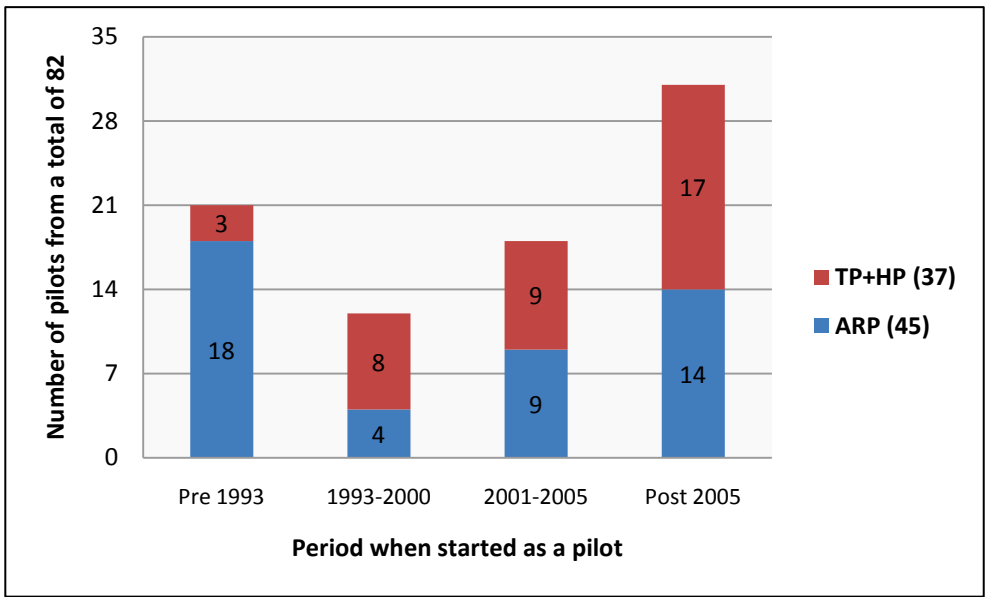
7. Pilots' preferred work arrangement.

Survey Q 12: Which would be your preferred working arrangement with a pilotage provider company?
(Options provided: Employee-Employer; Business partners; Contractor-Agent and manager; Other)



8. Year started pilot training.

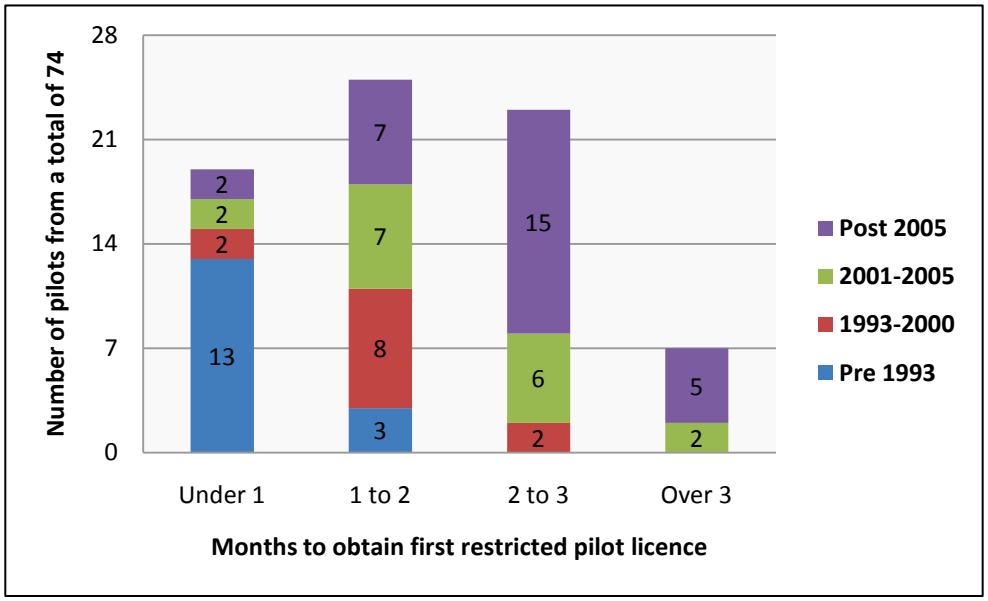
Survey Q 23: When did you start training as a trainee coastal pilot?



Note: Periods are based on the year pilots started training. Forty-nine pilots (60 per cent) began training after 2000.

9. Duration of pilot training.

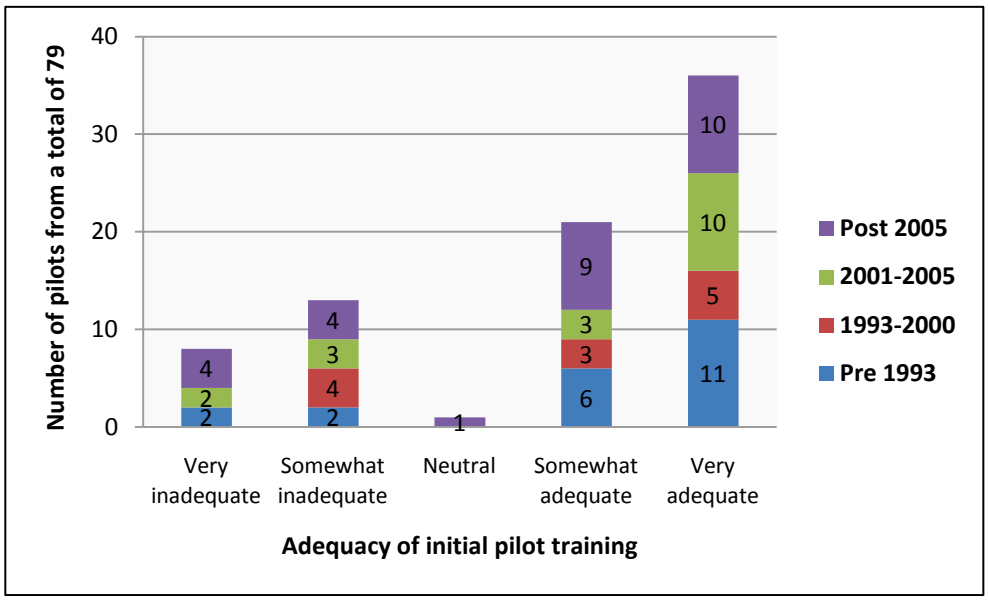
Survey Q 24: How many months did you train before obtaining your first restricted pilot's licence?



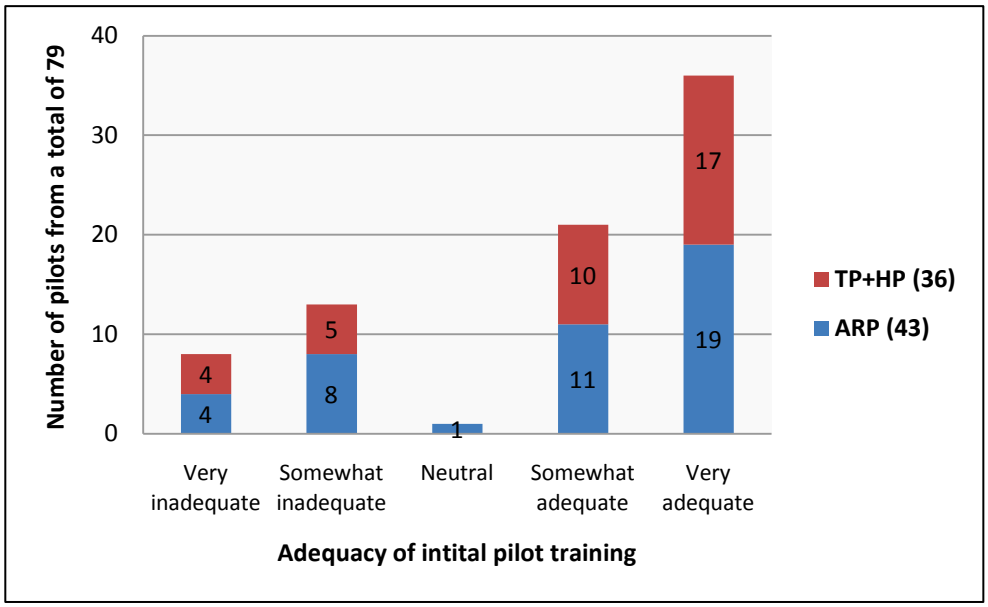
Note: The average number of months to obtain a first licence was 2.2 months (range: 0 to 9 months). Sixty per cent of pilots obtained a licence within 2 months.

10. Adequacy of initial pilot training.

Survey Q 26: In your opinion, how adequate was your initial training in preparing you to perform a coastal pilot's duties safely and competently?
(A five point scale was provided: Very inadequate; Somewhat inadequate; Neutral; Somewhat adequate; Very adequate)

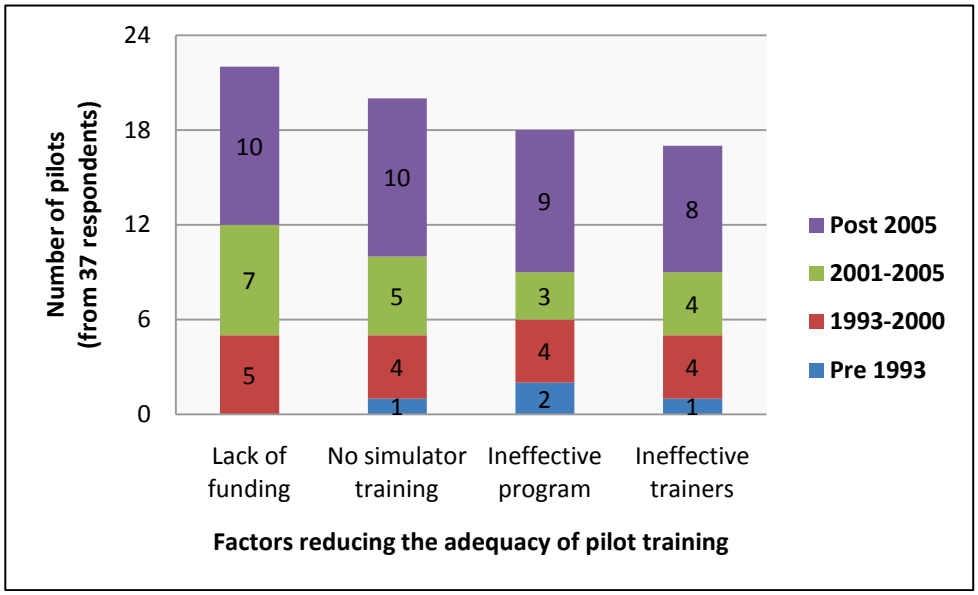


Note: Seventy-two per cent of pilots rated their training as somewhat or very adequate whereas 27 per cent rated it somewhat or very inadequate.



11. Factors reducing adequacy of training.

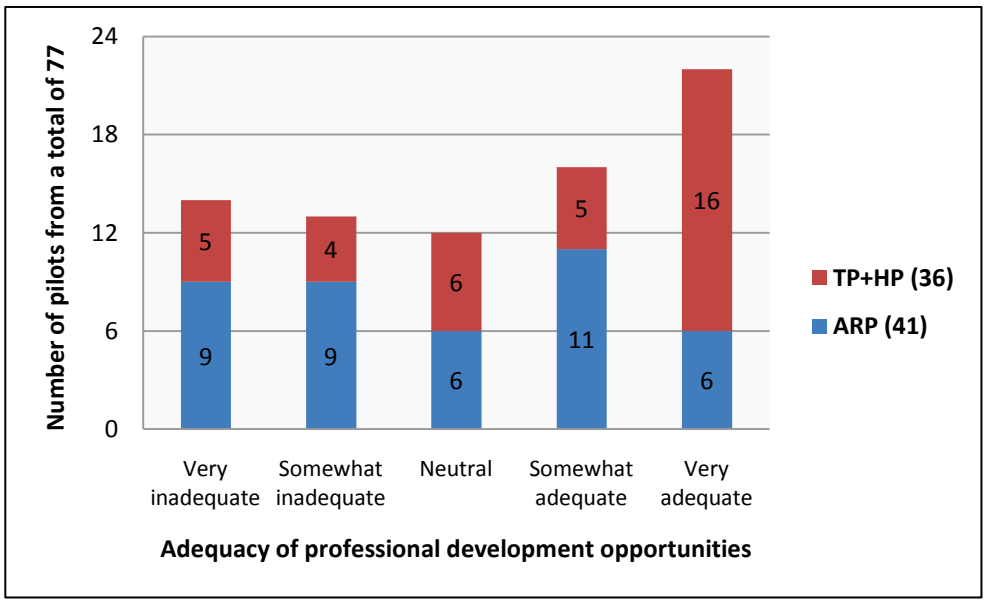
Survey Q 27: Did any factors reduce the adequacy of your initial pilot training?
(Options provided: None; No competency tests; Insufficient mandatory pre-requisites; No aptitude assessment; Ineffective trainers; Insufficient observer voyages; Training too short; Ineffective training program; No or insufficient simulator training; Training too long; No check pilot assessments; No or partially funded training; Others)



Note: Fifty-two per cent of pilots indicated no factors reduced the adequacy of training.

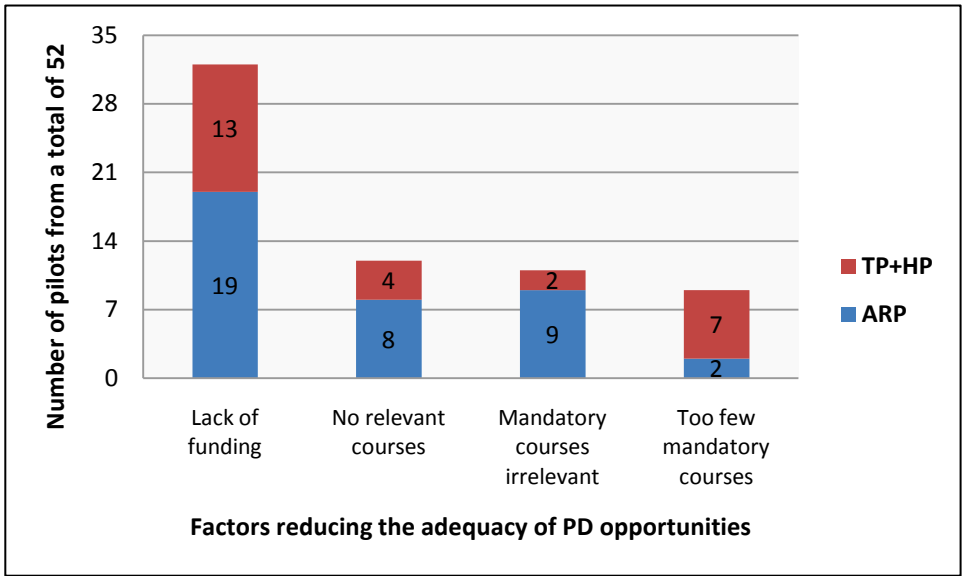
12. Adequacy of professional development.

Survey Q 32: In your opinion, how adequate are the opportunities provided for your professional development?
(A five point scale was provided: Very inadequate; Somewhat inadequate; Neutral; Somewhat adequate; Very adequate)



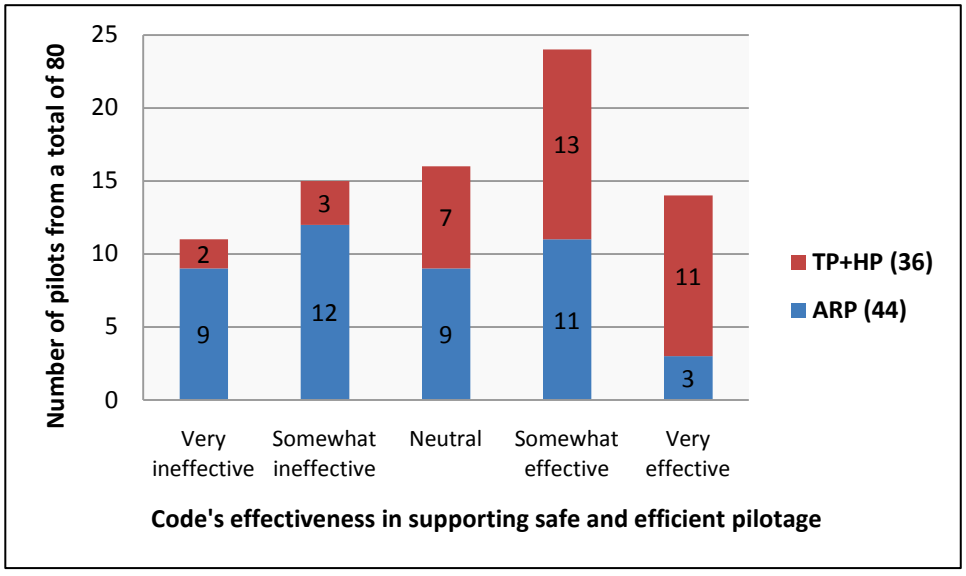
13. Factors reducing the adequacy of professional development.

Survey Q 33: Do any factors reduce the adequacy of the opportunities for your professional development?
(Options provided: None; No or inadequate funding; Too many mandatory courses; No relevant courses available; Mandatory courses irrelevant; Too few mandatory courses; Others)



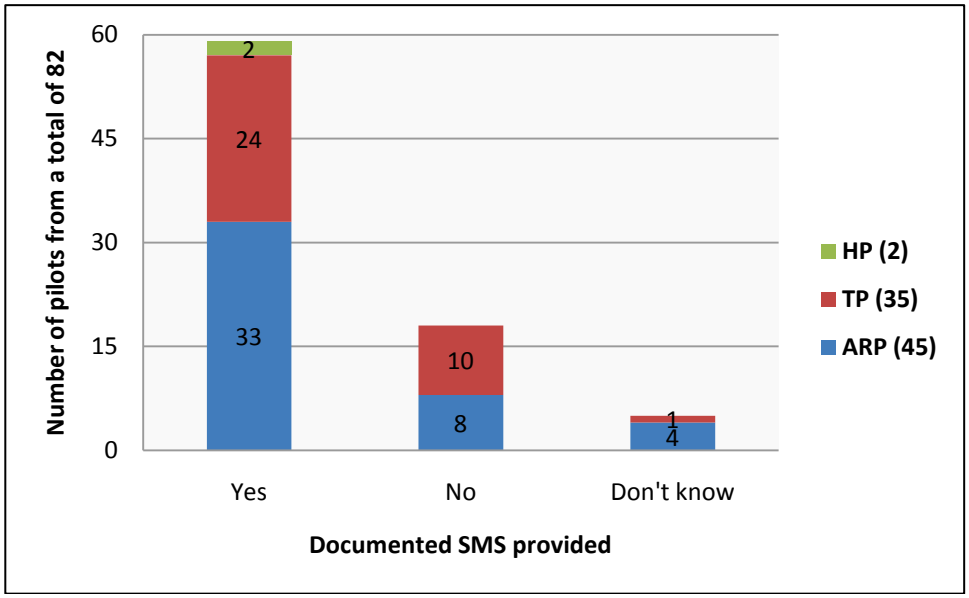
14. Effectiveness of Pilotage Safety Management Code.

Survey Q 35: In your opinion, how effective is the Queensland Coastal Pilotage Safety Management Code included in the Coastal Pilotage Regulations (Marine Orders Part 54, Issue 4, 2006) in supporting the safe and efficient management of pilotage services?
(A five point scale was provided: Very ineffective; Somewhat ineffective; Neutral; Somewhat effective; Very effective)



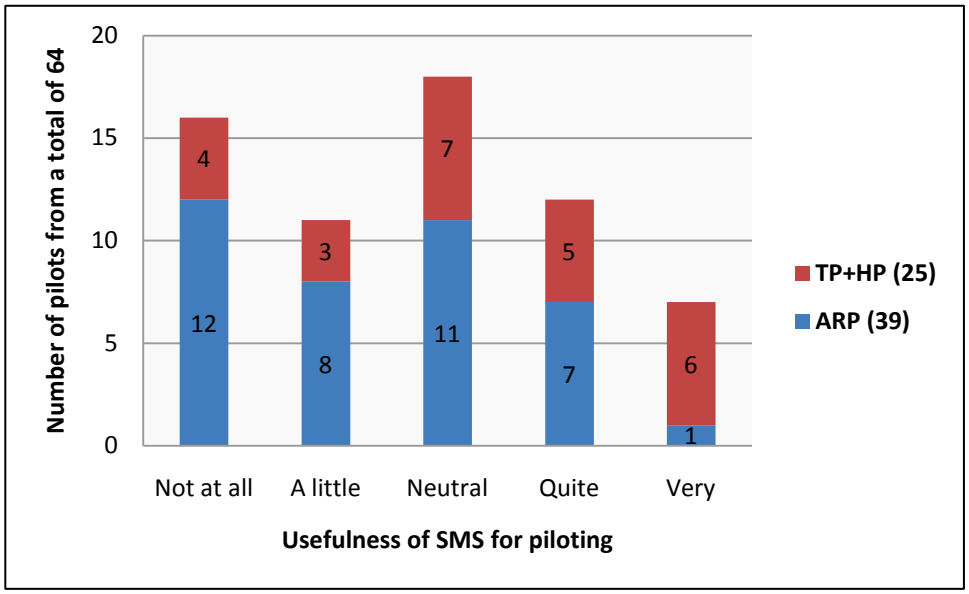
15. Provision of a documented safety management system (SMS).

Survey Q 36: Does your pilotage provider company provide you a documented pilotage safety management system?
(Options provided: Yes; No; Don't know)



16. Usefulness of pilotage provider's safety management system (SMS).

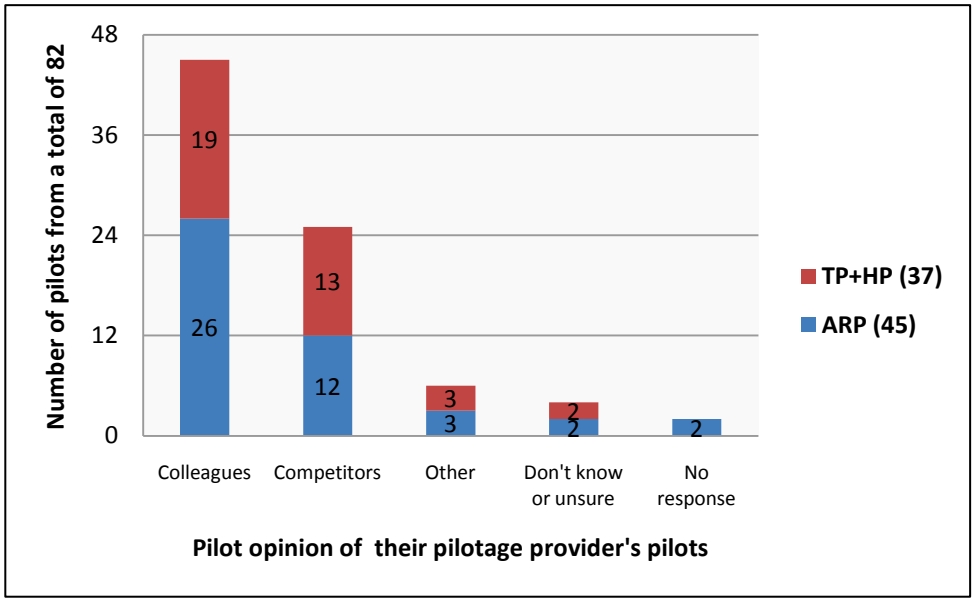
Survey Q 40: How useful is your pilotage provider company's safety management system to your piloting?
(A five point scale was provided: Not at all useful; A little useful; Neutral; Quite useful; Very useful)



Note: Twenty-three pilots indicated that they had either not been provided with an SMS manual or did not know if they had. Most of those pilots did not respond to this question.

17. View of own pilotage provider's pilots.

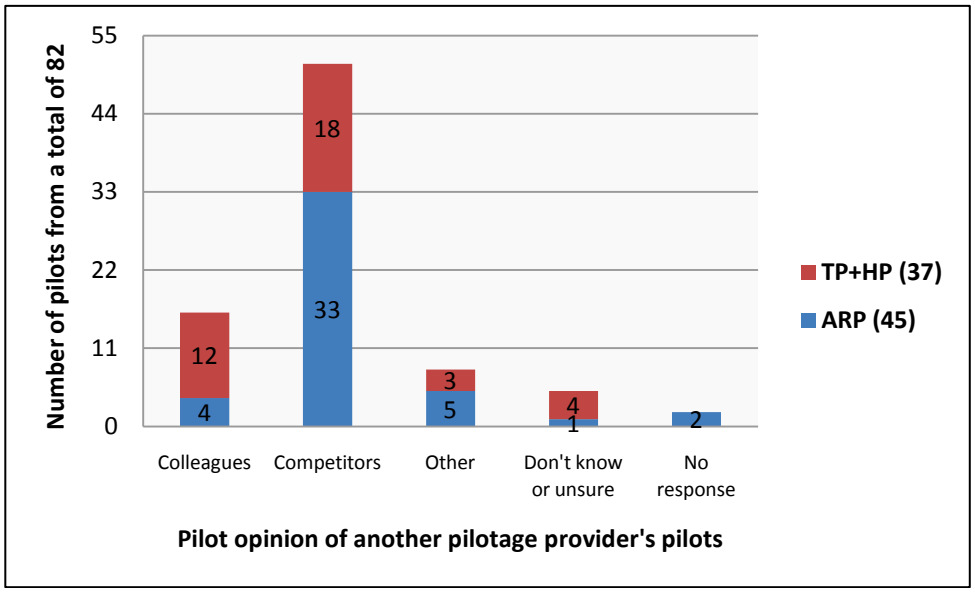
Survey Q 42: Do you consider other pilots with your pilotage provider company as your ...?
(Options provided: Colleagues; Competitors; Don't know or unsure; Other)



Note: Fifty-six per cent of pilots considered their provider's pilots were colleagues.

18. View of other pilotage provider's pilots.

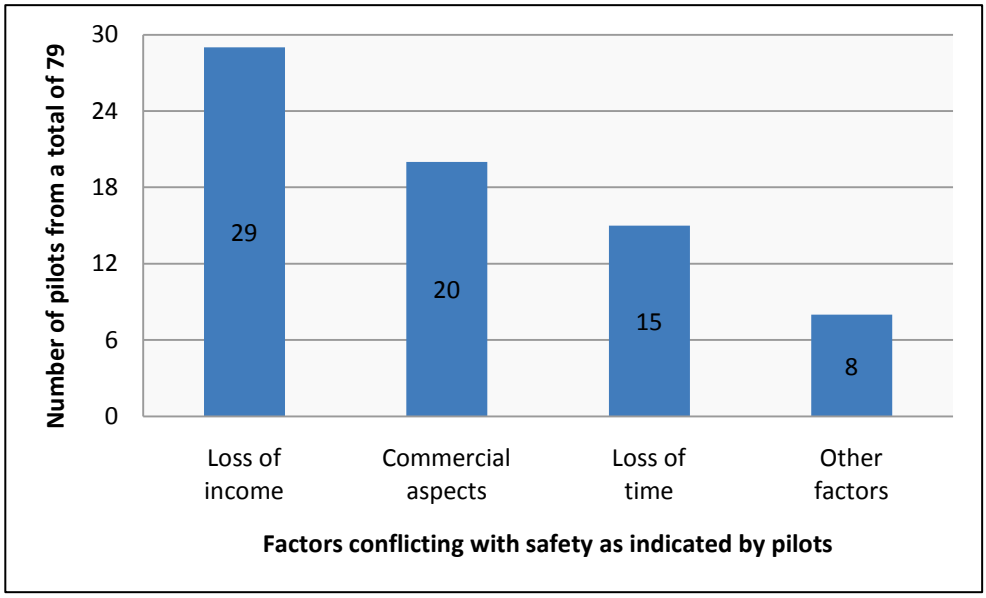
Survey Q 43: Do you consider pilots with other pilotage provider companies as your ...?
(Options provided: Colleagues; Competitors; Don't know or unsure; Other)



Note: Twenty per cent of pilots considered other providers' pilots were colleagues.

19. Factors conflicting with safety.

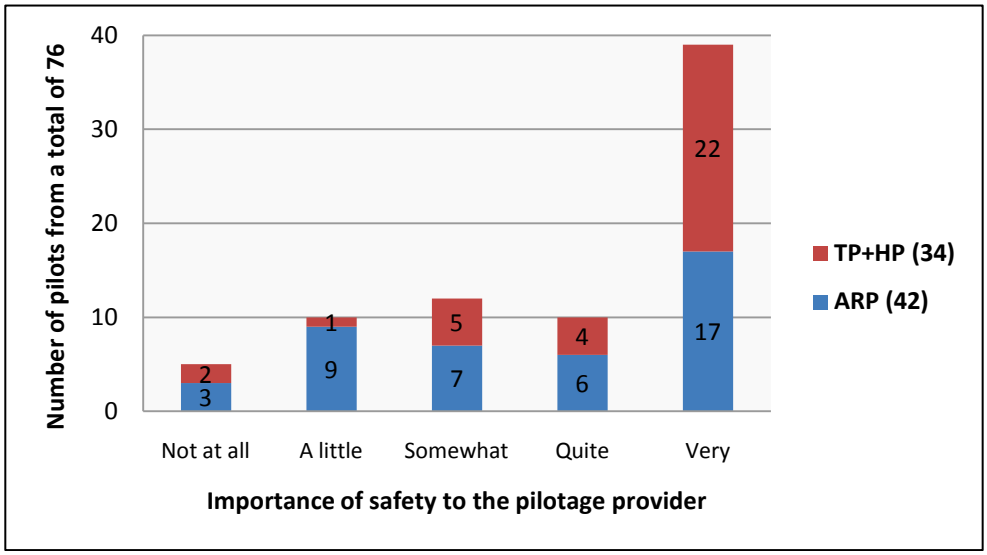
Survey Q45: Do any factors conflict with the importance you aim to give to the safety of pilotage operations?
(Options provided: No; Loss of income; Loss of time; Other)



Note: Fifty-one per cent of pilots indicated there were no conflicting factors.

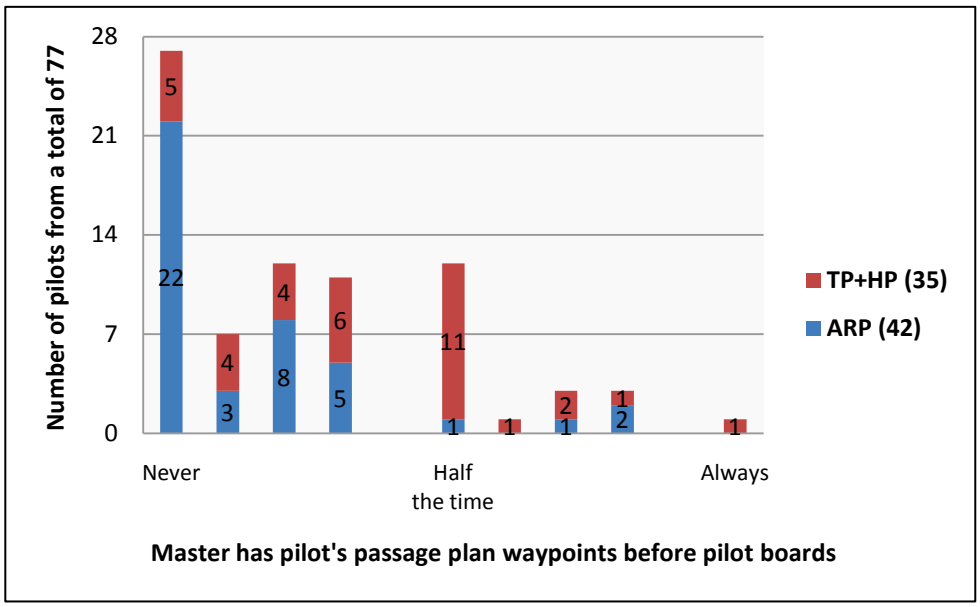
20. Importance of safety to pilotage provider.

Survey Q 46: How important is the safety of pilotage operations to your pilotage provider company's management?
(A five point scale was provided: Not at all important; A little important; Somewhat important; Quite important; Very important)



21. Provision of passage plan to ships before the pilot boards.

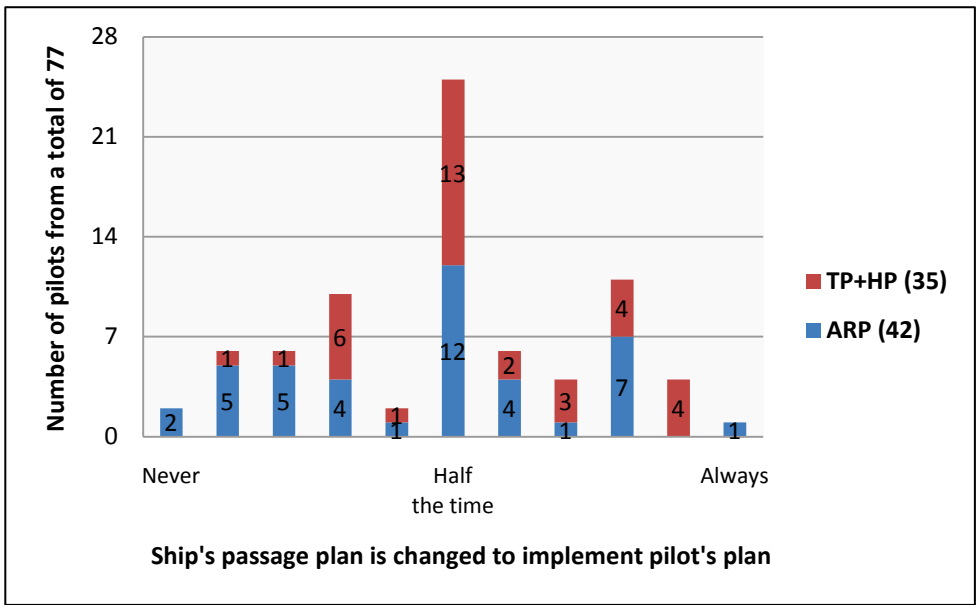
Survey Q 48: How often does the master have your passage plan's waypoints before you board the ship?
(An 11 point scale from 'Never' to 'Always', with a mid-point of 'Half the time', was provided)



Note: Ninety per cent of responses were in the 'never' to 'half the time' part of the scale.

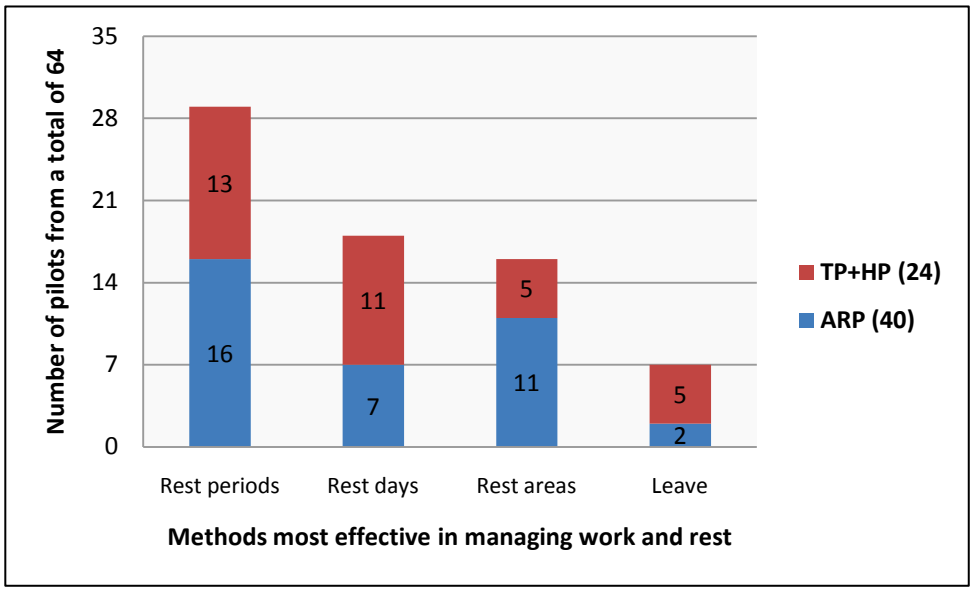
22. Change of passage plan after the pilot boards.

Survey Q 49: How often do you need to change the ship's passage plan to implement your plan?
(An 11 point scale from 'Never' to 'Always', with a mid-point of 'Half the time', was provided)



23. Methods most effective in managing work and rest.

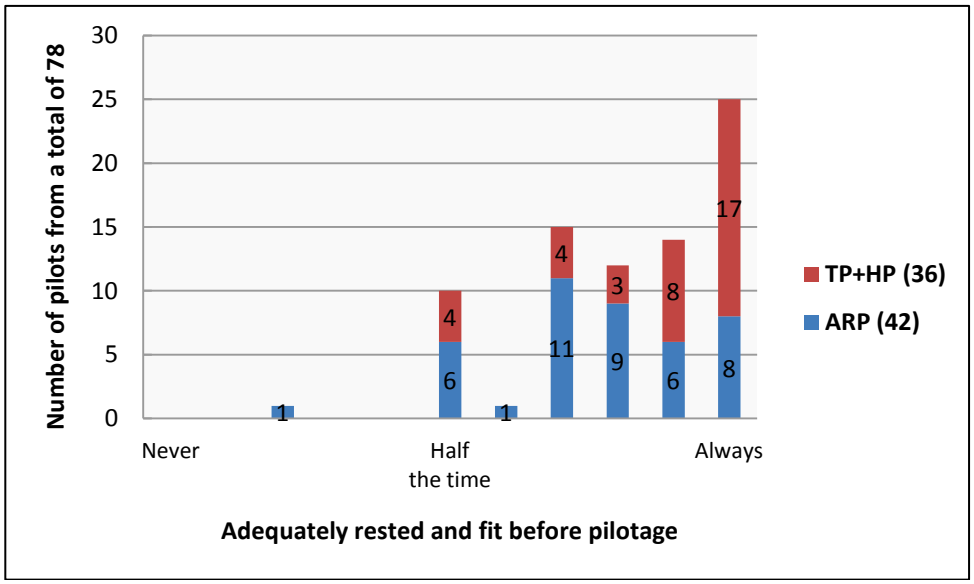
Survey Q 55: Which methods do you believe are the most effective in managing your working hours?



Note: Other methods (existing or desirable) indicated by pilots included having a roster, accurate ship arrival and departure times, salaried employment, a two pilot system and management of the competitive environment.

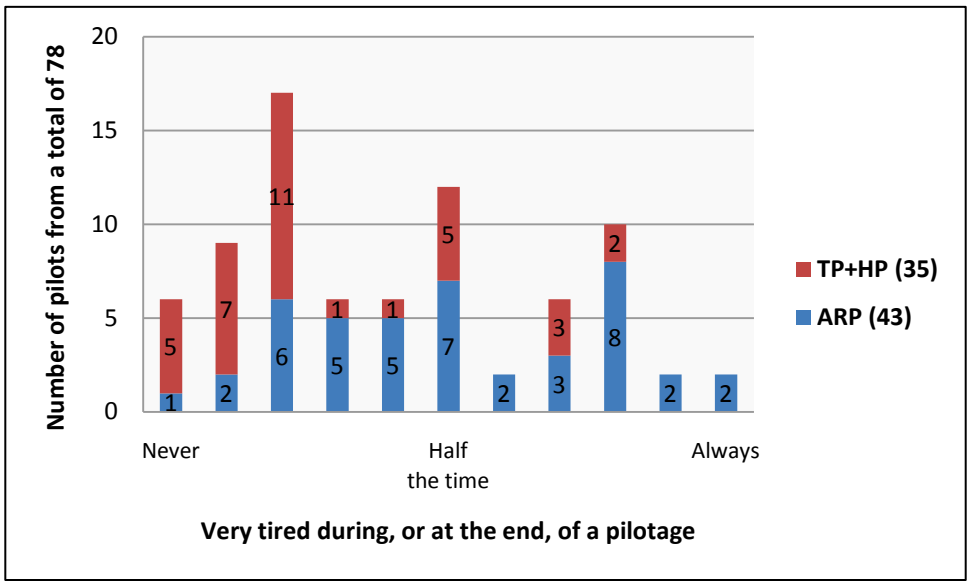
24. Adequately rested before a pilotage.

Survey Q 56: How often do you start a pilotage adequately rested and fit (defined rest period taken, had adequate good quality sleep, not feeling tired and a fatigue score less than defined limit)?
(An 11 point scale from 'Never' to 'Always', with a mid-point of 'Half the time', was provided)



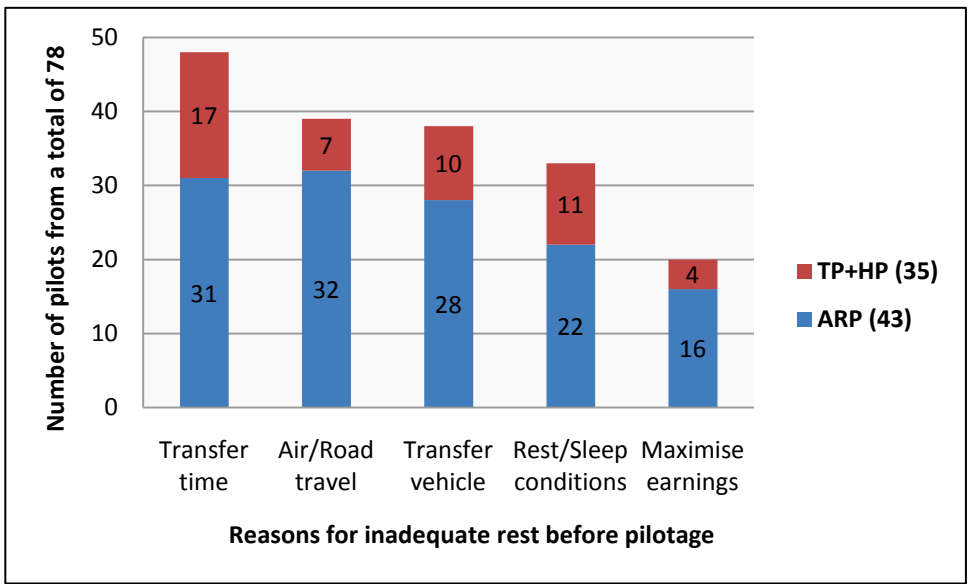
25. Very tired during, or at the end of, a pilotage.

Survey Q 57: How often are you feeling very tired (or your fatigue score is excessive) during, or at the end of, a pilotage?
(An 11 point scale from 'Never' to 'Always', with a mid-point of 'Half the time', was provided)



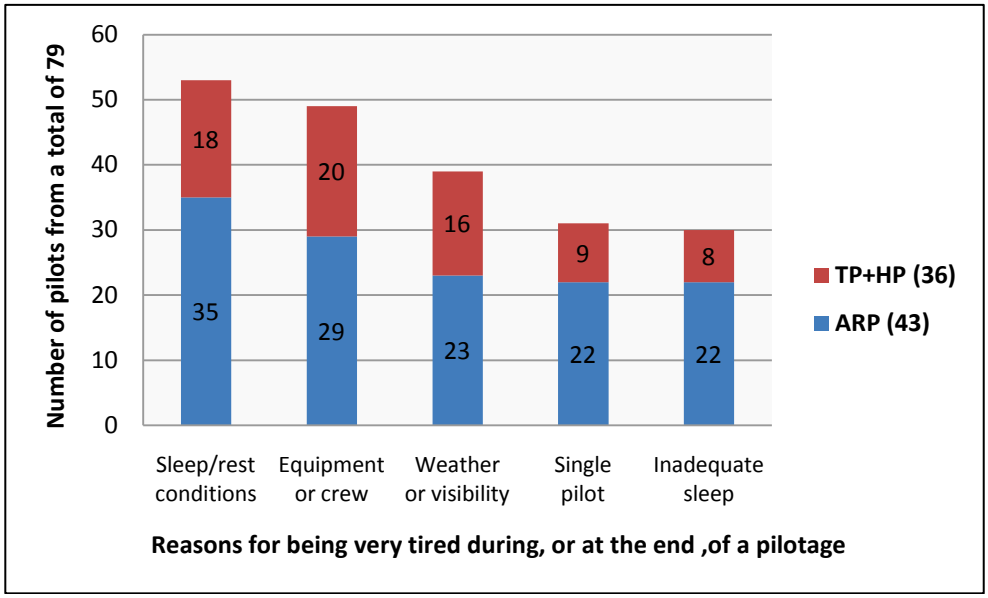
26. Factors increasing tiredness before a pilotage.

Survey Q 58: Which factors or reasons have made you very tired before a pilotage?
(Options provided: None; Rest period less than defined; Excessive pilot transfer time Unsuitable rest and sleep conditions; Excessive road/air travel time; Need to maximise earnings; Substandard pilot transfer vehicle; You can rest during pilotage; Drug or alcohol use; Others)



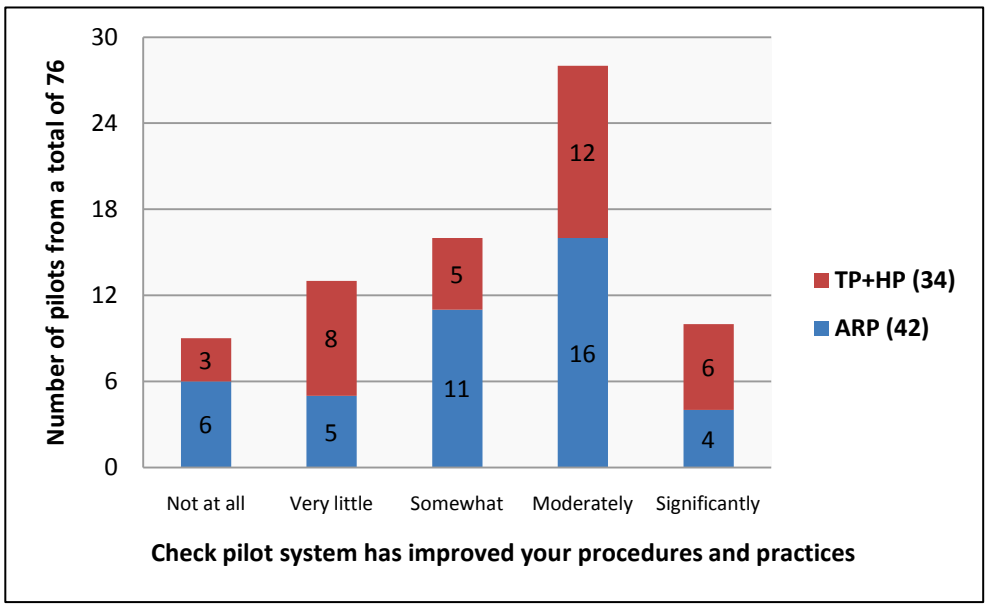
27. Factors increasing tiredness during, or at the end of, a pilotage.

Survey Q 60: What are the reasons for you being excessively tired during, or at the end of, a pilotage?
(Options provided: None; Insufficient rest before pilotage; Single pilot; Unsuitable rest or sleep conditions; High ship speed; Adverse weather or visibility; Inadequate sleep opportunities; Poor equipment or crew; Drug or alcohol use; Need to maximise earnings; Heavy traffic conditions; Others)



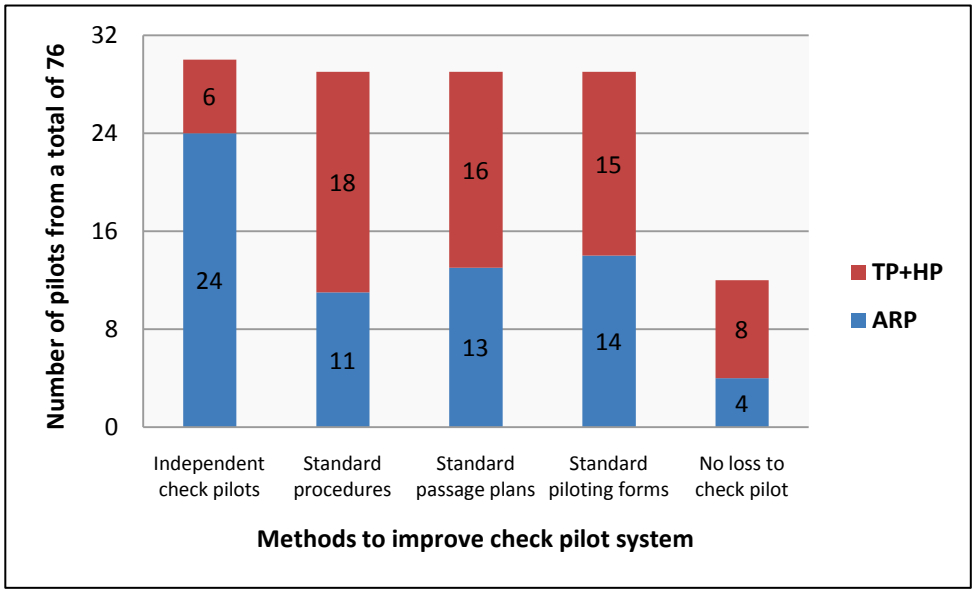
28. Effect of check pilot system on pilotage methods.

Survey Q 71: Has the check pilotage regime improved your pilotage procedures and practices?
(A five point scale was provided: Not at all; Very little; Somewhat; Moderately; Significantly)



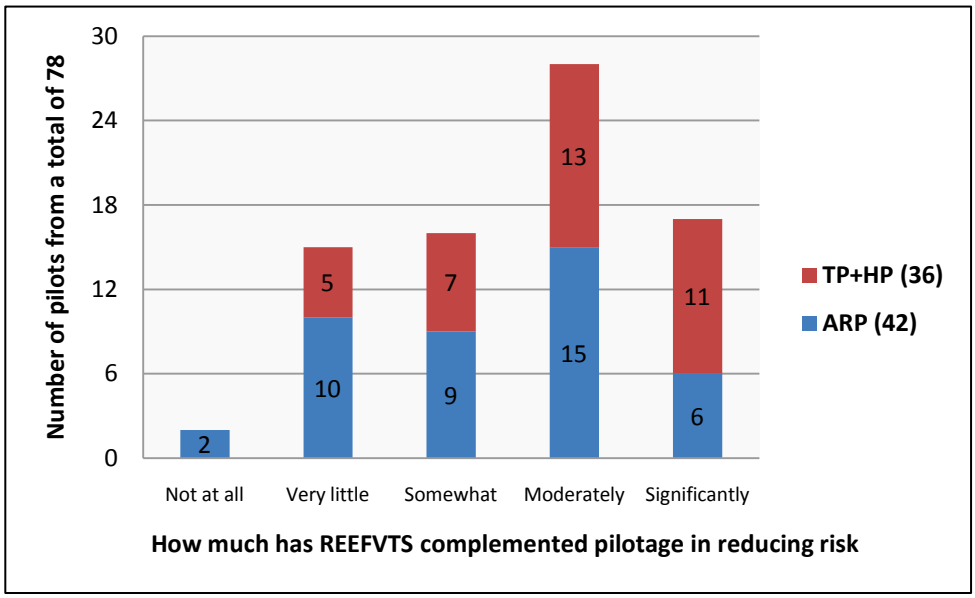
29. Methods to improve check pilot system.

Survey Q 72 What should be done to make the check pilot regime more effective in improving pilotage?
(Options provided: Nothing; Don't know; Standard procedures; Standard passage plans; Standard pilot check lists and forms etc.; Independent check pilots; No income or time loss to check pilot; Others)



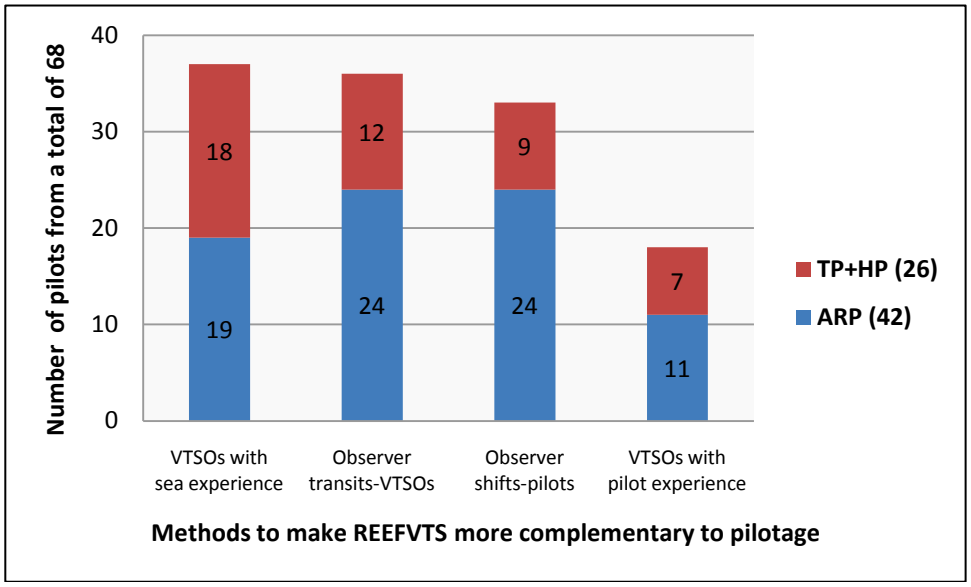
30. Effect of REEFVTS in complementing pilotage.

Survey Q 73: In your opinion, how much has the Great Barrier Reef & Torres Strait Vessel Traffic Service (REEFVTS) complemented coastal pilotage in reducing the risk of a shipping incident?
(A five point scale was provided: Not at all; Very little; Somewhat; Moderately; Significantly)



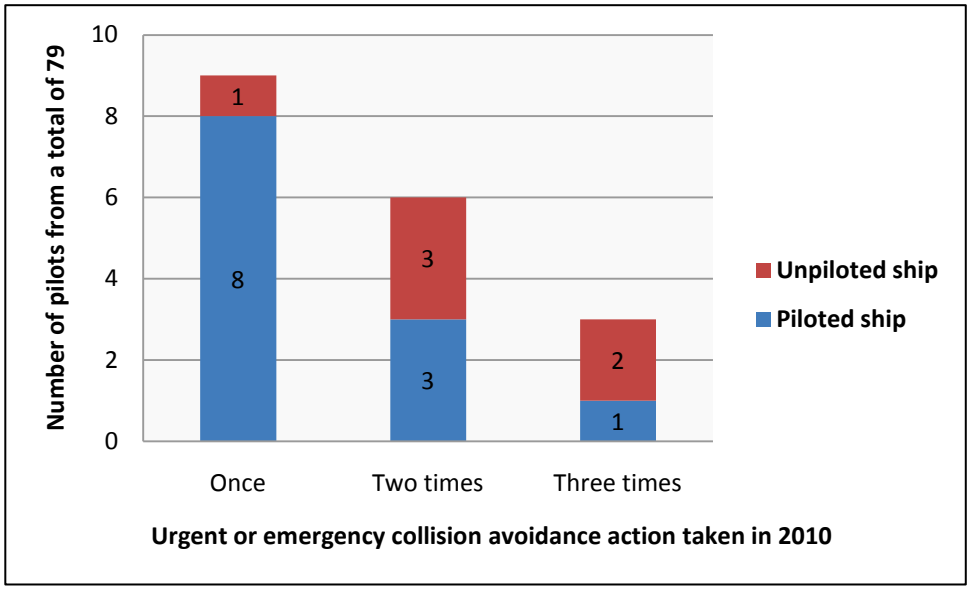
31. Methods to improve REEFVTS.

Survey Q 74: What should be done to make REEFVTS more complementary to coastal pilotage?
(Options provided: Nothing; Don't know; Traffic service officers undertaking observer voyages; Pilots undertaking observer shifts at traffic centre; VTS officers with pilot experience; VTS officers with experience at sea; Others)



32. Collision risk events.

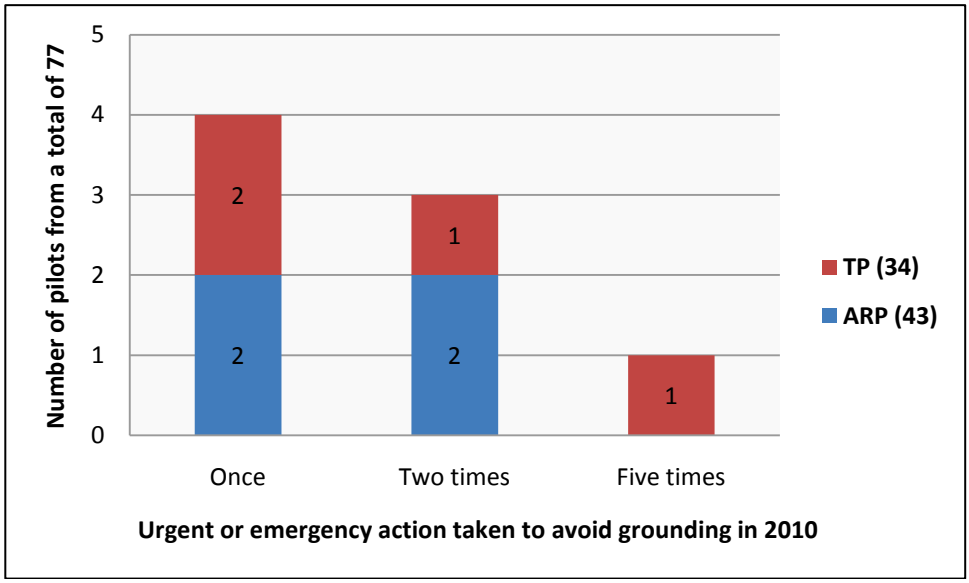
Survey Q 76: How many times in the last year have you had to take urgent or emergency action to avoid collision with another ship?
(Options provided: a) Other ship not piloted; b) Other ship piloted; If never, enter 0)



Note: Ninety-two per cent and 85 per cent of pilots, respectively, indicated that they had not needed to take action to avoid collision with an unpiloted ship or a piloted ship.

33. Grounding risk events.

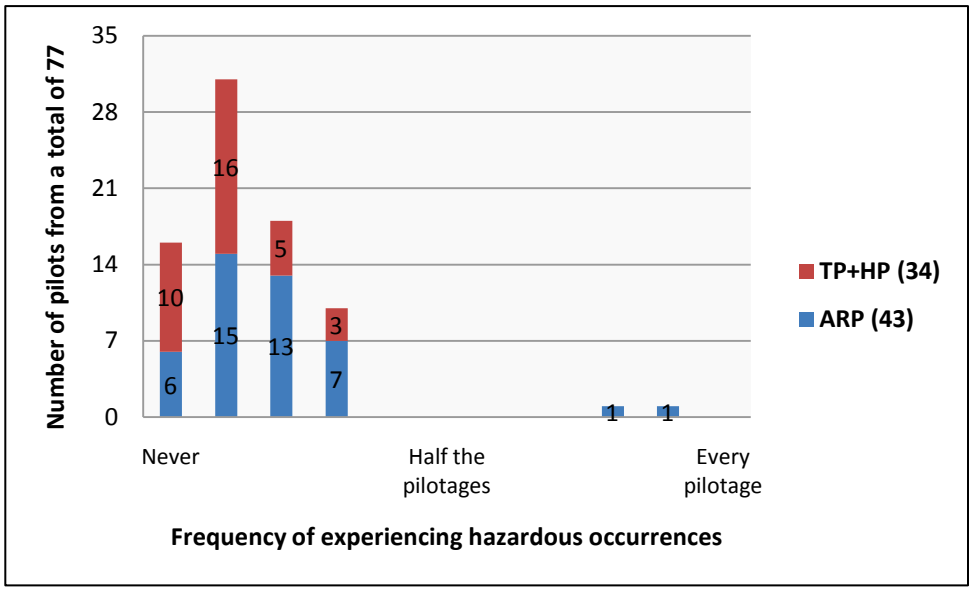
Survey Q 77: How many times in the last year have you had to take urgent or emergency action to prevent the ship you were piloting from grounding?
(Options provided: If never, enter 0)



Note: Eighty-nine per cent of pilots indicated that they had not needed to take action to avoid grounding.

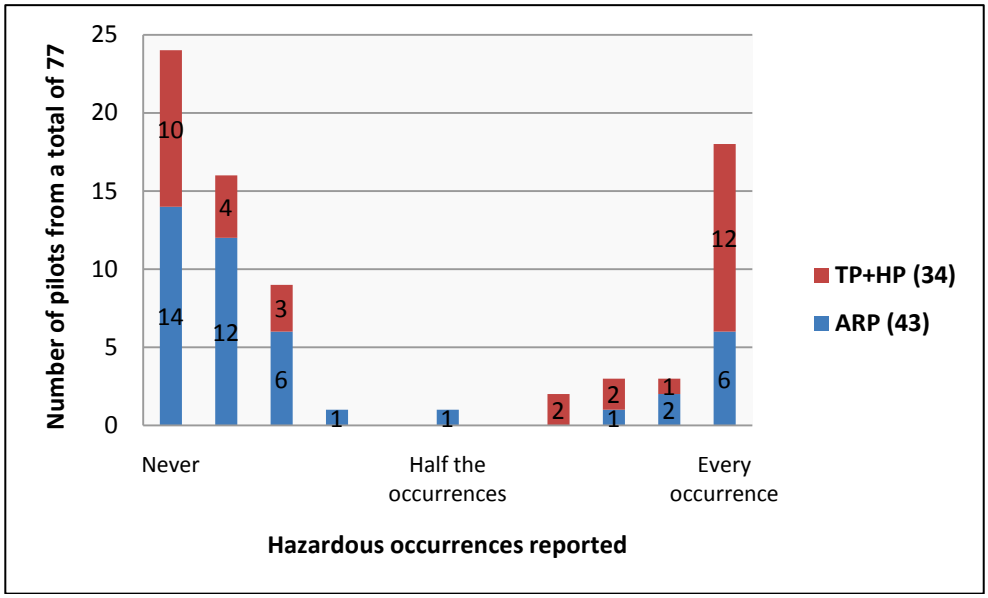
34. Frequency of hazardous occurrences.

Survey Q 80: How often have you experienced hazardous occurrences?
(An eleven point scale from 'Never' to 'Every pilotage', with a mid-point of 'Half the pilotages', was provided)
(Hazardous occurrences were specified to be accidents, incidents and near misses which are defined in MO 54, issue 4)



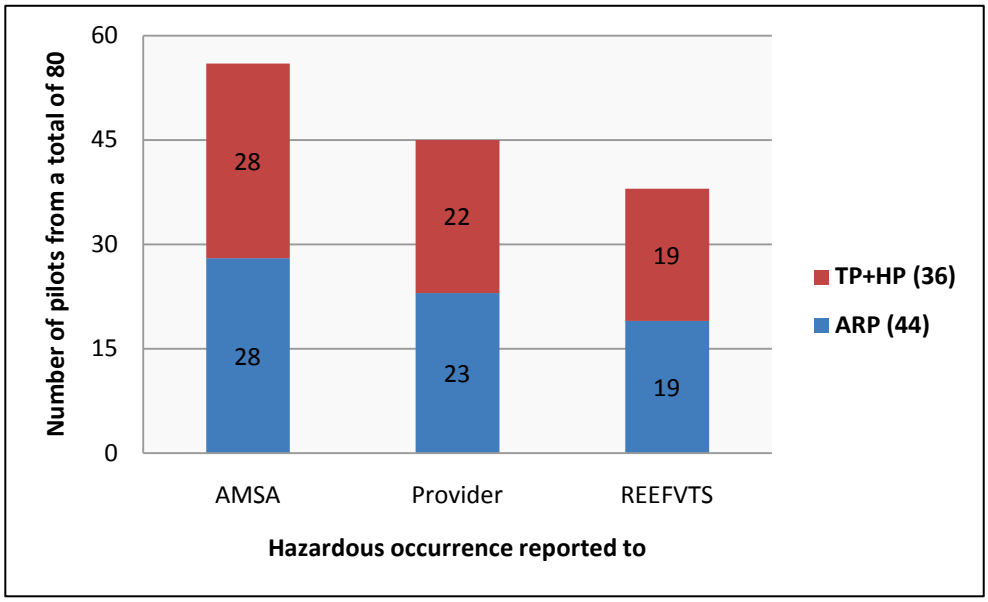
35. Frequency of reporting hazardous occurrences.

Survey Q 81: How often do you report hazardous occurrences?
(An eleven point scale from 'Never' to 'All occurrences', with a mid-point of 'Half the occurrences', was provided)



36. Hazardous occurrences reported to.

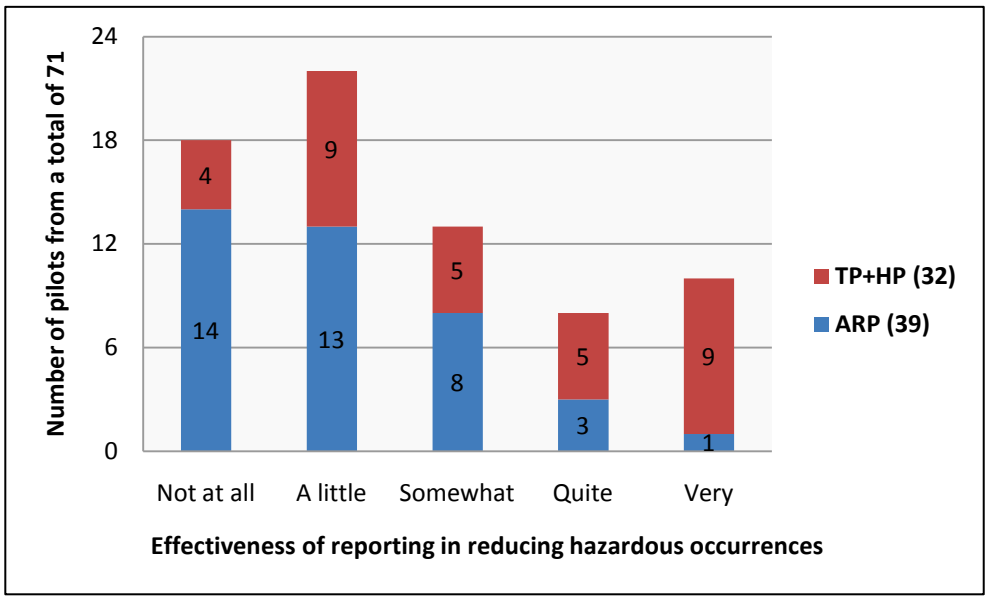
Survey Q 82: Who do you report hazardous occurrences to?
Options provided: No one; Pilotage provider company; Australian Maritime Safety Authority; REEFVTS; ATSB; Maritime Safety Queensland; REPCON Marine (Confidential reports to ATSB); Others)



Note: Ten pilots indicated they reported to no one.

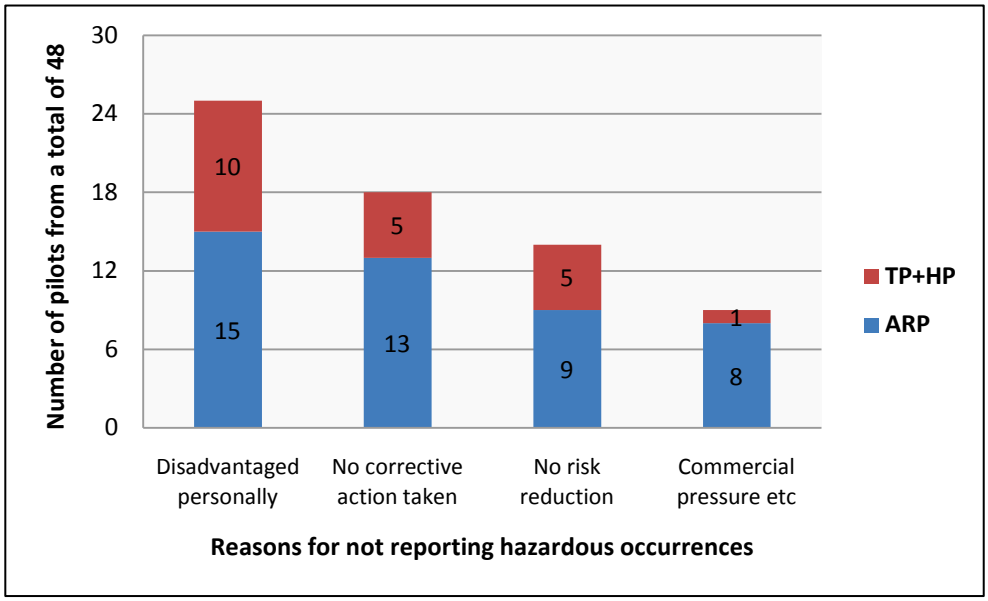
37. Effectiveness of hazardous occurrence reporting.

Survey Q 84: In your opinion, how effective has the reporting of hazardous occurrences been in reducing the number of incidents and near misses?
(A five point scale was provided: Not at all effective; A little effective; Somewhat effective; Quite effective; Very effective)



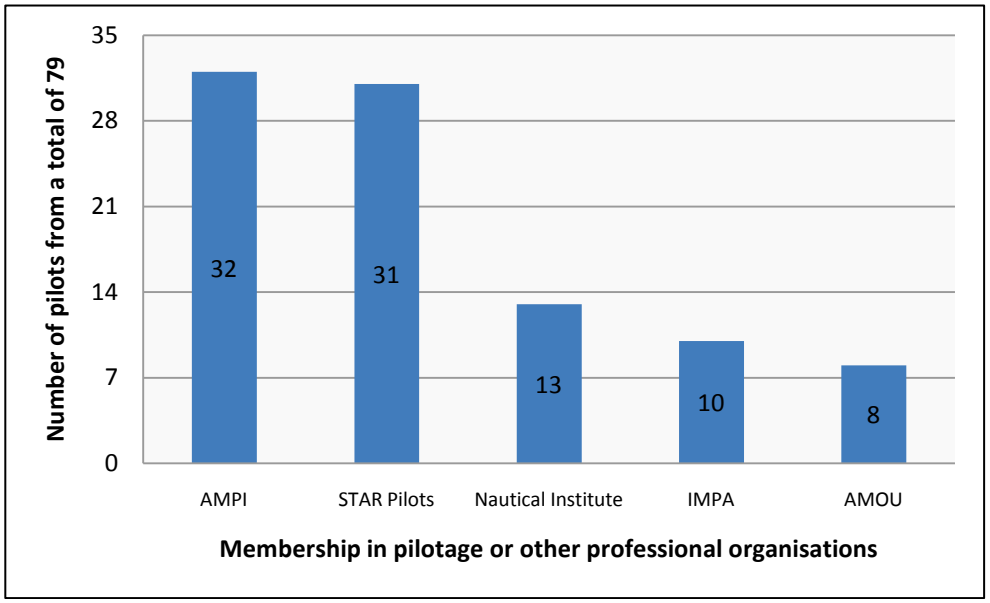
38. Reasons for not reporting hazardous occurrence.

Survey Q 85: Why would you not report hazardous occurrences?
(Options provided: No reporting system; Reporting does not reduce risk; Corrective action is never taken; No time to report; Personally disadvantageous; Others)



39. Memberships and/or affiliations.

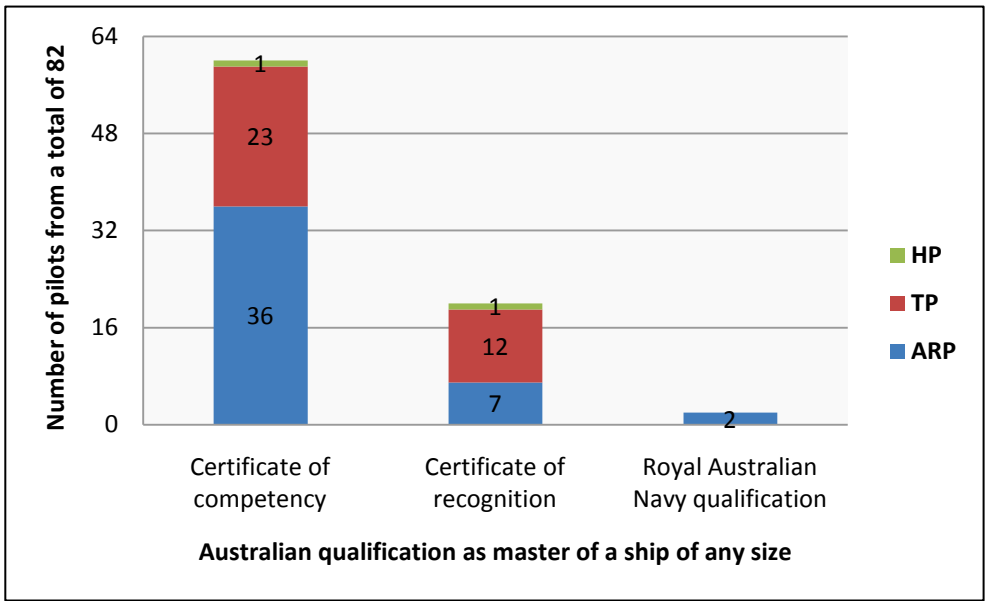
Survey Q 88: Which industry and pilotage organisations or associations are you a member of or associated with?
(Options provided: None; AMPI (Australasian Marine Pilots Institute); IMPA (International Marine Pilots Association); The Nautical Institute; STAR (Sea Torres and Reef) Pilots; Others)



Note: Twenty-eight pilots indicated they were not associated/members of any organisation.

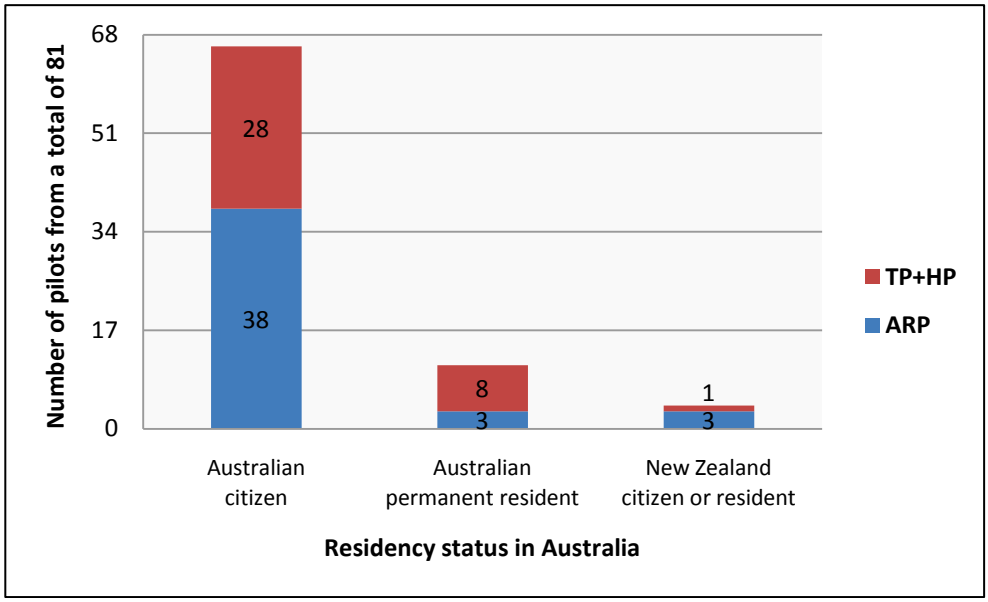
40. Type of Australian master's qualifications.

Survey Q 89: Which type of Australian master's qualification do you, or did you, hold?
(Options provided: Certificate of recognition; Certificate of competency)



41. Legal status in Australia.

Survey Q 92: What is your legal status for Australian residency?
(Options provided: Australian citizen; Permanent resident visa; Temporary resident visa; Other)



APPENDIX B: PILOTAGE INCIDENTS SUMMARY

This appendix provides a summary of the groundings and collisions that occurred between July 1993 and February 2009 where a coastal pilot was on board the ships involved. Of the 14 incidents that occurred during this 16 year period, there were nine groundings and five collisions. A summary of the circumstances that led to each incident and the principal findings of the ATSB or the Marine Incident Investigation Unit (MIIU) investigations are included.

1. Near grounding of the bulk carrier *M Nuri Cerrahoglu*, 5 November 1994.

MIIU report number 74.

<http://www.atsb.gov.au/publications/investigation_reports/1994/mair/mair74.aspx>

The investigation did not find evidence that *M Nuri Cerrahoglu* actually grounded. However, the ship was in water where the depth was such that it was unable to maintain forward movement in safety and there was insufficient under keel clearance. While the coastal pilot's passage plan took into account the need to anchor to the east of Prince of Wales Channel, the ship left the anchorage north of Alpha Rock prematurely in view of the tidal conditions within the Prince of Wales Channel, indicating inadequate passage planning.

2. Grounding of the container ship *Carola*, 30 March 1995.

MIIU report number 79.

<http://www.atsb.gov.au/publications/investigation_reports/1995/mair/mair79.aspx>

Carola grounded on South Ledge Reef after the chief mate did not alter the ship's course at the planned course alteration position. The investigation identified that the chief mate did not call the pilot at the required 'call pilot' position and that the chief mate's level of fatigue, brought about by the consumption of alcohol and the lack of sleep, affected his actions. While the rest period taken by the pilot was consistent with existing practices, the incident demonstrated the risks involved in managing a single-handed pilotage.

3. Grounding of the refrigerated cargo ship *Peacock*, 18 July 1996.

MIIU report number 95.

<http://www.atsb.gov.au/publications/investigation_reports/1996/mair/mair95.aspx>

Peacock grounded on Piper Reef while proceeding at full speed with a coastal pilot on the bridge. The investigation identified that the pilot's level of chronic fatigue, brought about by his piloting schedule, severely affected his actions and that there was a breakdown in bridge resource management principles on the bridge in the hours before the grounding.

4. Collision between the bulk carrier *Maersk Tapah* and the fishing vessel *Nimbus*, 26 November 1996.

MIIU report number 103.

<http://www.atsb.gov.au/publications/investigation_reports/1996/mair/mair103.aspx>

The two vessels collided south of Low Isles. The investigation identified that neither the pilot nor the ship's second mate made a full appraisal of an overtaking situation

and the risk of collision and that their use of objective means to assess whether or not the bearing of the fishing vessel was appreciably changing was ineffective. The investigation also found that the pilot accepted an unnecessary close-quarters situation in the overtaking manoeuvre, resulting in contact between the ship and the fishing vessel.

5. Collision between the bulk carrier *River Boyne* and the Royal Australian Navy patrol vessel *HMAS Fremantle*, 13 March 1997.

MIIU report number 112.

<http://www.atsb.gov.au/publications/investigation_reports/1997/mair/mair112.aspx>

The two vessels collided off Heath Reef where sea room is very limited. The investigation found that the collision was caused by a complex chain of human factors, which included, but were not limited to: incomplete passage and contingency planning; awareness of traffic in the area; a lack of experience in traffic encounters within the Great Barrier Reef; and the decision on board *HMAS Fremantle* to apply starboard helm based on incomplete and scanty information.

6. Grounding of the bulk carrier *Thebes*, 11 June 1997.

MIIU report number 119.

<http://www.atsb.gov.au/publications/investigation_reports/1997/mair/mair119.aspx>

Thebes grounded on the southern side of Larpent Bank, at the western approaches to the Prince of Wales Channel, after it had deviated from the intended course, with the deviation going unnoticed by the ship's bridge team for almost 15 minutes. The investigation identified that a lack of bridge resource management principles resulted in the master and watchkeeping officer being in the ship's chartroom after the pilot had left the bridge. Consequently, the wheelhouse was unattended and the vessel's progress was not being monitored. Furthermore, when it was discovered that a risk of collision existed between the ship and a fishing vessel, the decision of the master and pilot to go hard to port, towards the intended track of the fishing vessel, before making a full appraisal of the situation, went unchallenged by the watch officer.

7. Grounding of the bulk carrier *Dakshineshwar*, 12 July 1997.

MIIU report number 120.

<http://www.atsb.gov.au/publications/investigation_reports/1997/mair/mair120.aspx>

Dakshineshwar grounded after the ship lost steerage when the main engine stopped during a transit of the Prince of Wales Channel. The investigation identified that the ship's engineers lacked an understanding and knowledge of some of the automated systems in the engine room and that there were poor or deficient operational procedures in the engine room control room. Also, there were deficient communications between the bridge and the engine control room and the failure to use the bridge telegraph, the most basic communication system with the engine room.

8. Grounding of the container ship *NOL Amber*, 1 November 1997.

MIIU report number 127.

<http://www.atsb.gov.au/publications/investigation_reports/1997/mair/mair127.aspx>

NOL Amber grounded on Larpent Bank shortly after the pilot had boarded. The investigation identified that neither the ship nor the pilot had a properly prepared passage plan, that the master/pilot information exchange was deficient, that the pilot

lacked an appreciation of the ship's position and that bridge resource management principles were not followed during the short time leading up to the grounding.

9. Grounding of the general cargo ship *New Reach*, 17 May 1999.

ATSB report number 147.
<http://www.atsb.gov.au/publications/investigation_reports/1999/mair/mair147.aspx>

New Reach grounded in the vicinity of Heath Reef. The investigation identified that the pilot's actions leading up to the grounding were affected by fatigue and that no strategies had been employed to manage the pilot's fatigue level. The pilot had less than a year's coastal pilotage experience. It was also found that bridge resource management principles were less than optimal and this led to single person errors not being detected.

10. Collision between the bulk carrier *Silver Bin* and the fishing vessel *Chinderah Star*, 25 March 2000.

ATSB report number 156.
<http://www.atsb.gov.au/publications/investigation_reports/2000/mair/mair156.aspx>

Silver Bin and *Chinderah Star* collided just to the east of Chapman Island. The investigation identified that neither vessel was proceeding at a 'safe speed' after entering a rain squall and that the lookout maintained by the pilot and the bridge team, both visually and by radar, on *Silver Bin* was ineffective in that *Chinderah Star* was not detected at any time prior to the collision.

11. Grounding of the bulk carrier *Doric Chariot*, 29 July 2002.

ATSB report number 182.
<http://www.atsb.gov.au/publications/investigation_reports/2002/mair/mair182.aspx>

Doric Chariot grounded on Piper Reef while the pilot was on the bridge. The investigation identified that the pilot was affected by fatigue which resulted in him falling asleep in an inappropriate part of the passage; that he instructed he should next be called in a position which was too close to dangers for any successful avoiding action to be taken; that the pilot did not provide the watchkeeping officer with sufficient clear, unambiguous, instructions regarding the course between Eel Reef and Piper Reef and that the pilot's strategies for managing his fatigue levels were ineffective. It was also found that the bridge resource management exercised by the pilot and the watchkeeping officer was ineffective.

12. Collision between the bulk carrier *Bunga Orkid Tiga* and the fishing vessel *Stella VII*, 5 January 2004.

ATSB report number 199.
<http://www.atsb.gov.au/publications/investigation_reports/2002/mair/mair182.aspx>

The vessels collided near Creech Reef. The pilot was not on the bridge of *Bunga Orkid Tiga* at the time and the officer of the watch made a succession of course alterations to port, into the path of the fishing vessel. The investigation indentified that neither vessel was maintaining an effective visual lookout and both vessels effectively remained on a collision course with each other. While the pilot's resting was consistent with usual practice, the incident demonstrated the risks involved in managing a single-handed pilotage.

13. Collision between the container ship *Nexoe Maersk* and the fishing vessel *Discovery III*, 23 May 2006.

(The ATSB obtained information for its incident database from the Australian Maritime Safety Authority and Maritime Safety Queensland, both of which investigated the incident).

The two vessels collided southeast of Hannibal Islands after *Nexoe Maersk*'s bridge watchkeeping officer altered course to starboard and the deckhand on the fishing vessel altered course to port. The pilot was not on *Nexoe Maersk*'s bridge at the time and resting, consistent with usual practice. However, the incident demonstrated the risks involved in managing a single-handed pilotage.

14. Grounding of the tanker *Atlantic Blue*, 7 February 2009.

ATSB report number 262.
<http://www.atsb.gov.au/publications/investigation_reports/2009/mair/262-mo-2009-001.aspx>

Atlantic Blue grounded on Kirkcaldie Reef while the pilot was on the bridge. The investigation identified that the ship's progress and position were not effectively monitored by the bridge team while the ship moved well off-track and inadequate action was taken to bring it back on track. In addition, bridge resources were not managed effectively, off-track limits were not defined and the bridge team did not have a shared mental model of the passage. The investigation report identified safety issues relating to the ship's passage planning procedures; the check pilot system for coastal pilots and the coastal vessel traffic service's monitoring system.

APPENDIX C: MARINE ORDERS PART 54 EXTRACTS

This appendix includes selected extracts from the provisions of the last three issues of Marine Orders Part 54 (MO 54). These include sections of the Great Barrier Reef Pilotage Safety Management Code (GBRPSMC), later renamed the Queensland Coastal Pilotage Safety Management Code (QCPSMC) that were appended to issues of MO 54. The extracts from MO 54 provided below are arranged in the order in which the marine orders were issued, i.e. the earliest first. The numbers identifying particular provisions in MO 54, or sections of the Codes, are included.

1. Extracts: MO 54, Issue 3 (Amendment), 2001, GBRPSMC (Code).

Functional Requirements (Code section 1.4)

Every Provider must develop, implement and maintain a Safety Management System (SMS) which must include:

1.4.1 a safety and environmental protection policy describing how the objectives set out in 1.2.2 are to be achieved;

1.4.2 instructions and procedures for pilots to promote the safe pilotage of ships and protection of the environment in compliance with relevant legislation;

1.4.3 procedures for ensuring that non-conformities, accidents and hazardous situations are reported to the provider, investigated and analysed with the objective of improving safety and pollution prevention. Procedures should be established for the implementation of corrective action;

1.4.4 a fatigue management plan;

1.4.5 procedures to prepare for and respond to emergency situations; and

1.4.6 procedures for internal audits and management reviews.

The responsibilities of pilotage providers (Code section 3)

Each provider is responsible for:

3.1 ensuring that it only allocates appropriately qualified and prepared pilots who are fully conversant with the provider's SMS [A properly qualified pilot will hold the appropriate licence for the pilotage area to be transited (Marine Orders, Part 54) and be medically fit (Marine Orders, Part 9)];

3.2 meeting any obligations under Commonwealth and State occupational health and safety legislation and relevant State/Commonwealth maritime legislation;

3.3 having in place a drug & alcohol policy and a harassment policy;

3.4 implementing its approved fatigue management system;

3.5 preparing rosters to cover leave for pilots, etc;

3.6 having in place procedures:

3.6.1 to deal with any requirement for a change of pilots at short notice, such as a grounding or other incident;

3.6.2 to deal with the unforseen illness of a pilot (either on board or ashore);

3.6.3 for pilots to identify, describe and respond to potential emergency shipboard situations;

3.7 establishing and maintaining procedures for ensuring that any training, which may be required in support of the SMS, has been undertaken by all personnel concerned;

3.8 designating a person or persons in the provider's office having direct access to the highest level of management with the function of providing a link between the provider and the pilot on board;

3.9 appointing a person approved by the Manager to be a Training Pilot;

3.10 appointing a person approved by the Manager to be a Check Pilot;

3.11 ensuring that procedures are in place covering the reporting of matters such as near misses, accidents, equipment failures, etc. to the appropriate regulatory authority (AMSA, QDoT, CASA) [Such reports should be able to be made on a confidential basis if required]; and

3.12 meeting the requirements of sections 8, 9, 10 and 11 of this Code.

The responsibilities of pilots (Code section 7)

Each pilot is responsible for:

7.1 providing information and advice to the master of the ship to assist the master and the ship's navigating officers to make safe passage through the pilotage area or areas for which the pilot is engaged;

7.2 ensuring that he/she has prepared comprehensive passage plans, checklists, etc. and plans for dealing with situations on board related to lack of essential navigational equipment such as radar, compass etc. Passage plans must be discussed with the Master and any relevant information such as equipment malfunction or lack of navigation aids taken into account;

7.3 ensuring that he/she has confirmed with the master that emergency plans are in place on board the vessel and that there is a full understanding of the pilot's role in such plans;

7.4 ensuring correct communications procedures are used in relation to the VHF and any other equipment that may be used;

7.5 ensuring access is available to up to date charts, tide tables, Notices to Mariners;

7.6 carrying out all duties in accordance with the approved Code of Conduct;

7.7 compliance with the Provider's SMS;

7.8 compliance with any approved fatigue management system;

7.9 undertaking voyages with a Check Pilot as observer at least once as a condition of revalidation of his or her licence [Guidelines that have been approved by the Manager are set out in Annex B];

7.10 undertaking approved professional development courses at the agreed intervals.

2. Extracts: MO 54, Issue 4, 2006, QCPSMC (Code).

Functional Requirements (Code section 1.4)

Every pilotage provider must develop, implement and maintain a SMS which must include:

1.4.1 a safety and environmental protection policy describing how the objectives set out in 1.2.2 are to be achieved;

1.4.2 instructions and procedures for pilots to promote the safe pilotage of ships and protection of the environment in compliance with relevant legislation;

1.4.3 procedures for ensuring that non-conformities, accidents and hazardous situations are reported to the pilotage provider, investigated and analysed with the objective of improving safety and pollution prevention. Procedures should be established for the implementation of corrective action;

1.4.4 the fatigue management plan;

1.4.5 procedures to prepare for and respond to emergency situations;

1.4.6 procedures for internal audits and management reviews; and

1.4.7 defined levels of authority and lines of communication between and among shore staff, pilot launch crews and pilots.

The responsibilities of pilotage providers (Code section 3)

Each pilotage provider is responsible for:

3.1 ensuring that it only allocates qualified pilots who are fully conversant with the pilotage provider's SMS [A qualified pilot will hold the appropriate licence for the pilotage area to be transited (Marine Orders, Part 54) and be medically fit (Marine Orders, Part 9)];

3.2 meeting any obligations under Commonwealth and State occupational health and safety legislation and relevant State/Commonwealth maritime legislation;

3.3 having in place a drug & alcohol policy and a harassment policy;

3.4 implementing the fatigue management plan;

3.5 preparing rosters to cover leave for pilots, etc;

3.6 having in place procedures:

3.6.1 to deal with any requirement for a change of pilots at short notice, such as a grounding or other incident;

3.6.2 to deal with the unforseen illness of a pilot (either on board or ashore);

3.6.3 for pilots to identify, describe and respond to potential emergency shipboard situations;

3.7 establishing and maintaining procedures for ensuring that any training, which may be required in support of the SMS, has been undertaken by all personnel concerned;

3.8 designating a person or persons in the pilotage provider's office having direct access to the highest level of management with the function of providing a link between the pilotage provider and the pilot on board;

3.9 ensuring that all pilots operate under an approved code of conduct [The approved code of conduct is available from AMSA];

3.10 appointing a person approved by the Manager to be a training pilot;

3.11 appointing a person approved by the Manager to be a check pilot and arranging and co-ordinating check pilot voyages;

3.12 ensuring that pilot transfer arrangements meet appropriate standards;

3.13 ensuring that procedures are in place covering the reporting of matters such as near misses, accidents, equipment failures, etc. to the appropriate regulatory authorities, e.g. AMSA, MSQ, CASA;

3.14 meeting the requirements of sections 8, 9, 10 and 11 of this Code; and

3.15 ensuring that pilots comply with section 7 of this Code.

The responsibilities of pilots (Code section 7)

Each pilot is responsible for:

7.1 providing information and advice to the master of the ship to assist the master and the ship's navigating officers to make safe passage through the pilotage area or areas for which the pilot is engaged;

7.2 ensuring that he/she has prepared comprehensive passage plans, checklists, etc. and plans for dealing with situations on board related to lack of essential navigational equipment such as radar, compass etc. Passage plans must be discussed with the master and any relevant information such as equipment malfunction or lack of navigation aids taken into account;

7.3 ensuring that he/she has confirmed with the master that emergency plans are in place on board the vessel and that there is a full understanding of the pilot's role in such plans;

7.4 ensuring correct communications procedures are used in relation to the VHF and any other equipment that may be used;

7.5 ensuring access is available to up to date charts, tide tables, Notices to Mariners;

7.6 carrying out all duties in accordance with Marine Orders and the approved code of conduct [The approved code of conduct is available from AMSA];

7.7 compliance with the pilotage provider's SMS;

7.8 compliance with the fatigue management plan;

7.9 undertaking voyages with a check pilot as observer at least once as a condition of revalidation of his or her licence;

7.10 undertaking approved professional development courses at the agreed intervals;

7.11 promoting and practising the principles of bridge management teamwork;

7.12 wearing any personal protective equipment required by the pilotage provider's SMS;

7.13 reporting to REEFVTS when ceasing or commencing pilotage duties on board the vessel, specifically:

(a) ship name;

(b) pilot's name and licence number; and

(c) time pilot ceased duty or commenced duty.

[The methods of communication with REEFVTS are provided in the *User Manual for the Great Barrier Reef and Torres Strait Vessel Traffic Service (REEFVTS)*]

3. Extracts: MO 54, Issue 5, 2011.

Purpose (Provision 4)

This Part [MO 54]:

(a) makes provision for pilotage provider operations;

(b) makes provision for licensed pilots and the performance of pilot duties;

(c) designates the Torres Strait as a compulsory pilotage area;

(d) prescribes required information for application for an exemption from the requirement to navigate with a pilot.

Definitions (Provision 6)-selected

In this Part [MO 54]:

Act means *Navigation Act 1912*.

Note: Terms used in this Part have the same meaning that they have in the Act. For example, the following terms are defined in the Act:

- Australian coastal sea
- licensed pilot
- pilot
- pilotage provider
- ship.

Demerit infringements and points (Provision 36)

36.1 A pilotage provider incurs demerit points if the provider is responsible for a infringement against a provision mentioned in table 36.3.

36.2 The number of demerit points incurred for a demerit infringement is the number mentioned in table 36.3 for the infringement.

Table 36.3 Demerit grounds and points

Item	Provision	Description	Demerit Points
1	54	Fail to report incident within 4 hours after the incident occurred	2
2	54	Fail to report incident within 10 hours after the incident occurred	5
3	51	Fail to produce records or information	5
4	46	Fail to ensure that pilot holds Certificate of Medical Fitness	18
5	29	Fail to comply with direction that is disciplinary action	18
6	47	Fail to ensure that pilot remains onboard piloted ship in pilotage area unless authorised by AMSA	18
7	48	Fail to ensure pilot complies with under keel clearance requirements	18
8	57	Fail to ensure pilot complies with the pilotage provider's fatigue risk management plan	21

36.3 A provider who incurs demerit points for an infringement mentioned in item 2 of table 36.3 does not incur demerit points for an infringement mentioned in item 1 of table 36.3 for the same incident.

Safety management system (Provision 44)

The following are conditions of a pilotage provider licence:

(a) that the provider have a safety management system and that the provider complies with the system;

(b) that the provider monitor the implementation, operation and effectiveness of the provider's safety management system;

(c) that the provider undertake internal audits of the safety management system at least once in each calendar year;

(d) that the provider ensures that each licensed pilot whom the provider assigns to the transit of a ship through a pilotage area, whether as employee of the provider or otherwise, complies with the safety management system;

(e) that the provider makes the safety management system available in a place where pilots whom the provider assigns to the transit of ships have access.

Note For compliance with the safety management system by licensed pilots-see Division 6.

Pilot training (Provision 55)

It is a condition of a pilotage provider licence that the pilotage provider provides the training that a licensed pilot must undertake for provision 97.

Meaning of *safety management system* (Provision 60)

In this Part [MO 54]:

Safety management system, for a pilotage provider, means a system for coordinating and managing the provider's operations that minimises the risk of personal injury and environmental damage.

Note A safety management system for a pilotage provider is initially approved by AMSA when the provider applies for a licence-see pr 10. A change in the safety management system is approved through the approval of an amendment to the pilotage provider licence-see pr 15 and 16.

Mandatory requirements (Provision 62)

62.1 A safety management system for a pilotage provider must describe the following to the satisfaction of AMSA:

(a) how the provider's work practices are conducted safely;

(b) how the provider complies with the applicable fatigue risk management plan;

(c) how risks are identified and minimised;

(d) how the provider complies with the Act;

(e) how the provider ensures that all licensed pilots are trained to comply with this Part;

(f) how the provider ensures compliance with the under keel clearance requirements.

62.2 The safety management system must include the following information:

(a) requirements for internal audits;

(b) how the system is revised and kept up to date;

(c) a statement of the procedures for carrying out corrective actions;

(d) incident reporting and investigation methods;

(e) a drug and alcohol policy for staff of the provider and people employed or contracted by the provider.

Requirements for pilots (Provision 63)

A safety management system for a pilotage provider must include provisions that, to the satisfaction of AMSA, ensure that licensed pilots employed or contracted by the provider do the following:

(a) understand the safety management system;

(b) conduct pilotages in accordance with this Part;

(c) have appropriate resources to undertake pilotages under this Part.

Restricted and unrestricted pilots licences (Provision 93)

93.1 It is a condition of a restricted pilot licence and unrestricted pilot licence that the licensed pilot must do the following:

(a) give information and advice to the Master of the ship to assist the Master and the ship's navigating officers to make safe passage through the pilotage area;

(b) remain onboard a ship whenever the ship is in the pilotage area unless otherwise authorised by AMSA;

(c) comply with the Act;

(d) consider and take into account the pilot advisory notes;

(e) prepare a detailed passage plan for the pilotage of a ship that:

(i) uses the approved passage plan model, specific to the ship being piloted; and

(ii) is agreed with the Master of the ship;

(f) take into account relevant information regarding the ship including information provided by onboard systems and external aids to navigation;

(g) confirm with the master all emergency plans relevant to the ship and the pilot's role in the plans;

(h) ensure correct communications procedures are used for VHF radio and any other equipment that may be used during the pilotage;

(i) promote and practise the principles of bridge resource management in accordance with STCW Code, Part 3-1, s B-VIII/2, made under the STCW Convention;

(j) comply with the Safety Management System of the pilotage provider engaging the pilot to conduct the pilotage;

(k) comply, as much as practicable, with the Safety Management System of the ship being piloted;

(l) comply with the applicable fatigue risk management plan;

(m) for subparagraph 51.1 (a) (iv) — give the pilotage provider the service date of a personal flotation device used by the pilot;

(n) if the pilot holds an unrestricted pilot licence for the Whitsundays pilotage area and is permitted to anchor in the area — anchor in the area in accordance with the conditions of anchoring in the area;

(o) comply with the under keel clearance requirements;

(p) tell the provider of any incident involving the ship being piloted, no later than 2 hours after the incident occurs.

Examples for part (f)

- malfunctioning onboard equipment
- aids to navigation such as buoys

Note It is a condition of a pilotage provider licence that the provider must produce records of service dates of personal flotation devices used by pilots or pilot launch crew engaged by the provider — see pr 51.1 (a) (iv).

93.2 It is a condition of a restricted pilot licence and an unrestricted pilot licence that the pilot, however described, perform the duties mentioned in this provision with the appropriate skill, care and attention to ensure the safe passage of the ship the pilot is piloting.

93.3 In this provision:

applicable ***fatigue risk management plan*** means:

(a) if the pilot is contracted or employed by a pilotage provider for whom a fatigue risk management plan has been approved under provision 59 — the approved fatigue risk management plan for the provider; or

(b) if the pilot is contracted or employed by a pilotage provider for whom a fatigue risk management plan has not been approved under provision 59 — the fatigue risk management plan published by AMSA.

pilot advisory note means a note made by AMSA published by AMSA.

Note 1 For pilot advisory notes — see http://www.amsa.gov.au.

Note 2 Failure to comply with a condition mentioned in this provision is a ground for disciplinary action — see pr 88.

STCW Convention — see Act, s 9A.

Compliance with safety management system (Provision 96)

It is a condition of a pilot licence that the licensed pilot complies with the safety management system of the pilotage provider who employs or engages the pilot.

APPENDIX D: CHECK PILOT SYSTEM ITEMS

This appendix provides information from the standard AMSA document for check pilot assessments. The performance criteria, the check pilot's aide memoire and the pilot audit and check list from the 2007 version of the standard document are included below. The previous version (2004) of the standard document was similar in these respects. All check pilot assessments undertaken until 1 January 2011 were conducted in accordance with these performance criteria and most of the check pilots used the standard AMSA document.

1. Performance Criteria (PC) and Check Pilot's Aide Memoire items

Comments can be added to each PC assessment. The check for each item is answered by Yes or No, except where specific details are to be inserted.

PC 1: Can the pilot demonstrate that his fatigue status is compliant with the QCPSMC?

- Completion date & time of last pilotage
- Did the pilot look well rested before the assessment

PC 2: Can the pilot describe the effectiveness of his Passage Plan?

- Did the pilot have a completed and effective passage plan?

PC 3: Is the Pilot's Conduct and Appearance suitable and is the pilot in possession of a current Pilot Licence?

- Correct wearing of life-jacket and any other safety equipment
- Lifejacket last serviced [date]
- Wearing appropriate footwear
- Neatly attired
- Pilots Licence sighted

PC 4: Did the pilot carry up to date publications?

- Full set of corrected charts (or chartlets)
- Queensland Tide Tables
- AMSA Tide Tables
- Notices to Mariners Annual Summary
- Ausrep/Reefrep Booklet
- Reef Guide

PC 5: Did the Pilot demonstrate effective communication with the Master and Bridge Team for successful Passage Planning?

1. Did the pilot receive a Pilot Card?
2. Did the pilot use a Check List?
3. Did the pilot present a Passage Plan?
4. Did the Passage Plan include & was the following discussed?

- The planned track, showing courses in 360 degree notation
- Alter Course positions, showing lat/long & brg/dist from object
- The allowable cross track error for each track
- Clearing distances for use with parallel indexing

- Danger areas adjacent to intended track and no go areas
- Areas where charts can be changed
- Gyro and Compass errors
- Areas where the pilot may leave the bridge
- Areas of restricted water depth along intended track
- Areas dependant on tides to produce sufficient depth
- Graphs of tides and tidal windows in POW and Booby Island
- Use of transmitting tide gauges
- Areas where speed reduction is required to maintain UKC
- Anchorages used for waiting for tides
- Areas of potential currents and tides
- Emergency anchorages
- Radar conspicuous objects for position fixing or parallel indexing
- Visual clearing marks, transits for use in avoiding no go areas
- Areas where change in main engine status is required
- Areas where hand steering is required
- Areas where personnel are required to standby the anchors

5. Did the pilot have up to date Navigation Warnings?

6. Did the pilot have the latest weather report?

7. Did the pilot ensure that any deviation from the passage plan was confirmed with the bridge team?

PC 6: Did the pilot demonstrate the requirements of, and carry out the correct use of the VHF?

- Reef Reporting system and correct VHF reporting
- Ensure one VHF tuned to channel 16 with ample volume
- All ship's broadcast made for P.O.W. Channel
- Discretion and VHF Etiquette
- Use of standard marine communication phrases

PC 7: Did the pilot demonstrate effective Bridge Resource Management?

- Communication – Open, interactive, closed loop
- Briefings and de-briefings
- Challenge and response
- Short term strategy
- Delegation
- Clear unambiguous conning orders

PC 8: Did the pilot confirm the manoeuvring characteristics of the vessel?

- Location of manoeuvring data display
- Sea speed and manoeuvring speeds
- Stopping distances and turning circles
- Minimum speed required prior engine astern
- Any particular engine requirements i.e. critical rpm etc.

PC 9: Did the pilot discuss procedures for recall to bridge after rest break and use safe rest break management?

- Clearly mark "Call Pilot" well before the nearest hazard

- Advise the OOW of any traffic to be encountered
- Advise the OOW of expected tidal streams to be encountered
- Clearly mark all hazards, no go areas on the chart
- Check auto-pilot set in auto and adjusted to correct heading
- Establish procedures for recall to the bridge
- Advise OOW of any navigational requirements, fix frequency etc
- Procedures in the event of reduced visibility
- Procedures if any traffic/fishing vessels causing concern
- Set personal timer/alarm clock

n.b. If assessment voyage is in either Hydrographers Passage or the Great North East Channel (where rest may not occur) please simulate these questions to the candidate

PC 10: Can the pilot discuss effective Contingency Plans for the voyage?

- Did any extraordinary situations occur?

If Yes, discuss below type of situation and pilots reaction
If No, simulate different scenarios and ask for pilot's response

PC 11: Did the pilot have an understanding of the limitations of electronic charting and navigation equipment?

Did the pilot understand limitations/errors of:

- Electronic charting equipment
- GPS and GPS Datums
- Radar errors
- AIS

PC 12: Did the pilot demonstrate knowledge of traditional (non electronic) piloting techniques?

Yes or No

PC 13: Did the pilot demonstrate Compliance with Code of Conduct and Fatigue Management and QCPSMC?

- Was the pilot aware of the latest Code of Conduct?
- Did the pilot comply fully with the Code of Conduct?
- Pilot aware of the Queensland Coastal Pilots Safety Management Code
- Pilot aware of Approved Fatigue Management Plan
- Pilot aware of Pilot Advisory Notes
- Pilot aware of Accident and Incident Reporting Procedures
- Procedures if Pilot taken ill and unable to continue pilotage
- Providers procedures for dealing with end of pilotage paperwork
- Providers procedures for dealing with work/rest reporting requirements
- Pilot aware of Providers Environmental, Safety and Other Policies.

PC 14: Did the pilot demonstrate a satisfactorily general execution of the pilotage task?

- Was the pilotage task executed:
  Safely
  Successfully
  If No, list reasons below:

2. Pilot Audit and Check List

Pilot Audit & Check List

The original of this checklist and comments page is to be submitted to AMSA with a copy to the pilot's provider company when completed

	Satisfactory	Unsatisfactory	Comments
Fatigue status compliant with the QCPSMC	☐	☐	
Effective Passage Plan	☐	☐	
Appearance, PPE and in possession of pilots license	☐	☐	
Carrying up to date publications	☐	☐	
Effective initial communication with bridge team and master	☐	☐	
Correct VHF use	☐	☐	
Effective use of BRM	☐	☐	
Confirm vessels manoeuvring characteristics	☐	☐	
Effective and safe rest break management	☐	☐	
Effective contingency plans	☐	☐	
Understand limitations of electronic bridge equipment	☐	☐	
Demonstrate traditional pilotage techniques	☐	☐	
Compliance with applicable codes	☐	☐	
Overall Assessment	☐	☐	

Check Pilot
AMSA March 2007

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APPENDIX E: SOURCES AND SUBMISSIONS

Sources of Information

The sources of information during the investigation included:

All 82 licensed coastal pilots

Australian Reef Pilots

Torres Pilots

Hydro Pilots

Australian Maritime Safety Authority

Maritime Safety Queensland

Department of Infrastructure and Transport

Australian Hydrographic Service

Australasian Maritime Pilots Institute

International Maritime Pilots Association

ASP Ship Management

BP Australia

P&O Maritime Services

National Bulk Commodities Group

Shipping Australia

Ports Australia

Brisbane Marine Pilots

Sea Torres and Reef Pilots

International Group of P&I Clubs

Trinity House, London

Japan Transport Safety Board

Marine Consultancy Group

Great Barrier Reef Marine Park Authority

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<http://www.atsb.gov.au/publications/investigation_reports/1994/mair/mair74.aspx><http://www.atsb.gov.au/publications/investigation_reports/1995/mair/mair79.aspx><http://www.atsb.gov.au/publications/investigation_reports/1996/mair/mair95.aspx><http://www.atsb.gov.au/publications/investigation_reports/1996/mair/mair103.aspx><http://www.atsb.gov.au/publications/investigation_reports/1997/mair/mair112.aspx><http://www.atsb.gov.au/publications/investigation_reports/1997/mair/mair119.aspx><http://www.atsb.gov.au/publications/investigation_reports/1997/mair/mair120.aspx><http://www.atsb.gov.au/publications/investigation_reports/1997/mair/mair127.aspx><http://www.atsb.gov.au/publications/investigation_reports/1999/mair/mair147.aspx><http://www.atsb.gov.au/publications/investigation_reports/2000/mair/mair156.aspx><http://www.atsb.gov.au/publications/investigation_reports/2000/mair/mair162.aspx><http://www.atsb.gov.au/publications/investigation_reports/2002/mair/mair182.aspx><http://www.atsb.gov.au/publications/investigation_reports/2002/mair/mair182.aspx><http://www.atsb.gov.au/publications/investigation_reports/2009/mair/262-mo-2009-001.aspx><http://www.atsb.gov.au/publications/investigation_reports/2010/mair/274-mo-2010-003.aspx>

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Submissions

Under Part 4, Division 2 (Investigation Reports), Section 26 of the *Transport Safety Investigation Act 2003*, the ATSB may provide a draft report, on a confidential basis, to any person whom the ATSB considers appropriate. Section 26 (1) (a) of the Act allows a person receiving a draft report to make submissions to the ATSB about the draft report.

A draft of this report was provided to all coastal pilots, the Australian Maritime Safety Authority, Australian Reef Pilots, Torres Pilots, Hydro Pilots, Mackay Helicopters, Maritime Safety Queensland, Great Barrier Reef and Torres Strait Vessel Traffic Service (REEFVTS), Department of Infrastructure and Transport, Australian Hydrographic Service, Australasian Maritime Pilots Institute, Australian Shipowners Association, Ports Australia, Great Barrier Reef Marine Park Authority, International Maritime Pilots Association, ASP Ship Management, BP Australia , P&O Maritime Services, National Bulk Commodities Group, Shipping Australia, Brisbane Marine Pilots, Sea Torres and Reef (STAR) Pilots, Marine Consultancy Group, International Group of P&I Clubs and Whitsunday Helicopters.

Submissions were received from 71 coastal pilots, the Australian Maritime Safety Authority, Australian Reef Pilots, Torres Pilots, Maritime Safety Queensland, Great Barrier Reef and Torres Strait Vessel Traffic Service (REEFVTS), Department of Infrastructure and Transport, Australasian Maritime Pilots Institute, Australian Shipowners Association, Ports Australia, Great Barrier Reef Marine Park Authority, International Maritime Pilots Association, National Bulk Commodities Group, Shipping Australia, Brisbane Marine Pilots, Sea Torres and Reef (STAR) Pilots, Marine Consultancy Group and International Group of P&I Clubs. The submissions were reviewed and where considered appropriate, the text of the report was amended accordingly.

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Investigation

ATSB Transport Safety Report
Marine Safety Issue Investigation

Safety issue investigation into
Queensland Coastal Pilotage

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