

Removing the rubble: The Thredbo landslide search and rescue

Abstract: At close to midnight on 30 July 1997, a landslide swept down Thredbo Alpine Village, destroying two lodges and killing 18 people. This case study details the people and events involved in the eight-day search and recovery after the landslide and the rescue of the sole survivor, in what remains one of the biggest and most dangerous challenges ever faced by Australian emergency services.

It was late on 30 July 1997 when 18 people from Thredbo Alpine Village had settled in for the night at staff accommodation, Bimbadeen Lodge. A little further up the mountain, a lacklustre ski season meant only one person was in Carinya Lodge, accommodation for the ski resort's members and their guests.¹ At about 11.40 pm, a landslide swept earth, rocks and trees into Carinya Lodge, forcing the multi-storey building and other debris over a road and onto Bimbadeen Lodge below.² The rescue operation that followed was considered a large-scale test of the nation's emergency services and one of the most hazardous ever tackled in Australia.³ Hundreds of rescuers from a range of agencies and states worked during the eight-day operation. One man was found alive and rescued on the third day, before forecast bad weather threatened to hamper efforts to recover the remaining 18 victims buried beneath the rubble. Superintendent Steve Hyman, who was the first senior New South Wales Fire Brigade officer on site, said "This is an incident like no other... It was a disaster that challenged emergency organisations' planning and response due to its remote location."⁴

Day One – proceeding with caution, not emotion

According to District Emergency Operations Controller, Region Commander Bruce Johnson, response to the landslide was almost immediate, the first 000 call received in about one minute. "Within minutes of this disaster taking place, rescue units were on the scene," he said. "We had the primary Rescue Unit from Thredbo, the Fire Brigade (and) a detachment of our SPG (State Protective Group) police who were down there. They are our tactical police, highly trained and very effective police. They were there training to do what they have to do in snow conditions... and they became a tremendous asset for us".⁵

¹ Johnson, B, "Control and co-ordination of the operation", *State Debrief – Thredbo landslide – July-August 1997*, Police Centre Auditorium, Sydney, 4 September 1997.

² Tragedy in the darkness: Thredbo's disaster, hour by hour A2, *The Age*, 1 August, 1997.

³ Clucas, J, 1997, "Thredbo – a tragic testing ground, *Public Works Engineering*, August/September 1997, p 6.

⁴ Ristevski, E (ed), 2001, *Fire News*, Vol. 2, April 2001, p 8.

⁵ Johnson, B, 1997, "Control and co-ordination of the operation", *State Debrief – Thredbo landslide – July-August 1997*, Police Centre Auditorium, Sydney, 4 September 1997. All further quotes from Johnson, unless otherwise attributed, are from this State Debrief.

The site was dangerously unstable, with slabs of concrete and masonry continuing to move and vehicles caught up in the slabs threatening to topple further. Police consulted with fire officers before making the decision to evacuate the site.⁶

Abandoning the rescue and the consequential lack of action was met with anxiety and anger from victim's relatives and Thredbo Villagers. People could be heard screaming out for help from beneath the rubble and some questioned why they couldn't continue removing timber and metal via a human chain. It was explained to them that the site was so unsafe, that it would be putting people's lives in danger. "There was no way we could put emergency service personnel at risk, the slide was just too dangerous and too unstable," said NSW Fire Brigade's Steve Hyman. "There were too many things that we couldn't see that could have come down on the rescuers and if they fell or were injured, we would have had more victims and the people who were trapped would not have got rescued. So we did the right and responsible thing and waited for daylight."⁷

The mountainous mission

The demolition site was assessed by a Sydney geophysics expert and at 10 am the following morning (31 July), the rescue operation recommenced. While the emergency plan of nearby town Jindabyne was actioned at Thredbo and local services were deployed immediately, when the scale of the mission was realised, operations were elevated to police district level, where the resources of multiple local government areas could be called upon.⁸

New South Wales Police was responsible for coordinating the rescue, with Bruce Johnson liaising with a team of experts from the various rescue services to assess problems and assign tasks. The multi-tiered operation had an emergency Operations Centre established in Jindabyne, where resources and back-up was provided. The rescue was undertaken by a host of emergency services, comprised of NSW Police, Ambulance and Fire Brigade, the Bush Fire Service, NSW Volunteer Rescue Association and State Emergency Service. The SES provided the manpower required to remove debris, excavate drainage ditches and sandbag the rescue area to minimise water seeping through.⁹

The first body was found during the evening of 31 July and by the next day, 200 people were working around the clock, overnight in sub-zero temperatures and under spotlights. Bruce Johnson told the media pack that the longer the rescue took the less chance of finding survivors. "It is fairly slim, sure. But we remain hopeful."¹⁰ By 2 August, more than 400 people from agencies across NSW, ACT and Victoria were involved in the Thredbo rescue mission.¹¹ "Initially we were working shifts of four hours on, four off," said Mark O'Connor, the Station Officer at Victoria's Tactical Rescue Department.

6 Shiel, F, "Anguished firefighters search for loved ones", *The Age*, 2 August 1997.

7 Ristevski, E (ed), 2001, *Fire News*, Vol. 2, April 2001, p 8.

8 Lucas, J, 1997, "Thredbo – a tragic testing ground, *Public Works Engineering*, August/September 199, p 6. In 1990, NSW established 150 local emergency management committees, whose role was to prepare plans for the prevention, preparation, response and recovery from emergencies in their own local government area.

9 Lucas, J, 1997, "Thredbo – a tragic testing ground, *Public Works Engineering*, August/September 1997.

10 Murdoch, L and Shiel, F, "Hope for landslide survivors is fading", *The Age*, 1 August, 1997.

11 Woodley, B, "Volunteers lead epic rescue", Weekend Australian, 2 August 1997.

"This was extremely taxing as no sooner had you started work you were knocked off, then you had something to eat, had a shower and grabbed two hours sleep before getting back to work. As the incident progressed the shifts went to eight hours on, eight off and later 10 hours on followed by a 16 hour break. This at least allowed everyone to relax and unwind."¹²

People power worked hand in hand with an extensive range of apparatus provided for the rescue, including earthmoving equipment, Bobcats, 12 and 14 tonne trucks, engineering equipment, blasting mats, compressors and lighting. Smaller items included thermal imaging cameras, hard hats and lamps, mobile phones, computers and photocopiers.

Gregor Manson from the National Parks and Wildlife Service noted that some pieces of hired equipment were in poor condition when it arrived and required short term maintenance, while other equipment was not suited to the extreme conditions.¹³

"The weather at night was -12°C with a wind chill of -30°C, which was extremely taxing on everyone and especially our equipment," said Mark O'Connor. "The diamond blade chainsaws are water cooled, unfortunately the water froze, the hydraulic oil began to separate and diesel fuel began to coagulate. In our worst training scenarios we didn't expect to be placed on a snow capped mountain with an extremely steep angle with such cold temperatures."¹⁴

Stuart Diver, the sole survivor

At 5.37 am on 2 August, signs of life were detected by sound detection equipment.¹⁵ Several more bodies had since been discovered and the discovery of a survivor gave rescuers hope that more people could be found alive. "The philosophy of every rescue is you never give up hope until the last piece of debris is removed," said NSW Fire Brigade spokesman, Commander Ian Krimmer.¹⁶

Rescuers cut through a concrete slab, before one asked if anyone could hear him. "I can hear you," was the reply. Ski instructor Stuart Diver was pinned between two concrete reinforcing rods, creating a cavity that kept him alive.¹⁷ Rescuers spent the day digging through many metres of rubble to reach Diver. Early on in the rescue, a small land slip caused workers to retreat, but two rescuers from the special casualty access team remained in another cavity they had created near Diver.¹⁸ Rescue experts trained in retrieving people from caves and confined spaces were called to Thredbo, but were not involved in Diver's rescue, instead assigned to clearing debris and watching for movement in the rubble. "There's a bit of an oversupply of rescue personnel down there at the moment,"

12 O'Connor, M, "Activation - Thredbo", Firemark, Metropolitan Fire and Emergency Services Board newsletter, October/November 1997, p 11.

13 Manson, G, "Control and co-ordination of the operation", *State Debrief - Thredbo landslide - July-August 1997*, Police Centre Auditorium, Sydney, 4 September 1997. All further quotes from Manson, unless otherwise attributed, are from this State Debrief.

14 O'Connor, M, "Activation - Thredbo", Firemark, Metropolitan Fire and Emergency Services Board newsletter, October/November 1997, p 11.

15 Munro, I, Tippet, G, Daley, P, "The Discovery", Sunday Age, 3 August 1997.

16,17 "Rescue workers buoyed by survival amid the rubble", Sunday Age, 3 August 1997.

18 Munro, I, Tippet, G, Daley, P, "The Discovery", Sunday Age, 3 August 1997.

said NSW Volunteer Rescue Association south-east region co-ordinator, Rod Roderick. “The problem is they don’t want to go. But eventually they will have to have a rest.”¹⁹

Two lines of attack were set up to rescue Diver, one coming 16 metres from the eastern side and tunnelling through the pile, and another coming underneath Diver. Fibre optic cameras were also used to gain a better understanding of where he was located. During the rescue a team of paramedics would go in every 20 minutes for five minutes to monitor his condition.²⁰ Diver was rescued nearly 12 hours after being discovered and more than 60 hours after the landslide, chronically dehydrated but in good spirits. The operation continued concurrently and two more bodies were recovered during this time.²¹

Diver’s wife, Sally was beside him when the landslide occurred, however she had not yet been found. As Diver was recovering quickly, it was assumed he may return to the site and this was the catalyst for a mistakes made by personnel on the site. “They gave that body a name and everybody was referring to Sally Diver,” said rescue co-ordinator, Inspector Garry Smith. “They had to get Sally out of the rubble. To me that was a mistake because it concentrated people’s efforts far too greatly in one particular area.”²²

The search continues and wet weather looms

The day after Diver was taken to hospital, a sniffer dog was brought in to search for bodies, but this proved unsuccessful. Rescue workers used techniques learnt from the 1995 Oklahoma City bombing, removing debris via a human chain to ensure possible survivors weren’t further injured by heavy machinery.²³

By 4 August, 600 rescuers were working on the site, including up to 300 SES volunteers. There were also people from the Disaster Victim Identification unit, Australian Federal Police, Salvation Army officers, Red Cross workers, grief counsellors and chaplains.²⁴ Workers from Queensland had also joined the operation by this stage and together with the aforementioned agencies, specialist urban search and rescue officers arrived at Thredbo. Trained to find survivors and bodies in collapsed buildings, the USAR crew were trained using international practises and lessons learnt from Australian disasters such as the Newcastle earthquake.²⁵ “Plans of the building were provided and we were tasked with finding the kitchen, as below the kitchen was the computer room, and it was expected that at that time of night there would be someone at their computer, surfing the net,” said USAR team member, Shane Reeves.²⁶

19 Dennis, J, “Wollongong tunnel experts called in”, The Illawarra Mercury, 4 August 1997.

20 Fire & Rescue NSW, “Thredbo landslide”, <http://www.fire.nsw.gov.au/page.php?id=476>, downloaded 13 August 2013.

21 “Rescue workers buoyed by survival amid the rubble”, Sunday Age, 3 August 1997.

22 Smith, G, “Control and co-ordination of the operation”, *State de-brief - Thredbo landslide - July-August 1997*, Police Centre Auditorium, Sydney, 4 September 1997. All further quotes from Smith, unless otherwise attributed, are from this State Debrief.

23 Mitchell, B, “The painstaking mission goes on”, The Age, 4 August 1997.

24 Cooke, J and Clennell, A, “600 dedicated rescuers dig for life”, The Sydney Morning Herald, 4 August 1997.

25 Mitchell, B, “Rescue specialists trained for building collapses”, The Age, 5 August 1997.

With 10 bodies recovered but eight yet to be found, forecast rain and snow threatened to obstruct rescue efforts. Rain filling the network of tunnels that had been dug would end any hope of finding survivors and SES crews erected a “high-tech” tarpaulin across the site so work could continue if the wintery weather arrived early.²⁷ There was also concern for the stability of nearby Schuss Lodge, its foundations undermined during the landslide. If rain and snow arrived as expected, there was the potential for a second landslide when the exposed soil turned to mud. Engineers worked to shore up the lodge, which was perched above the continuing rescue efforts.²⁸ The bitter wind and rain eventually arrived two days later on 6 August and shifts were reduced accordingly, to prevent workers from suffering hypothermia.²⁹ By the end of the following day, Thredbo was covered in a blanket of snow – just as the final bodies had been recovered. It had held off for the entire search and rescue operation.

The search is over

The final victims were identified as being trapped in a particular area covered by concrete slabs. Once these were cut into smaller sections, they were lifted away by mobile cranes.³⁰ These last three bodies were removed early on the morning of 7 August and brought the final death toll to 18.³¹ The closing press conference from emergency services was a tearful one. The battle against the elements to find survivors, and dealing with desperate relatives and Thredbo locals amid criticism at the speed they were working, was over. “I’m not a snow person, I’m not a skier or anything like that, but certainly Thredbo will be very close to my heart for the rest of my life,” said Commander Charlie Sanderson from NSW Police. David Osborn, managing director of Thredbo Alpine Village said, “I think the message from the Thredbo community to the world is, ‘don’t leave us on our own – we are really here to provide enjoyment’.”³²

Lessons learnt

Once the search and rescue was complete, issues were raised in various forums about the lessons learnt from the Thredbo landslide. Keith Dawe, Chairperson of the Snowy River Local Emergency Management Committee and Thredbo Recovery co-ordination Committee said the local community should have been more involved in the rescue to aid long term recovery. “They tended to be pushed aside by the large number of visitors and by a misguided concern to protect the local people from the trauma,” he said. “While some local knowledge was used, there was some more that was lost or ignored in the process that could have aided the rescue operation. For example there were equipment failures due to visitors not understanding how to work in sub-zero temperatures.”³³

26 Peterson, R, “Thredbo”, Phoenix, September/October 1997, p.8.

27 “Rain may disrupt rescue attempt”, The Advertiser, 5 August 1997.

28 Murdoch, L, “Crews rush to shore-up disaster site”, The Age, 5 August 1997.

29 Lawson, K, “Rescue workers race against elements”, The Canberra Times, 7 August 1997.

30 Mitchell, B, “Tunnel system, cameras aid gruelling task”, The Age, 5 August 1997.

31 ABC News Online, “Thredbo rescue operation over”, 7 August 1997.

32 Harris, T and Powell, S, “It’s all over: Thredbo teams pull out”, The Australian, 8 August 1997.

A Critical Incident Debrief team was on site during the entire operation, offering support to workers. Clinical psychologist, Julie Berg, worked with the NSW Fire Brigade and said one of the lesson learnt was that sending in too many professionals overdoes it. “Some of the comments that did come back from firefighters were that, ‘We don’t want to be over protected and we don’t want to be seen as being stressed out, because it is our job to cope with very stressful situations’.”³⁴

District emergency officer of Southern Highlands, John Connell said he was satisfied with how the state’s emergency plan had worked. “We’ve spent seven years getting this emergency management plan in place and it’s worked magnificently,” he said. “We haven’t learnt any major lessons, but we’ve learnt a few little ones. And we’ve proven the structure is flexible enough to adapt to any situation.”³⁵

A State Debrief of the Thredbo landslide was conducted on 4 September 1997, with participants from emergency services identifying several lessons learnt from the event, including the management of equipment and people.

Superintendent John Wasley from Ambulance NSW said there were major issues in the first 48 hours. “We had a problem with fatigue,” he said. “We had difficulty providing adequate accommodation for people. It took quite a while to get that organised. People who had worked long hours, who were sent off site without any sort of emotional support or debriefing, were found to be back in the work place in urgent need of support ... that was when we put in a lot of logistical support to organise things such as accommodation, transport, welfare issues.”³⁶

Gregor Manson suggested that operations such as Thredbo’s should involve local garage staff, who could provide mechanical assistance to machinery when needed. He also said there was an under-utilisation of Government resources, which affected the cost of the operation and that the delivery of goods was frequently hampered by the congestion of rescue vehicles at the bottom of the site. He also suggested early strategic team meetings were required, to determine resources and where they are coming from. “In this case it is particularly relevant, with the sort of clothing and equipment that is needed in a very cold climate.”

33 Dawe, K, “Thredbo landslide recovery”, Australian Journal of Emergency Management, Vol.16, Summer 2001-2002, p 58.

34 Ristevski, E (ed), 2001, Fire News, Vol.2, April 2001, p 24

35 Clucas, J, 1997, “Thredbo – a tragic testing ground, Public Works Engineering, August/September 1997, p 6.

36 Wasley, J, *State Debrief – Thredbo landslide – July-August 1997*, Police Centre Auditorium, Sydney, 4 September 1997.

Garry Smith indicated that lessons learnt during his involvement in the Newcastle earthquake rescue had benefitted the Thredbo operation. “I decided that if I was ever involved in something of a similar nature, I would ensure that the comments and criticisms that came out of Newcastle would never happen again and I think from listening to the people that we have had dealings with at the various debriefs, I think we have achieved that.”

A lack of understanding and training in urban search and rescue by some emergency services was identified and in September 1998, The NSW Fire Brigade developed a Urban Search and Rescue (USAR) course. In the first four courses, more than 100 fire fighters were trained, and during a period of three months, several police and ambulance officers.³⁷

Coroner’s conclusions

On 29 June 2000, New South Wales State Coroner Derrick Hand said, “Until the Thredbo landslide tragedy there had been little public recognition that landslides were a significant threat in Australia.” He added that “the causes of the tragic deaths which occurred as a result of the landslide are complex.”³⁸ In his report, he stated, “Despite all the criticism and suggestions put forward it is quite clear that because of the extreme danger involved in moving the debris, the rescue and recovery was carried out in a thoroughly professional way with proper and due regard for the safety of the emergency services personnel and those trapped by the debris. The recovery of Stuart Diver alive was most certainly due to the careful and professional manner of the operation.”³⁹

The road where the landslide began is now supported by massive gabion retaining walls, while the ground where the two lodges once stood is now covered with native vegetation, visible from a commemorative platform.⁴⁰ Its 18 posts commemorate the number of lives lost in the landslide.

37 Ristevski, E (ed), 2001, Fire News, Vol.2, April 2001, p 28.

38 Skertchly, A and K, “Thredbo disaster Coroner’s inquest, Australian Journal of Emergency Management, Vole 16, Summer 2001-02.

39 Hand, D, Report of the inquest into the deaths arising from the Thredbo landslide, 29 June 2000, p 162.

40 Thredbo self-guided memorial walk brochure, <http://rockpoollodge.com.au/pdfdownloads/MemorialWalk.pdf>

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Steps to a Miracle: Timeline of the rescue of Stuart Diver

5.37 am: Fire Brigade officer Steve Hirst hears muffled cries , calls for machinery to be turned off.

5.38 am: Hirst asks if Diver can hear him and hears a faint cry back as Diver says his name.

5.40 am-6 am: Fire Brigade uses Trapped Person Locator to narrow down Diver's position.

Anaesthetist Dr Richard Morris and paramedic Paul Featherstone establish contact via a small hole in the concrete. Twenty minute health checks begin.

6.30 am: Tunnelling begins. Station Officer Geoff Courtney from the left and another team from the right.

6.30 am - 10.30 am: Tunnellers reach point above slab over Diver's head, but are concerned for his safety. Courtney makes contact, shakes hands with Diver.

10.30 – 5 pm: Searchers redirect tunnel efforts towards Diver's feet.

10cm hole drilled in slab above Diver's feet. Hole later widened to 60cm by 40cm.

Officer Rob Killham jumps into hole and waggles Diver's leg.

Mass of debris inhibits work – an entire lounge suite has to be removed from the hole. Rescuers laboriously cut wire, foam and wood away. Roof tiles, bricks and other debris is cleared from below Diver's feet.

Rescuers pull Diver towards the opening, allowing him to sit upright.

Medical checks are made before he is lifted vertically out of the hole.

Rescue Tool Kit

- Trapped Persons Locator: Sonar equipment used to find bodies.
- Fibre optic cable camera: Used to inform doctors about Diver's condition.
- Pulse Oximeter: Shines a beam of light through the top of a finger to determine oxygen levels in blood.
- Bear Hugger: A rescue blanket – the blanket's warm air blower tube was used to raise Diver's temperature while he was still trapped.
- Lifepack 10: Monitors heart activity. Its leads were passed into the cavity to check Diver's condition.