



Australian Government
Australian Transport Safety Bureau

Under reporting of aviation wirestrikes



Research

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Aviation Research Report
AR-2011-004
Final



Australian Government
Australian Transport Safety Bureau

ATSB TRANSPORT SAFETY INVESTIGATION REPORT

Aviation Research and Analysis Report

AR-2011-004

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Under reporting of aviation wirestrikes

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CONTENTS

THE AUSTRALIAN TRANSPORT SAFETY BUREAU	v
TERMINOLOGY USED IN THIS REPORT	vi
SAFETY SUMMARY	vii
1 INTRODUCTION	1
1.1 The Transport Safety Investigation Act 2003 and the Transport Safety Investigation Regulations 2003.....	2
2 COLLECTION OF DATA.....	5
2.1 Data sources.....	5
2.2 The ATSB aviation accident and incident database.....	6
2.3 Data from electricity distribution and transmission companies.....	6
3 ANALYSIS OF WIRESTRIKES	7
3.1.1 Unreported wirestrike occurrences	7
3.1.2 TSI Act commencement	9
3.1.3 Locations.....	10
3.1.4 Operation type	12
3.1.5 Aircraft type	13
3.1.6 Injury and damage levels	14
3.1.7 Time of year	15
3.1.8 Pilot awareness.....	16
4 CURRENT INITIATIVES TO REDUCE AVIATION WIRESTRIKES.....	17
4.1 ATSB research and education about wirestrikes	17
4.2 Electronic Terrain and Obstacles Database	17
4.3 Marking of wires.....	18
4.4 Wirestrike avoidance initiatives by electricity distribution and transmission companies.....	19
4.5 Wirestrike avoidance initiatives by the Aerial Agricultural Association of Australia	22

5	ANALYSIS OF UNDER REPORTING.....	25
6	FINDINGS	27
7	SAFETY ACTIONS.....	29
7.1	Australian Transport Safety Bureau.....	29
7.2	NSW Department of Trade and Investment	30
8	REFERENCES	31
	APPENDIX A: SOURCES AND SUBMISSIONS	33
	APPENDIX B: LOCATIONS OF WIRESTRIKES BY STATE.....	37

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

Accident: an investigable matter involving a transport vehicle where:

- (a) a person dies or suffers serious injury as a result of an occurrence associated with the operation of the vehicle; or
- (b) the vehicle is destroyed or seriously damaged as a result of an occurrence associated with the operation of the vehicle; or
- (c) any property is destroyed or seriously damaged as a result of an occurrence associated with the operation of the vehicle.

Incident: An occurrence, other than an accident, associated with the operation of a transport vehicle which affects or could affect the safety of operation.

Occurrence: accident or incident.

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.

Serious incident: An incident involving circumstances indicating that an accident nearly occurred.

SAFETY SUMMARY

Why have we done this report?

All incidents and accidents affecting aviation safety are required to be reported to the Australian Transport Safety Bureau (ATSB) under the *Transport Safety Investigation Act 2003*. However, anecdotal evidence suggested that there has been an under reporting of aviation wirestrikes in Australia by pilots and others in the industry.

To determine if this was the case, electricity distribution and transmission companies and a telecommunications company, who are not responsible for reporting aviation occurrences to the ATSB, were asked to provide the ATSB with data on any aviation wirestrike they were aware of on their network. This report also documents existing initiatives these companies have taken to reduce wirestrikes on their networks.

What the ATSB found

This research investigation found that, based on data from electricity distribution and transmission companies, at least 40 per cent of wirestrike occurrences in Australia between July 2003 and June 2011 had not been reported to the ATSB.

It was also found that many electricity distribution and transmission companies produce safety education material for pilots and land owners warning them of the dangers of wires from the air and from the ground. Others also actively liaise with aerial agricultural and balloon operators to promote strategies in managing wires while flying.

Safety message

It is important that all aviation wirestrikes are reported to the ATSB so that they can be investigated (if required) and so that occurrence details can be collected for research purposes to identify emerging safety trends. Information reported to the ATSB increases our understanding of wirestrikes, the trends, as well as how and why they happen. It is only with reported information that the ATSB can improve aviation safety by establishing the true extent of wirestrikes and determining how and where they occur so that actions can be directed towards the most appropriate areas to reduce wirestrikes.

Pilots and operators involved in a wirestrike occurrence should report to the ATSB. Notifications can be made via the toll free number 1800 011 034 (available 24/7) or via the ATSB notification website <http://www.atsb.gov.au/mandatory/asair.aspx>.

What's been done?

The ATSB will engage in a range of safety actions aimed at increasing the reporting of wirestrikes. These safety actions include promoting safety messages to the aviation industry, wire infrastructure owners and state regulators with an oversight of powerlines, with respect to the importance of reporting wirestrikes. The ATSB is also proposing changes to the Transport Safety Investigation Regulations 2003 to the Government, which are expected will be agreed and released in September 2012, to make it clearer that all aviation wirestrikes are required to be reported to the ATSB based on the premise that any contact with a wire during flight always has an adverse effect or a potential adverse effect on safety.

1

INTRODUCTION

From July 2003 to mid-June 2011, there were 166 aircraft wirestrikes in Australia that were reported to the Australian Transport Safety Bureau (ATSB). The majority of these wirestrikes did not result in a fatality.

About half of the aircraft that struck electrical, telecommunication and other wires were engaged in the low flying activity of crop spraying. Another 17 per cent were involved in other aerial work activities such as aerial stock mustering, fire control, and survey and photography. Other wirestrikes have occurred during takeoff or landing, especially for balloons and emergency situations such as forced landings away from an aerodrome. However, some wirestrikes have also occurred in situations where the pilot engaged in unauthorised low flying such as sightseeing or 'buzzing'.

Regardless of the reason for a wirestrike, all occurrences affecting aviation safety are reportable matters to the ATSB under the *Transport Safety Investigation Act 2003* (TSI Act). It is important that all aviation wirestrikes are reported to the ATSB to allow the opportunity for investigation and the collection of accurate data for research purposes. Information reported to the ATSB increases the understanding of wirestrikes, the identification of trends, as well as how and why they happen. It is only from reported information that the ATSB can improve aviation safety by establishing the true extent of wirestrikes and determining the circumstances in which they occur. This allows safety actions to be directed towards the most appropriate areas to help reduce wirestrikes.

Notifications of aviation safety related occurrences can be made to the ATSB via the toll free number 1800 011 034 (available 24/7) or via the ATSB notification website <http://www.atsb.gov.au/mandatory/asair.aspx>.

In addition, it is also important for involved persons to notify the wire infrastructure owner of a wirestrike, whether they be an electricity or a telecommunication company or a private wire owner, as there may be ramifications to the wider community, including the risk of electrocution and fires.



Electricity conductors and detached rudder horn (Investigation AO-2010-026)

The reliability of the ATSB database depends on compliance with reporting requirements and accurate reporting. Pilots may not report a wirestrike for a number of reasons. They may fear reprimand for damaging the wire or being liable for the cost of repairs; the wirestrike may have occurred while engaged in unauthorised low flying; or they were not aware of the reporting requirements. Incidents where there is little or no injury or damage are probably less likely to be reported to the ATSB than those that result in more severe consequences. Wirestrikes have the potential to be devastating or may result in no damage and/ or injuries. Hence, the ATSB recognises that there may be an under-reporting with regards to wirestrikes.

This research investigation was initiated after anecdotal information from a number of areas within the aviation industry suggested that the number of wirestrikes in Australia was higher than that reported to the ATSB.

The aim of this investigation was to obtain aviation wirestrike occurrence information from sources outside of the aviation industry. It was considered that a potentially fruitful source of wirestrike information may come from the owners of wires, as strikes with aircraft usually result in damaged wires or disrupted electricity or telecommunications services.

The objectives of the investigation were to:

- ascertain whether there was actually an under reporting of wirestrikes in Australia by collecting and analysing aviation wirestrike records held by electricity distribution and transmission companies and telecommunication companies ; and
- document any current initiatives that electricity distribution and transmission companies and telecommunication companies have taken or are taking to help reduce the incidence of wirestrikes on their network.

1.1 The Transport Safety Investigation Act 2003 and the Transport Safety Investigation Regulations 2003

In accordance with the *Transport Safety Investigation Act 2003* (TSI Act), all accidents and incidents related to flight safety in Australia or by Australian operators overseas must be reported to the ATSB. The TSI Act also allows the ATSB to investigate transport safety matters in the aviation, marine and rail transport modes within the Australian Government's constitutional jurisdiction.

The Transport Safety Investigation Regulations 2003 (TSI Regulations) detail the reporting requirements for aviation safety occurrences. An immediately reportable matter is a serious transport safety matter that covers occurrences such as accidents involving death, serious injury, destruction of, or serious damage to vehicles or property or when an accident nearly occurred. A routine reportable matter is a transport safety matter that has not had a serious outcome and does not require an immediate report, but where transport safety was affected or could have been affected.

Immediately reportable matters must be reported to the ATSB by a responsible person by telephone¹ as soon as reasonably practicable. Both immediately and

¹ If telephone communication is not reasonably available, immediate reports can be from another form of telecommunication or radio communication.

routine reportable matters are to be reported to the ATSB in writing by responsible persons within 72 hours of the occurrence. Responsible persons include the crew member of the aircraft concerned or the owner or operator of the aircraft.

Under definitions in the TSI Regulations (as amended 1 July 2009), most wirestrike occurrences are regarded as a reportable matter. Although there is an intended requirement for all wirestrikes to be reported, there may be occasions where it seems a wirestrike occurrence does not meet any of the reportable criteria. In particular, the provision in the regulations attached to some reportable matters that safety could have been affected, is open to interpretation. For example, this is the case when an on-board wire cutter severs a wire upon contact resulting in little or no damage to the aircraft and/ or resulting in no issues with aircraft control.

More information on the TSI Act 2003, TSI Regulations, and reporting requirements can be found on http://www.atsb.gov.au/about_atsb/legislation.aspx.

2.1 Data sources

All major commercial wire owners in Australia, comprising 20 electricity distribution and transmission companies and one telecommunication company, Telstra, were approached by the ATSB and asked to supply a list of all recorded wirestrikes involving their infrastructure. Companies or individuals that take supply from an electricity network operator using their own private powerlines were not approached as there are an unknown number of private powerline owners.

All companies were provided with a request for evidential material under section 32² of the TSI Act, requiring them to produce aircraft wirestrike records on their infrastructure to the ATSB since July 2003³. They were also asked to provide documentation showing any initiatives the companies had engaged in to prevent or reduce the incidence of aviation wirestrikes, and information detailing the extent of their networks.

All electricity distribution and transmission companies contacted were able to supply the ATSB with data. However, the telecommunication company informed the ATSB that it was not possible for them to obtain the required data as it does not have a single repository where it was possible to cost effectively identify and extract data on wirestrikes. For this reason, the request to this company for evidential material was withdrawn.

A list of the companies who were contacted is provided in Appendix A.



Investigation AO- 2011-046

² Section 32 is a provision in the TSI Act which compels a person to provide the ATSB with evidential material. Section 32 also protects this information as restricted information under section 3 of the TSI Act.

³ The TSI Act, which required mandatory reporting of safety occurrences to the ATSB, was effective from 1 July 2003.

2.2 The ATSB aviation accident and incident database

The ATSB database was searched for wirestrike occurrences that happened between July 2003 and 12 June 2011 (the date of the latest occurrence reported by the electricity distribution and transmission companies).

For all aviation occurrences, the ATSB collects information about the aircraft, the individual or individuals involved, the location, date and time, the type of operation, the airspace and the environment, the injury and damage, and the organisation (if applicable). In relation to wirestrikes, other information collected includes:

- the type of wire that was contacted
- whether there was a cable marker
- whether wire protection was fitted to the aircraft and whether the protection was effective
- whether the pilot was aware of the wire
- where the wire contacted the aircraft.

2.3 Data from electricity distribution and transmission companies

Wirestrike occurrences that were provided by the electricity distribution and transmission companies were cross-checked against those that were in the ATSB database. The ATSB asked for information relating to the date and time, location and registration of the aircraft (if known). In some cases, electricity distribution and transmission companies also provided information such as the aircraft type and a brief description of the occurrence.

Data completeness

The type of information collected by electricity distribution and transmission companies as a result of an electricity outage usually included the location, the type of wire damaged, the extent of the outage, the reason for the outage (in this case, an aviation wirestrike), and the repairs carried out. It was not often that electricity distribution and transmission companies collected, or knew about, the type of aircraft, its registration, or type of flying activity, of the aircraft involved in the wirestrike.

In some cases, the electricity company had information from a witness that an aircraft had struck the wire, or that an aircraft was flying in the vicinity just before the wirestrike. However, in other cases, given the height of the wire, a broken wire was assumed to have been the result of an aircraft strike when there was no other evidence to suggest otherwise.

For these reasons, the wirestrike information collected by electricity distribution and transmission companies was generally not as detailed as the information collected when a responsible person directly reported to the ATSB.

3.1.1 Unreported wirestrike occurrences

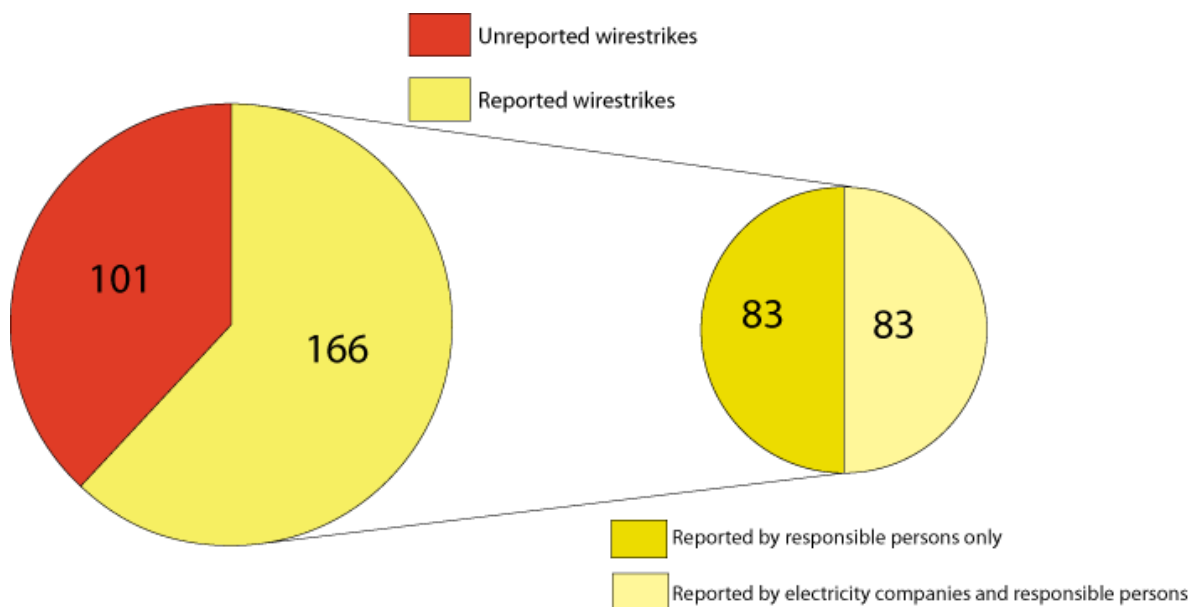
The result of this investigation indicates that there has been a large under reporting of wirestrikes in Australia.

Since the data collection for this investigation, the ATSB now knows of about 267 wirestrike occurrences throughout Australia between July 2003 and 12 June 2011 – this number is made up of the 101 wirestrike occurrences that were not previously reported to the ATSB (about 40 per cent) and the 166 cases that were reported prior to the initiation of this research investigation (Figure 1).

Those wirestrikes that were not originally reported to the ATSB, but were subsequently reported by the electricity distribution and transmission companies are regarded as ‘unreported wirestrikes’, while those that were reported directly to the ATSB prior to this investigation are regarded as ‘reported wirestrikes’.

Electricity distribution and transmission companies reported 184 wirestrikes in total. One hundred and one of these (55 per cent) were unreported while 83 wirestrikes had already been reported to the ATSB by responsible persons.

Figure 1: Wirestrike reporting between July 2003 and 12 June 2011



Half of the wirestrikes already in the ATSB database (83 occurrences) were not in the data provided by the electricity distribution and transmission companies. This suggests that the real incidence of unreported wirestrikes may be significantly higher than obtained by this investigation. This is probably due to a combination of three reasons.

First, the telecommunications company was unable to provide the ATSB with information of wirestrikes on its network as it does not have a single repository where it was possible to cost effectively identify and extract wirestrike information. Although most of the company's network is underground, it also reported that there

is in excess of 37,000 km of aerial cable on its Physical Network Inventory. As a result, a significant proportion of the wirestrike exposure could not be obtained.

Second, some wirestrikes involved privately owned electrical wires, including some large networks by non-electricity companies and individuals.

Thirdly, the electricity distribution and transmission companies may have been unaware of some wirestrikes on their networks for a number of reasons:

- not all powerlines were cut or only the earth return wire was cut when the aircraft made contact, so electricity supply would have been unaffected
- some powerlines struck were disused so even when the wire was cut, the network was unaffected
- not all wirestrikes were captured in the electricity distribution and transmission companies' database. For example, the electricity supply may have been restored locally or by contracted companies and head offices were not informed of the repair.
- some occurrences involved non-electrical wires, such as telecommunication wires.

Of the 267 wirestrike occurrences, 70 were classed as accidents and 196 were classed as serious incidents (see section on *Terminology used in this report*). Only one was regarded as an incident.⁴



Investigation AO-2011-030

⁴ In this particular case, the balloon had landed, passengers had exited the balloon and the balloon was deflating when a gust of wind caused the balloon envelope to contact high voltage powerlines.

3.1.2 TSI Act commencement

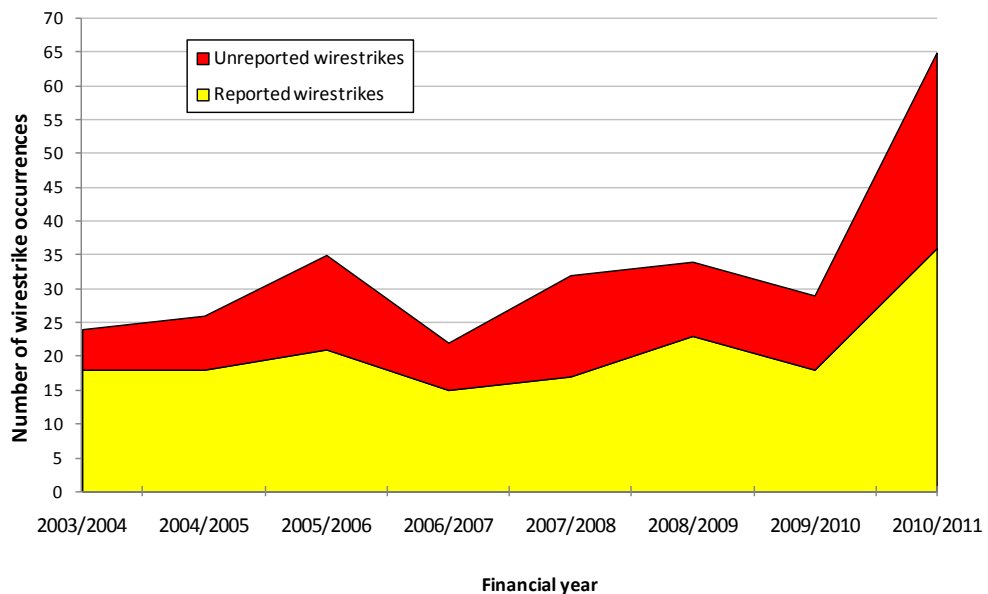
It was expected that there would be a greater incidence of under reporting closer to the commencement of the TSI Act in 2003 as industry may not have yet been familiar with the mandatory reporting requirements. Moreover, the current TSI Regulations are unclear about whether *all* wirestrikes should be reported, particularly those that were of little or no consequence in terms of injury, damage to the aircraft or the controllability of the aircraft.

Figure 2 shows that contrary to the above expectation, there appears to be an increasing trend towards under reporting. Reported wirestrikes followed a similar upwards pattern. This pattern suggests that there is an increasing trend towards wirestrikes – with more wirestrikes being reported and more also going unreported.

However, note that this finding should be interpreted with caution as it was somewhat difficult to assess the extent of under reporting around the commencement of the TSI Act for two reasons. Firstly, the telecommunication company was unable to provide the ATSB with wirestrike information.⁵ Secondly, while all companies were asked to provide data since 2003, only three electricity distribution and transmission companies did so. It is possible that some electricity companies did not capture wirestrike occurrences dating back to 2003.

Data from the BITRE (2012) shows that the flying hours by agricultural aircraft jumped almost 42 per cent from 73,271 hours in 2009 to 103,793 hours in 2010. This increase in agricultural flying activity may account, at least in part, for the rise in wirestrike occurrences between these 2 years.

Figure 2: Number of wirestrikes by financial year

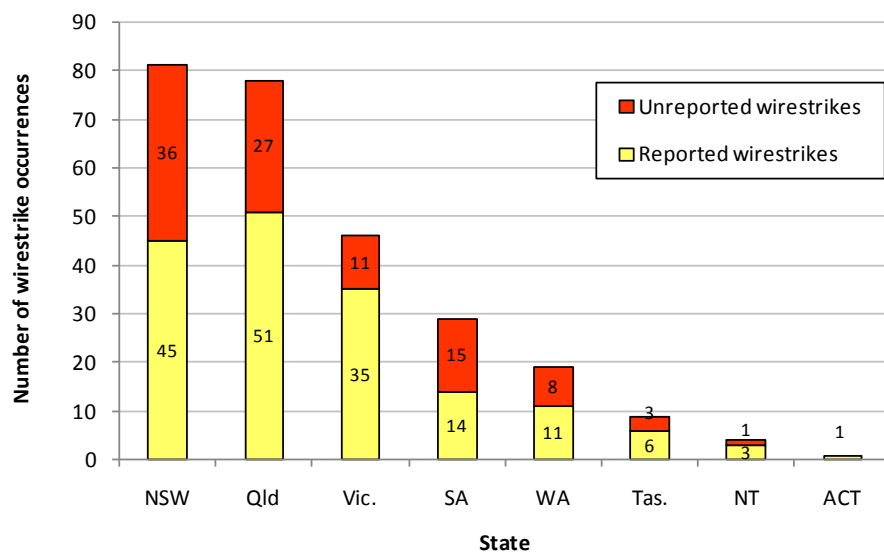


⁵ The company does not have a single repository where it was possible to cost effectively identify and extract wirestrike data.

3.1.3 Locations

Figure 3 shows that New South Wales (NSW) had the greatest number of wirestrikes closely followed by Queensland (Qld). Victoria (Vic.) had the third highest number of wirestrikes. The majority of wirestrikes (77 per cent) were concentrated in these eastern states. This concentration was to be expected as there is more aerial agricultural activity, and thus low-level flying, in these states compared with other states (BITRE, 2012). Conversely, in the Northern Territory (NT), there were only four wirestrikes in the reporting period, making up only 1.5 per cent of national wirestrikes. This may be due to the relative lack of wires and/ or aerial agricultural activity in the NT.

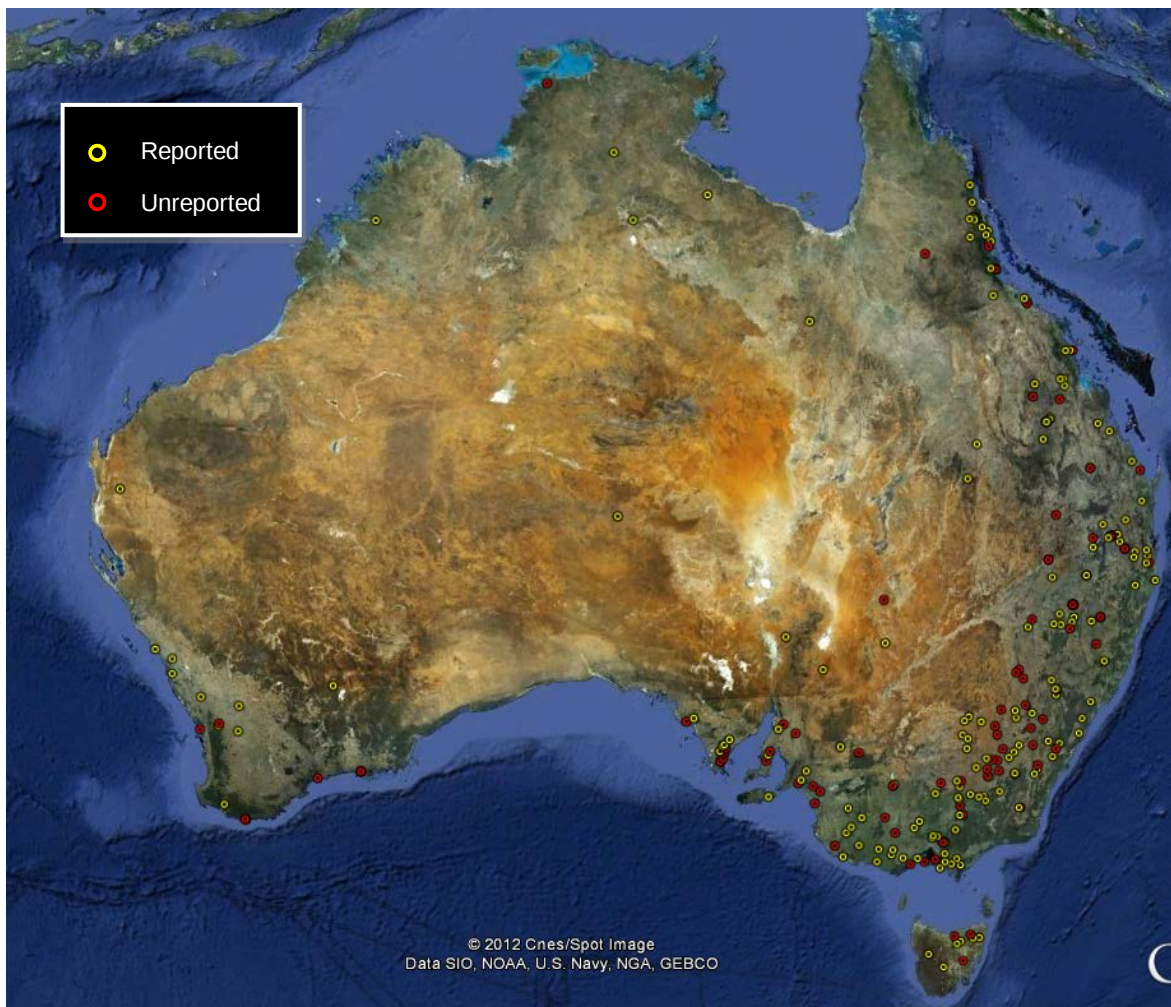
Figure 3: Number of wirestrikes by state



New South Wales made up the greatest proportion of *unreported* wirestrikes in Australia, followed by Qld. Most states had at least one-third of wirestrikes not reported to the ATSB. However, for NSW, WA and SA, this figure increased to 40 to 50 per cent of all wirestrikes.

Figure 4 shows the distribution of wirestrikes around Australia. Appendix B shows the distribution of wirestrikes in each state. Unreported wirestrikes are shown in red while reported wirestrikes are depicted in yellow.

Figure 4: Locations of wirestrikes in Australia



© Google Maps

3.1.4

Operation type

Table 1 shows the breakdown of operation types for aircraft involved in wirestrikes for all reported and unreported wirestrikes. Aircraft involved in aerial agriculture made up 49 per cent of the operation types involved in wirestrikes. Although it was the next most common operation type, ballooning made up only 9 per cent of the operation types, and these tended to occur in Qld or Vic. Next was private flying mainly for pleasure or travel, followed by sports aviation.

Table 1: Number of wirestrikes by operation type for all wirestrikes⁶

Operation type	Number	Per cent
Aerial Agriculture	132	49.4%
Ballooning	25	9.4%
Private	22	8.2%
Sports Aviation	13	4.9%
Other aerial work	10	3.7%
Survey / Photographic	8	3.0%
Gliding	6	2.2%
Aerial Mustering	6	2.2%
Fire Control	2	0.7%
Charter	1	0.4%
Emergency Medical Services	1	0.4%
Unknown	41	15.4%
Total	267	100%

For wirestrikes that were unreported, the operation type for the majority of aircraft involved in a wirestrike were unknown (42 per cent) due to the nature of the information collected. Where the operational type was recorded, aerial agriculture also made up a large percentage of operation types, followed by sports aviation (10 per cent) (Table 2).

⁶ Sports aviation includes aerobatics and parachuting. Ballooning and gliding are shown separately. Ballooning includes both private and commercial operations. Charter includes aeroplanes and helicopters only (not ballooning).

Table 2: Number of wirestrikes by operation type for unreported wirestrikes

Operation type	Number	Per cent
Aerial Agriculture	42	41.6%
Sports Aviation	10	9.9%
Ballooning	7	6.9%
Gliding	3	3.0%
Private	1	1.0%
Unknown	38	37.6%
Total	101	100%

3.1.5

Aircraft type

Of the unreported wirestrike data, 30 per cent of aircraft were of an unknown aircraft type (Table 3). Given the nature of the data provided by the electricity distribution and transmission companies, such a large number of aircraft with an unknown type was not surprising. Where the known aircraft type for unreported wirestrikes was considered alone, 65 per cent of aircraft were aeroplanes, while 11 per cent were ultralights and other recreational aeroplanes, 10 per cent balloons, and 9 per cent helicopters.

For reported wirestrike occurrences, 55 per cent of aircraft involved in wirestrikes were aeroplanes, followed by 32 per cent helicopters and 11 per cent balloons.

Table 3: Number and percent (where aircraft type known) of wirestrikes by aircraft type

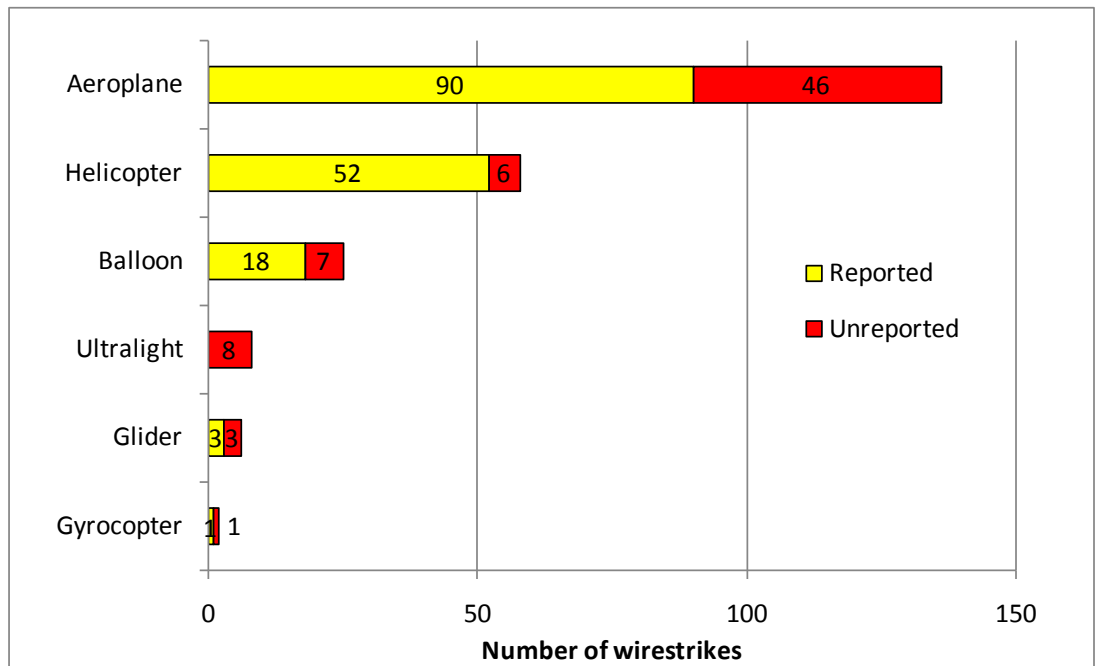
Aircraft Type	Unreported wirestrikes		Reported wirestrikes		Total wirestrikes	
	Number	Per cent	Number	Per cent	Number	Per cent
Aeroplane	46	64.8%	90	54.9%	136	57.9%
Helicopter	6	8.5%	52	31.7%	58	24.7%
Balloon	7	9.9%	18	11.0%	25	10.6%
Ultralight	8 ⁷	11.3%	0	0.0%	8	3.4%
Glider	3	4.2%	3	1.8%	6	2.6%
Gyrocopter	1	1.4%	1	0.6%	2	0.9%
Unknown	30	-	2	-	32	-
Total	101	100%	166	100%	267	100%

While about one third of all aeroplane and ballooning wirestrikes were not previously reported to the ATSB, only 10 per cent of helicopter wirestrikes were

⁷ Aircraft was described by the electricity company as an 'ultralight'.

not previously reported (Figure 5). This may be due to helicopters being more prone to aircraft damage following a wirestrike than either aeroplanes or balloons.

Figure 5: Aircraft types involved in unreported and reported wirestrikes



3.1.6 Injury and damage levels

Not all electricity distribution and transmission companies collected information on aircraft damage or level of injury. Hence, it was difficult to assess the extent of the damage and injury for wirestrikes that were only collected from electricity distribution and transmission companies.

However, within the 101 previously unreported occurrences, there were two fatal accidents which both involved ultralights.

For the 166 wirestrikes that were previously reported to the ATSB, 17 (10 per cent) of these were fatal, and a further 14 (8 per cent) resulted in serious injuries. In addition, 64 (38 per cent) of the aircraft sustained serious damage or were destroyed.

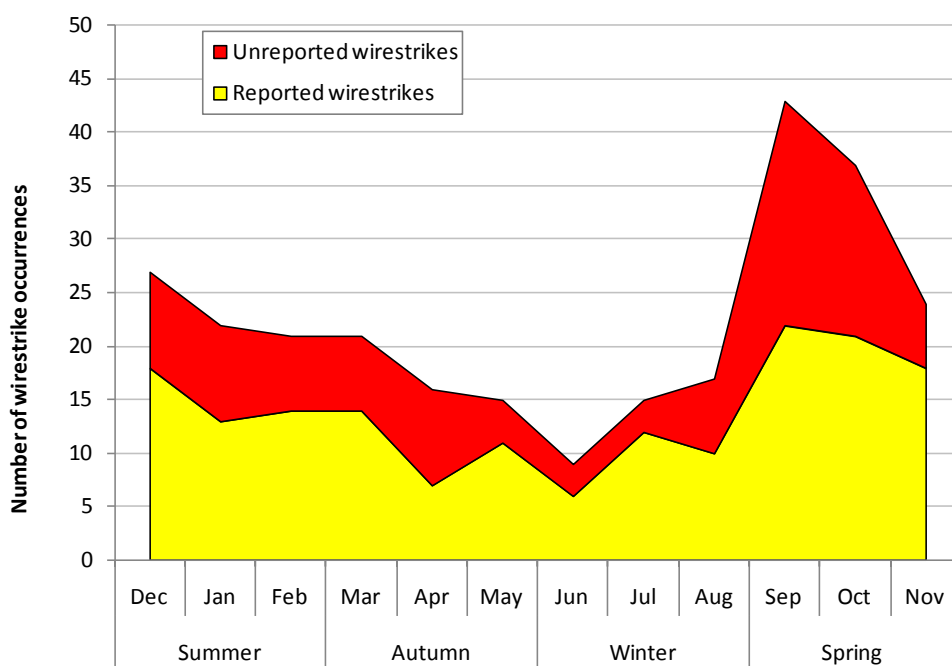


Main rotor blade witness mark tip damage (Investigation AO-2008-078)

3.1.7 Time of year

Averaged across the 8 years of the analysed data, there was a spike in wirestrikes in spring, while the winter months were associated with the lowest number of wirestrikes (Figure 6). This is not surprising given the expected increase in aerial work activity, and thus low-level flying activity, during spring and summer.

Figure 6: Number of wirestrikes by season



3.1.8 Pilot awareness

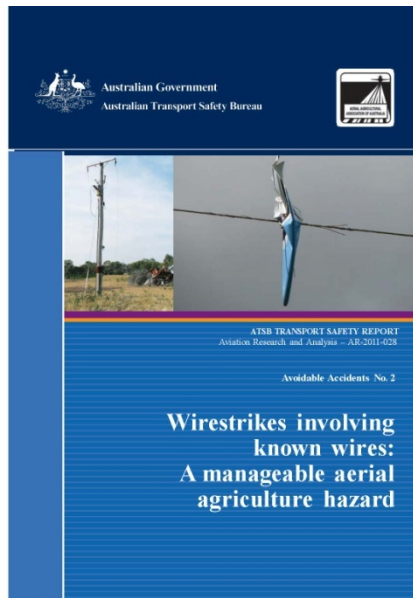
A study by the ATSB (2006) found that between 1994 and 2004, about two-thirds of pilots knew about the wire that they eventually hit. Unfortunately, for the majority of cases collected for this research investigation, this information was unavailable. Hence, the actual proportion of pilots who were aware of the wire before making contact may either be underestimated or exaggerated in the 2006 study.

4

CURRENT INITIATIVES TO REDUCE AVIATION WIRESTRIKES

4.1 ATSB research and education about wirestrikes

In the past, the ATSB has published research reports detailing the incidence of wirestrikes. Recently, the focus has shifted to providing industry with safety awareness and educational fact sheets on reducing the chances of a wirestrike. For example, *Avoidable Accidents No. 2 - Wirestrikes involving known wires: A manageable aerial agriculture hazard* (AR-2011-028) was published in 2011 as a joint ATSB and Aerial Agricultural Association of Australia (AAAA) publication. The booklet provides agricultural pilots with some strategies to manage known wires while flying. More publications related to wirestrikes and aviation safety in general can be found on <http://www.atsb.gov.au/safety-awareness.aspx>.



ATSB Research and Analysis publication AR-2011-028

4.2 Electronic Terrain and Obstacles Database

The International Civil Aviation Organization (ICAO) provides standards and recommended practices for the collection, storage and dissemination of terrain and obstacle data. Australia, a Member state of ICAO, is examining the practical aspects of meeting ICAO's requirements.

A working group consisting of representatives of the Department of Infrastructure and Transport, the Civil Aviation Safety Authority (CASA), Airservices Australia, and the Department of Defence has been examining ways of establishing an electronic terrain and obstacle database, known as an eTOD. The work of the group is ongoing.

4.3 Marking of wires

Research and pilot reports indicate that a wire that was known to the pilot can, and often does, go undetected. 'Inattentional blindness'⁸, limitations in vigilance, the inherent difficulty in visually spotting wires, and delayed reaction times are just some of the reasons why known wires can creep up on pilots (ATSB, 2011). Marking wires can enhance the visibility of wires. Wires that fall under certain criteria, such as in areas where regular low-level flying operations take place, are required to be marked.⁹ Further, wires are to be marked if any section of cable has a height greater than 90 m and a continuous span greater than 50 m.¹⁰ However, despite the advantages of marking a wire, not all wires are required to be marked as it is not feasible to mark all wires.

Electricity distribution and transmission companies install aerial markers on wires upon request. Land owners can request to have wires on their property marked and pilots who have a need to fly low-level near powerlines can also request wires to be fitted with markers.



An example of cable marking

⁸ We experience 'inattentional blindness' when we fail to perceive unexpected objects (even if they appear in the field of vision) if we are not paying attention to them (for example, focusing on another object or task).

⁹ Australian Standard 3891.2, 2008, Part 2: Marking of overhead cables for planned low level flying operations.

¹⁰ Australian Standard 3891.1, 2008, Part 1: Permanent marking of overhead cables and their supporting structures for other than planned low level flying.

4.4

Wirestrike avoidance initiatives by electricity distribution and transmission companies

New South Wales

In NSW, electricity distribution companies produced a variety of safety educational material for pilots and property owners. *Essential Energy* have provided information to property owners about ways to increase the visibility of powerlines from the ground and air and have intensified their campaign to improve pilot awareness of the availability of powerline overlay on Geographic Information System (GIS) mapping. *Essential Energy* also advised the ATSB that is in consultation with the AAAAA to have a 45 second community service radio announcement advising landowners to work with agricultural pilots to identify and mark powerlines. This radio announcement will be aired on rural radio stations leading up to the peak times for the aerial application of crops.

Endeavour Energy have produced educational material in conjunction with the CASA (Figure 7), made presentations to the electricity industry regarding safety during powerline inspections, conducted an open industry brief after a wirestrike occurrence in 2006, and conducted risk analyses on areas of concern.

TransGrid installs aerial markers on powerlines upon request as part of their initiatives in reducing wirestrikes.

Figure 7: Endeavour Energy and CASA's power line safety for pilots brochure



Courtesy of Endeavour Energy and the Civil Aviation Safety Authority

Northern Territory

Powerwater reported that, where crops require spraying in the NT, there are very few if any, powerlines. *Powerwater* works closely with *NT Gas*, the territory's natural gas company that conducts regular aerial surveys of their gas line, to ensure that orange wire markers are placed on all powerlines that can be flown over during the survey.

Queensland

In Queensland, electricity distribution companies produced safety education material and liaised with the aviation industry. *ENERGEX* produced material for pilots involved in low-level flying and also for balloon operators, as ballooning activity around the network is regular. *ENERGEX* also liaised with these operators reminding them of the dangers of operating around powerlines.

Ergon Energy liaised with the industry, such as conducting incident follow-up briefings, and has DVD and advertising material for pilots, such as the 'Look out and Live' campaign (Figure 8). In early 2012, *Ergon Energy* sent out 220 letters, fact sheets, 'Look out and live' stickers and swing tags to all aerial applicators, flying schools, helicopters, ballooning, and hang gliders in their franchise. When designing new or extending powerlines to supply agriculture or cultivated areas, customers are reminded to advise the pilot of new or extended lines if low-flying is carried out in the area. *Ergon Energy* also marks powerlines upon request.

Powerlink conducted risk assessments of airfields near their network and, in one case, have paid for the relocation of a private airfield.

Figure 8: Ergon Energy's 'Look out and Live' campaign



Courtesy of Ergon Energy

Western Australia

Horizon Power advertised to the farming community urging all farmers and agricultural pilots to be aware of all electrical hazards on the property before starting any work. As part of their 'Be Aware of Electricity' campaign, *Horizon Power* encourages the public to be aware of the electrical hazards on their property, including the location of overhead powerlines. In addition, *Horizon Power* fits visibility devices onto powerlines when requested, has underground wires in Broome Airport at the end of the runway, and lowered their transmission and distribution powerlines that are close to the airport in Karratha. *Horizon Power* has also developed procedures in accordance with the Electricity Supply Industry

guidelines. These procedures provide *Horizon Power* personnel and helicopter operators with a clear statement on the minimum requirements for conducting overhead power line inspections by helicopter as well as the need to conduct a pre-flight briefing before every inspection.

Western Power stated that they require their contractors to carry out risk assessments for all aerial operations carried out in or around their network.

South Australia

ETSA Utilities had an advertising campaign on television and radio alerting farmers to the dangers of working near powerlines. They also recruited the help of the AAAA to disseminate safety messages to its members.

Tasmania

Aurora Energy has a safety campaign called 'Look Up Look Out' for land owners and those working around power lines (Figure 9).

Transend Networks advised the ATSB that they ensure compliance with the Australian Standards for the marking of power lines.

Figure 9: Aurora Energy's 'Look Up Look Out' campaign



Courtesy of Powercor

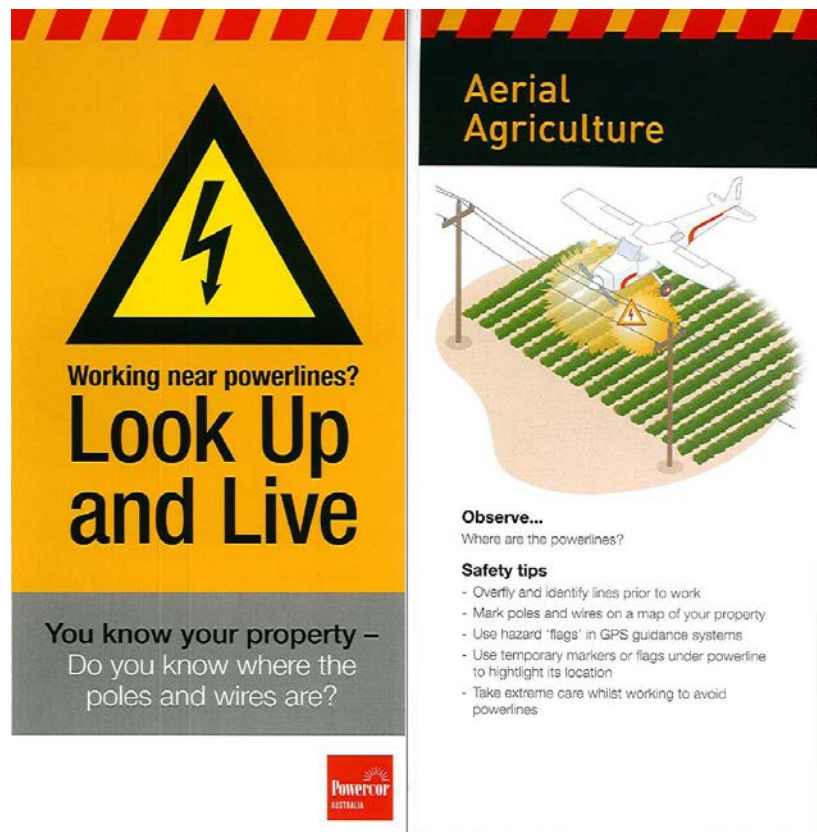
Victoria

United Energy, which services the south-eastern suburbs of Melbourne, fits markers onto wires upon request.

SP Ausnet installs company specific aerial markers for *SP Ausnet* aerial inspections of transmission lines.

Powercor has implemented a public awareness campaign, 'Look up and live' (Figure 10), aimed at farm safety around powerlines including information related to aerial agriculture and ways to reduce the risk of wirestrikes. In addition, *Powercor* has met with local branches of the Victorian Farmers Federation and attended local farm field days to promote these safety messages. *Powercor* also advised that they comply with the Australian Standard for the application of aerial markers in areas where aircraft activity is likely to occur.

Figure 10: Powercor's 'Look up and live' campaign



Courtesy of Aurora Energy

4.5 Wirestrike avoidance initiatives by the Aerial Agricultural Association of Australia

In conjunction with CASA, the AAAA produced a manual for agricultural pilots, the Aerial Application Pilots' Manual, which contain information about the hazards of flying around powerlines and offers some strategies to manage them. The AAAA also runs a Wire Risk Management course which builds on the information in the manual and addresses the human factor issues faced by aerial application pilots.

The AAAA introduced an integrated management system for aerial application companies. The Aerial Application Management System program includes a safety management system that directly addresses wire risk and also covers topics such as product stewardship, logistics, occupational health and safety, human resources and management. The program is based on an International Organization for Standardization style approach and encompasses the relevant Australian standards for risk management.

The ATSB strives to encourage a reporting culture by adopting a no-blame philosophy and does not investigate to determine liability or for the purpose of taking administrative action. However, it is clear that at least 40 per cent of wirestrikes were not reported to the ATSB between July 2003 and mid-June 2011 by responsible persons under the TSI Regulations. Outside of the current investigation into the under reporting of wirestrikes, there is little evidence about the extent of or reasons for not reporting other aviation safety occurrences to the ATSB.

In a 2010 industry survey by the ATSB, of the 244 respondents with an interest in aviation safety (generally those who subscribed to the ATSB email publication notifications), 93 per cent indicated that they were aware of their responsibilities to report safety matters to the ATSB. Although they were not asked whether they did or did not report safety occurrences, they provided some reasons why they may not report an aviation safety related matter.

About 17 per cent said that it was not their responsibility to do so, 16 per cent found the current regulations ambiguous, 11 per cent were not aware that they were required to report, 3 per cent cited being too busy as a reason, and 1 per cent said reporting was too difficult. About half said there were other reasons (not provided) for not reporting to the ATSB.



Investigation AO-2008-078

In addition to the reasons above, there may be other possibilities for the under-reporting of wirestrike occurrences. Listed below are some possible reasons.

- It may be that the aircraft was not insured so the pilot or the operator did not think it was beneficial to report to the ATSB.
- The pilot may have been violating regulations, such as conducting an unauthorised low-level flight, at the time of the incident.

- The pilot may have not wanted to be identified as being responsible for wire infrastructure damage to avoid potential repair costs.
- The pilot may not be aware that a wirestrike occurred, particularly if the aircraft had only clipped a wire.
- The damage to the aircraft or the wire was inconsequential and the pilot or operator did not believe they were required to report the incident to the ATSB.

Only one of the 226 wirestrikes in the 8-year period of this investigation where the operation type was known involved an aircraft undertaking commercial air transport operations. All others were engaged in general aviation (including aerial agriculture, survey/ photographic, aerial mustering, emergency medical services, fire control and other aerial work) and sport/recreational aviation (including ballooning, gliding, private flying and other sports flying). The air transport occurrence involved a charter helicopter flight that struck a wire during takeoff, which was immediately reported to the ATSB. The operation type for a further 41 of the occurrences was unknown, and given that a very small percentage of air transport operations (charter and regular public transport) were involved in wirestrikes that were reported, it is probable then that all or nearly all of these 41 occurrences also involved general or sport/recreational aviation operations. As such, while it is clear that there is an under reporting of aviation wirestrikes and that general aviation and sport/recreational aviation are mostly responsible for this under reporting, there is no evidence from this investigation to suggest wirestrike occurrences in air transport operations would not be reported to the ATSB.

The scope of this research investigation was limited to wirestrike occurrences. However, the fact that at least 40 per cent of wirestrikes had not been reported to the ATSB as required by the *TSI Act* suggests that other types of occurrences may also not be fully reported to the ATSB within general and sport/recreational aviation. Although many of the possible reasons given above for under reporting of wirestrike occurrences are equally relevant for non-wirestrike occurrences, the possibilities of pilots and operators avoiding admitting to low-level flying activities and/or paying for the cost of broken infrastructure generally do not apply outside of wirestrike occurrences. It is unclear how much, if any, the latter two reasons account for wirestrike under reporting. Therefore, it is probable there is also a significant under reporting of non-wirestrike occurrences in general and recreational aviation, although this may be lower than the 40 per cent established for wirestrike occurrences.

The ATSB and other agencies such as Civil Aviation Safety Authority, rely on reported occurrences to identify emerging safety issues in aviation. The ability to identify trends allows such agencies to direct their limited resources to the areas of greatest need before they result in fatal accidents. However, when there is a significant under reporting of accidents and incidents, emerging safety trends may not be noticed.

6

FINDINGS

There have been a significant number of aviation wirestrike occurrences that were not reported to the ATSB by responsible persons as required under the *Transport Safety Investigation Act 2003*. It is probable that there is also a general under reporting of all types of occurrences in general and sports/ recreational aviation. As a result, there is potential that emerging, significant safety issues may not be identified from analysis of reported occurrences (*Minor safety issue*).



Investigation AO-2009-017

Central to the ATSB's investigation of transport safety matters is the early identification of safety issue(s) in the transport environment. The ATSB prefers to encourage the relevant organisation to initiate proactive safety action that addresses safety issue(s) identified.

Below are safety actions that aim to boost the reporting of wirestrike and other occurrences by Responsible Persons under the TSI Act to the ATSB.

7.1 Australian Transport Safety Bureau

Feedback to occurrence reporters

Literature shows that for an occurrence reporting culture to work, feedback should be provided to reporters about how their information will be used and to provide a sense of purpose for the report. Individual reply and acknowledgment of receipt of the volume of reports received by the ATSB each year is not possible, but the ATSB is in the process of setting up an automatic reply or acknowledgement email for notifications that the ATSB receive via email or online via the ATSB website, to provide assurance to reporters that the submitted report has been received and how it will be processed.

Transport Safety Investigation Regulations revision

Work at the ATSB is underway to make reporting requirements broader to capture most circumstances where transport safety is compromised. Changes to the TSI Regulations are being proposed to the Government to include broader requirements that will require the reporting of all aviation wirestrikes, as any contact with a wire in flight either has an adverse affect on safety or a potential adverse affect on safety. The initial draft of those regulations was open for industry consultation between November 2010 and February 2011. The proposed changes to the TSI Regulations are expected to be agreed to by the Government and released around the last quarter of 2012, following a further period of consultation.

Promoting safety messages to the aviation industry

To promote the safety messages and encourage a greater reporting of wirestrikes, the ATSB will undertake the following communication activities.

- Liaise with general aviation associations and sporting and recreational aviation bodies to promote this report and its messages to the industry bodies' members.
- Distribute a media release (targeting the aviation industry and general media outlets) to announce the report's release.
- Distribute the report through CASA's Aviation Safety Adviser network.
- Include a feature article in industry publications such as *Flight Safety Australia* and *Australian Flying*.

Encouraging reporting by wire infrastructure owners and state regulators

To encourage the reporting of wirestrikes by wire infrastructure owners and state regulators with oversight of electrical and telecommunication wires, the ATSB will continue to provide information on ways to notify the ATSB of wirestrikes to regulators and infrastructure holders.

7.2 NSW Department of Trade and Investment

Reporting to the ATSB

The Resources and Energy Division of the NSW Department of Trade and Investment will report to the ATSB any future wirestrike information that is made known to them. The information they will provide include the date of the occurrence, the network operator, the severity of injury(s) and the location of the wirestrike.

- Australian Transport Safety Bureau. (2011). *Avoidable Accidents No. 2 - Wirestrikes involving known wires: A manageable aerial agriculture hazard*. (Aviation Research and Analysis Report – AR-2011-028). Canberra, Australia: ATSB.
- Australian Transport Safety Bureau. (2006). *Wire-strike Accidents in General Aviation: Data Analysis 1994 to 2004 (Re-released September)*. (Aviation Research and Analysis Report – B2005/0055). Canberra, Australia: ATSB.
- Australian Transport Safety Bureau. (2011). *ATSB Stakeholder satisfaction research for ATSB: Quantitative report*. Canberra, Australia: ATSB.
- Bureau of Infrastructure, Transport and Regional Economics. (2012). *General Aviation Activity 2010*. Canberra, Australia: BITRE.

APPENDIX A: SOURCES AND SUBMISSIONS

Sources of information

The sources of information during the investigation included:

ActewAGL

Aurora Energy

Ausgrid

Australian Department of Transport and Infrastructure

CitiPower

ElectraNet

Endeavour Energy

ENERGEX

Ergon Energy

Essential Energy

ETSA Utilities

Horizon Power

Jemena

Power and Water Corporation

Powercor

Powerlink

SP AusNet

Telstra Corporation Ltd

Transend Networks Pty Ltd

TransGrid

United Energy

Western Power

Acknowledgements

All electricity distribution and transmission companies for providing information on wirestrikes and proactive actions

Directorate of Defence Aviation and Air Force Safety Energy Networks Association

Energy Safety Western Australia, Department of Commerce

Resources and Energy Division, NSW Trade and Investment

State Aircraft Unit – Victoria

Workplace Standards Tasmania, Department of Justice

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 the electricity distribution and transmission companies listed in Sources of Information (above)
- Aerial Agricultural Association of Australia
- Australian Department of Transport and Infrastructure
- Civil Aviation Safety Authority
- Construction Policy and Regulation, ACT Planning and Land Authority
- Electrical Safety Office, Department of Justice and Attorney-General (Qld)
- Energy Networks Association
- Energy Regulation, Office of the Technical regulator (SA)
- Energy Safe Victoria
- Energy Safety Western Australia, Department of Commerce
- NT Worksafe, Department of Justice
- Recreational Aviation Australia
- Resources and Energy Division, NSW Trade and Investment
- Telstra Corporation Ltd
- Workplace Standards Tasmania, Department of Justice

Submissions were received from:

- Ausgrid
- Australian Department of Transport and Infrastructure
- Energy Safety Western Australia, Department of Commerce

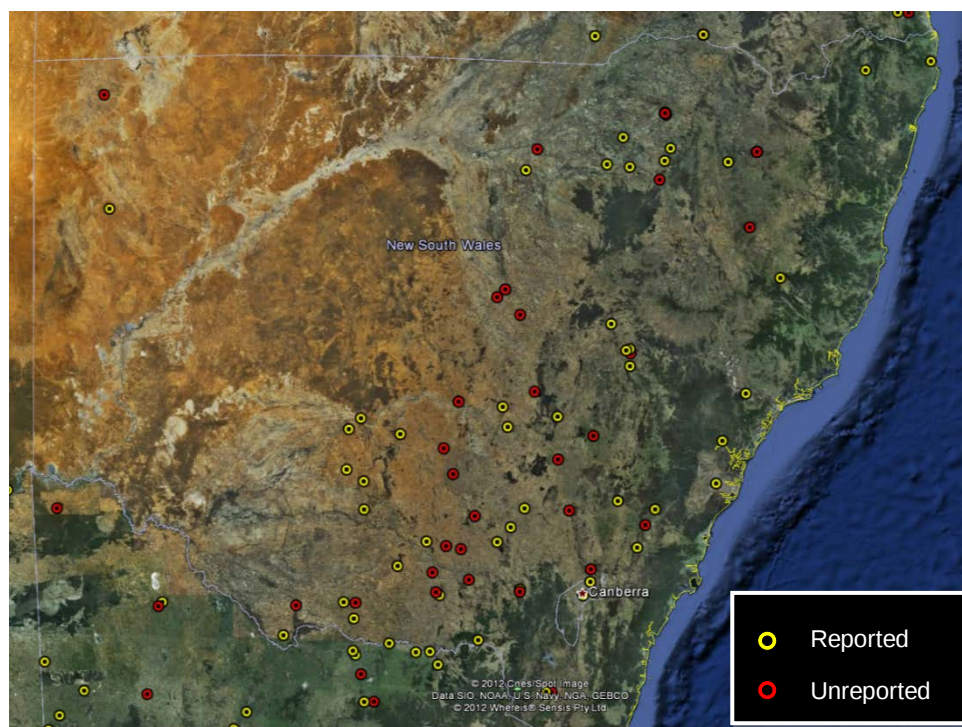
- Ergon Energy
- Essential Energy
- Horizon Power
- Powercor
- Powerlink
- Resources and Energy Division, NSW Trade and Investment
- SP Ausnet
- Telstra Corporation Ltd
- Workplace Standards Tasmania, Department of Justice

The submissions were reviewed and where considered appropriate, the text of the report was amended accordingly.

APPENDIX B: LOCATIONS OF WIRESTRIKES BY STATE

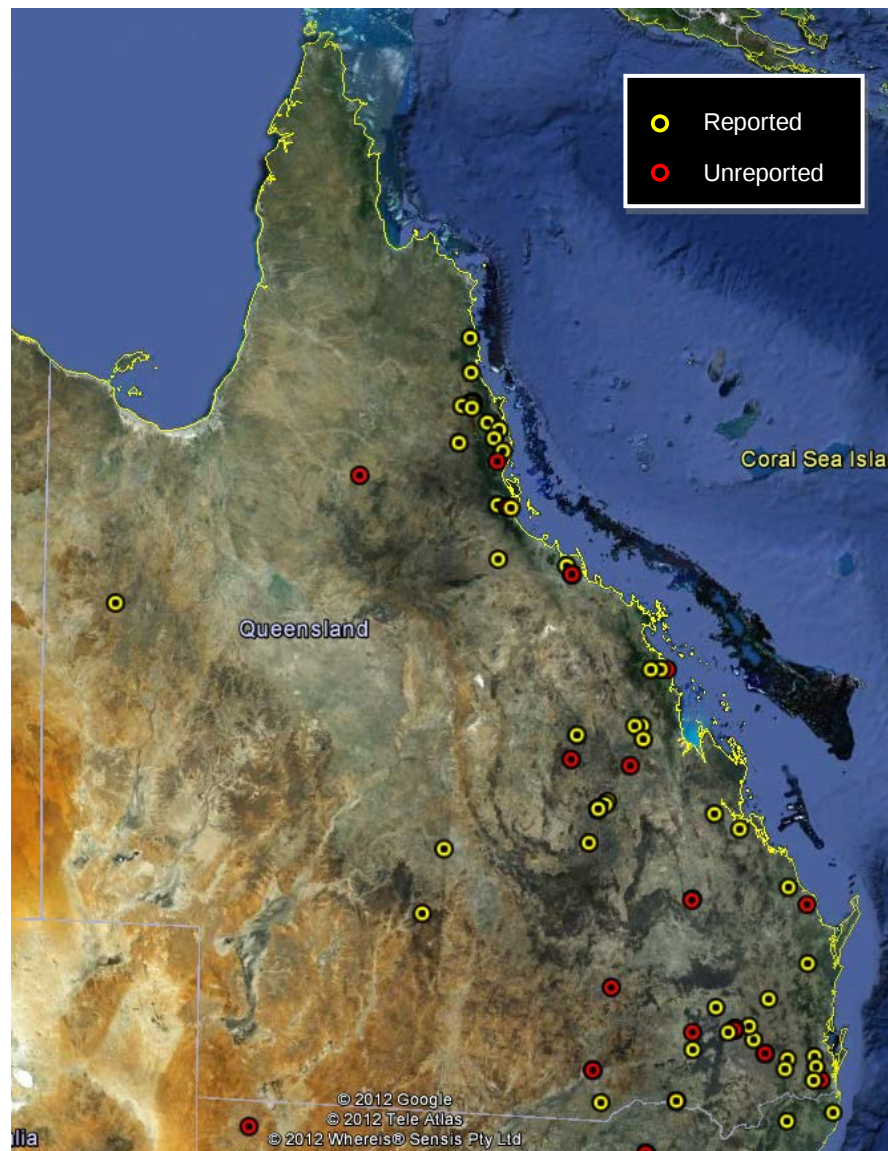
Note that unreported wirestrikes are shown in red while reported wirestrikes are depicted in yellow.

Figure 11: Locations of unreported and reported wirestrikes in New South Wales and the Australian Capital Territory



© Google Maps

Figure 12: Locations of unreported and reported wirestrikes in Queensland



© Google Maps

Figure 13: Locations of unreported and reported wirestrikes in Victoria

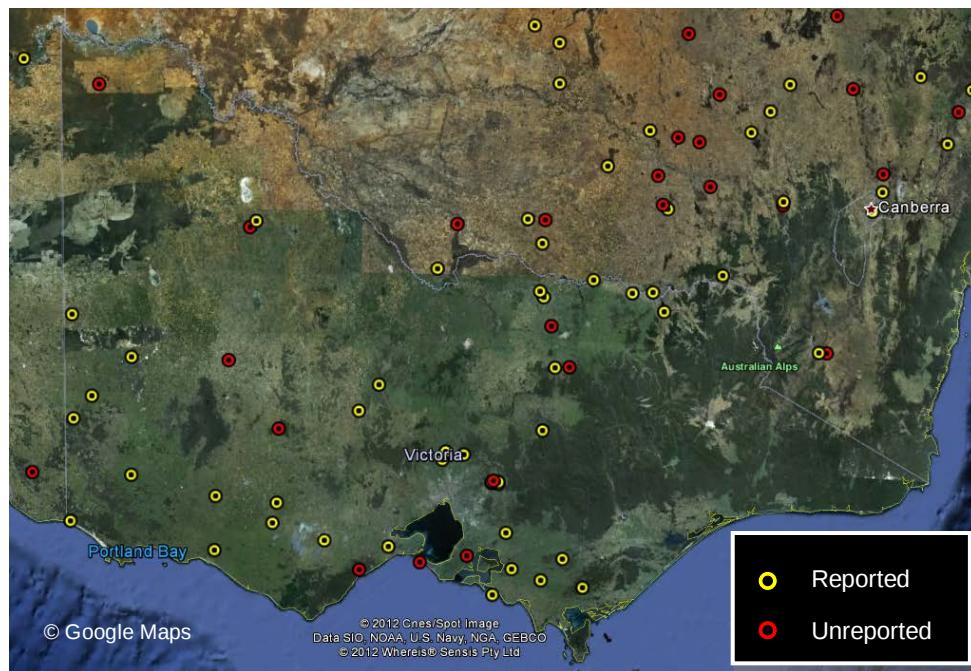


Figure 14: Locations of unreported and reported wirestrikes in South Australia

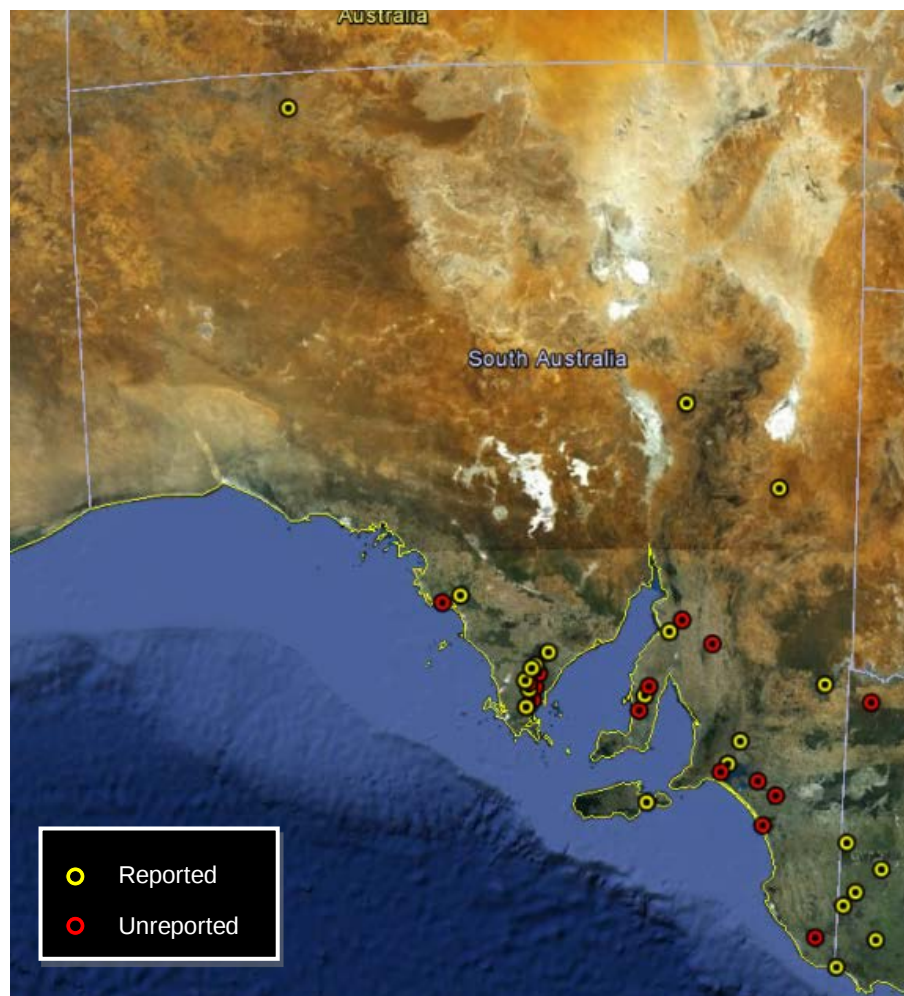
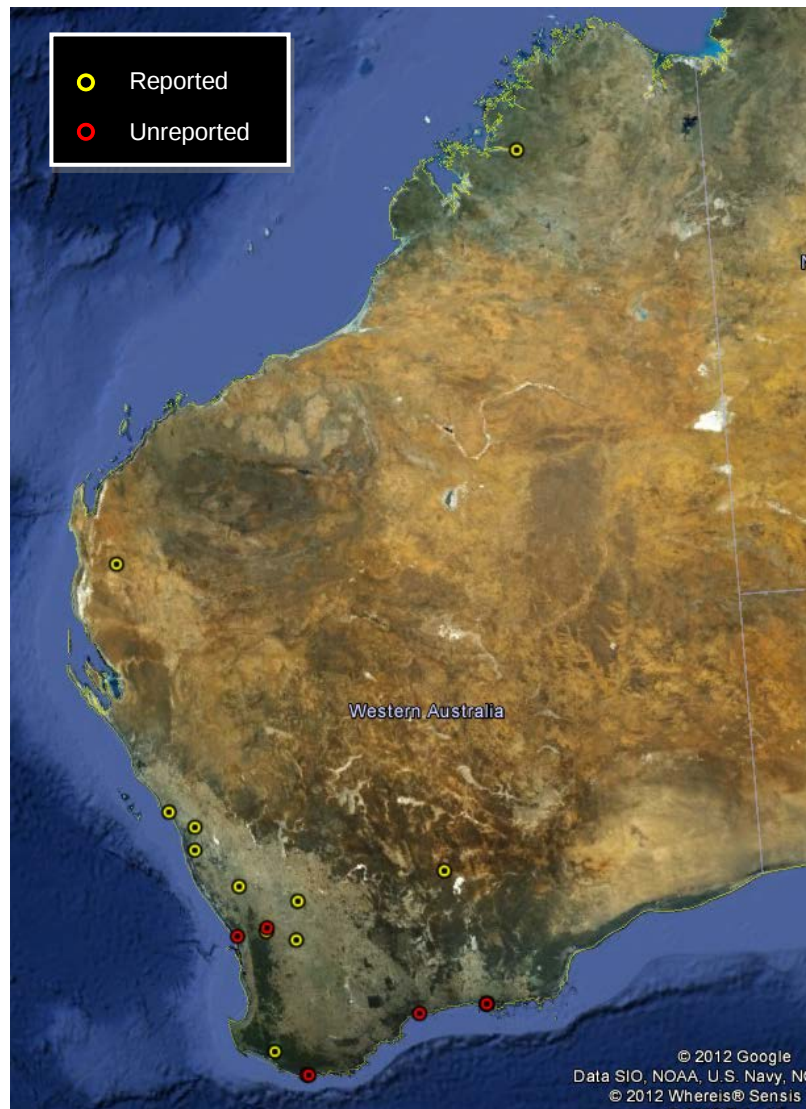
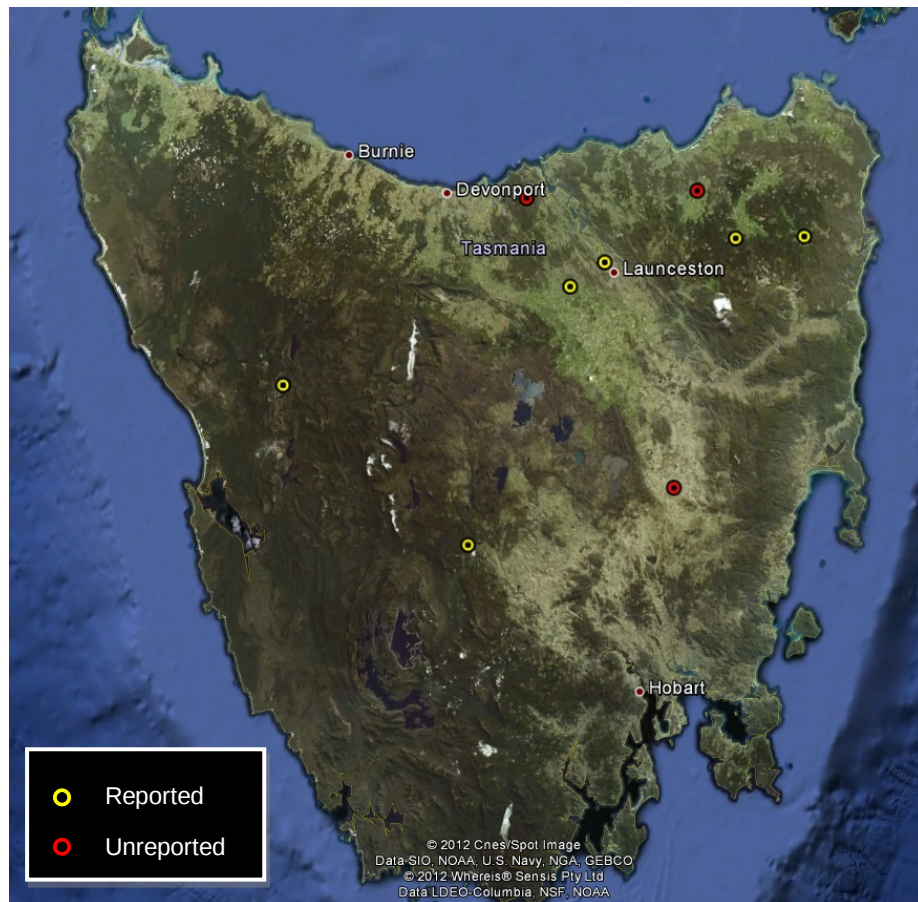


Figure 15: Locations of unreported and reported wirestrikes in Western Australia



© Google Maps

Figure 16: Locations of unreported and reported wirestrikes in Tasmania



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Figure 17: Locations of unreported and reported wirestrikes in the Northern Territory



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