

# Learning from the Mangatepopo Tragedy

## 1. Introduction

On 15 April 2008, six students and a teacher drowned while trying to escape from the flooded Mangatepopo gorge. The trip was part of an Adventure Challenge course at the Sir Edmund Hillary Outdoor Pursuits Centre (OPC). Since then, the causes of this tragedy have been extensively investigated and analysed and presented in two main reports:

- The OPC Trust Board instigated an independent investigation into what had happened using three external experts: the Independent Review Team (IRT). This was a thorough 'systems based' investigation.
- The second major report was produced by the Coroner. The Coroner endorsed the recommendations made by the IRT as well as making additional recommendations.

In addition, the Department of Labour (DoL) carried out an investigation and pressed charges against OPC. The Department of Labour did not produce a report detailing recommendations to OPC, however suggestions were proposed during meetings between the two organisations. In addition the DOL staff commented on OPC's own proposals, in relation to meeting their requirements.

There are several commonly used models of accident causation. In general, these present the idea that most accidents have multiple causal factors. The Mangatepopo tragedy was a prime example of this. The reports indicate that there was no single error or occurrence which caused the tragedy. On that day, many factors aligned in the worst possible way.

The IRT's analysis approach 'seeks to comprehensively identify every weakness or failure in safety systems revealed by an incident'[1]. The IRT caution in their report that this type of analysis 'is inherently negative and exhaustive' and 'quite unlike a safety audit'[2]. This paper aims to summarise this exhaustive analysis as openly as possible. This paper:

- Provides a summary of the recommendations in the IRT and Coroner's reports.
- Shares some of what OPC has learnt and developed since the tragedy.
- Highlights things which might be of interest to others working with young people in the outdoors.
- Encourages discussion and collaboration between OPC and others in the outdoor industry to ensure continued safety improvements.

In this section of our website we share more information. This includes charts detailing the individual recommendations by the IRT and Coroner and OPC's responses to these. We have also developed our own list detailing the learning we have taken from the DoL process. The full report by our IRT is

available to the public and can be requested by contacting [safety@opc.org.nz](mailto:safety@opc.org.nz). We also encourage people to use this email address to ask questions, or contribute ideas to help OPC's continual safety developments.

## **2. Major Learning Areas and Developments**

One of the first recommendations made by the IRT and DoL is that OPC considers their recommendations in the context of all activities. This has been wholeheartedly embraced. Our focus has been on reviewing and redeveloping all of the major safety systems and practices for the whole organisation.

### **a) New Safety Management System**

The OPC Safety Management System (SMS) was developed over many years and used RAMS (Risk Analysis and Management System) forms as a core feature. There have been many recommendations around what should be added to policies and RAMS forms, but the following point has also been noted: 'RAMS forms can overwhelm new instructors with detail. In particular, they can bury the imperative to prevent death and serious injury in a mass of less serious material' [3]. A new SMS needed to address both the requirement for additional information, and the need to be easy to comprehend and assimilate. The new SMS:

- Divides the analysis of hazards into three tiers to decrease repetition and increase focus on site-specific hazards.
- Includes a laminated Tier 3 form which can be taken into the field which highlights specific risks and management strategies for that site and includes things like evacuation and catchment area maps where relevant.
- Includes a tool called FLASH (Factors Likely to Accentuate Serious Harm) which facilitates critical analysis and decision making around the appropriateness of an activity in relation to the instructor, students and conditions.
- Includes a severity ranking of hazards and explicit mention of whether the hazard is eliminated, isolated, or minimised, as required by the DoL.
- Clearly defines the competency level and pre-requisites required by an instructor to operate at a specific site.
- Is directly linked to other relevant systems including staff training, staff assessment and crisis response. The goal is to align and streamline all safety related systems to reduce the risks of conflicting messages or holes appearing.
- Includes learning from past incidents and near misses.

OPC is currently in the final stages of our second full review of our overarching safety policies since 2008. The IRT listed policy violation[1], failure to sign off against important documentation[2], unclear policy[3] and requirements not being understood[4] as possible contributory factors, or underlying causes. Review of policy has required a new approach to communication and policy documentation is now a lot more concise and accessible to the people who need it. New documentation clearly defined processes and responsibilities for closure of certain activities or sites.

OPC has also recognised the vital importance of organisational culture towards safety and towards policy. Developing this culture will continue to be a strong focus for management and our safety committees. The Department of Labour suggested the need for better systems for checking instructor compliance. Again safety culture plays a key role here and OPC has been looking for ways to encourage an evaluative approach to checking compliance where instructors are actively involved in the processes of safety improvement. We are currently carrying out a DoL safety culture snapshot analysis which we hope will give us some quantitative evidence of how we are going in this area.

Wording of generic policy is continuing to challenge us and we are keen to collaborate with others on aligning this with industry standards as well as our own standards. The IRT have suggested that Mangatepopo gorge river level policies should not be open to subjective interpretation[8]. It is very hard to remove interpretation entirely, and any outdoors organisation will rely on judgements that are made in the field.

## **b) Staff Competence**

The level of experience of the instructor who was with the Elim group has been cited as a possible contributory factor[10]. The instructor had the experience and training required by OPC at that time for the upstream gorge trip. This highlighted the need to review this set of competencies, and to review all OPC's activity competencies.

The DoL also suggested to OPC that reviewing these competencies would be a positive step to take. As part of the new SMS, OPC has redesigned staff induction, training and assessment processes and the resulting 'scope' within which an instructor with certain experience is allowed to operate. Experience and judgement in a range of situations is assessed. This internal review is closely aligning with industry wide developments in this area primarily by Skills Active and NZOIA. Staff induction periods are now longer and levels of supervisions beyond the formal induction period have been increased.

A key focus is on training staff to recognise and respond to 'not normal' circumstances. The DoL suggested the need to use realistic training scenarios to test judgment, and OPC has incorporated realistic emergency scenarios into a number of staff training events.

The reports also suggest that the instructor may have been working too close to the limits of her experience and competency to be able to respond adequately to the situation which arose. In addressing this OPC has focused heavily on setting expectations for instructors to be working with a substantial margin of safety and on developing a safety culture based around conservative decision making, shared responsibility for safety and open peer review of decisions. Recent interviews with instructors indicated that they now feel very little pressure to be able to offer certain activities and that staff almost all feel comfortable and able to offer their feedback to other instructors and management.

The IRT have recommended to OPC that we establish a plan to reduce staff turnover and increase numbers of senior staff[11]. They have also highlighted that internal safety audits going back to 1996 identify this issue[12]. OPC addressed this concern immediately after the Mangatepopo accident through an international senior instructor recruitment drive having struggled to recruit enough senior instructors within New Zealand. Improving staff retention has been a long term strategic goal and from discussions with others in the industry seems to be a struggle right across the outdoor industry in New Zealand. OPC will be focusing attention on ways to address this in the second half of this year and hope to be able to share ideas and actions with others in the industry.

### c) Weather Forecasting and Response

Much attention has been focused on the weather forecast information upon which the decision to go into the gorge was based. The MetService severe weather warning alerts are now well known and used in the industry and became a part of OPC's weather policies and practices very soon after the tragedy. The external reviews all recommended signing up to the MetService severe weather warning service and accessing more frequent weather updates during the day.

Weather forecasts are sourced from several sites and so is supporting information when appropriate, such as river flows, swell reports and avalanche advisories. If our satellite internet connection is lost we are able to access back-up forecasts from the weather fax or marine radio channels. One simple tool we are using involves categorising the weather as green, yellow, or red. At 'red' staff all know that certain activities are closed. At 'yellow' staff know to be more vigilant and that they or the Duty Manager may decide to cancel certain activities at any time. If the resulting weather differs significantly from the forecast, the Duty Manager can very simply communicate this to all staff with a colour change and discuss with staff how to respond. Policies for activity closures during severe weather warnings and documentation of these decisions have also been improved in line with suggestions from the Department of Labour.

The flood which resulted in this tragedy was a flash flood. The volume of water measured by Genesis energy increased almost 200 times in two hours[13] during the time the group were in the gorge. Data however has also shown that this stream floods to this level on average once every two years: it was not a one in a million flood event. If accidents like this are to be prevented in the future we must get better at predicting when an occurrence like this might happen. As part of OPC's new Safety Management System we are mapping catchment areas for rivers and finding ways to source more detailed local rainfall information to consider with the forecast.

The other big change which has happened is in the staff and management culture: we still get out there and do things in the rain (anyone who has spent much time in the Central North Island will understand that rain is a big feature in our daily lives), but more conservative decisions are made around the choice of activities and the concept of closing an activity site is well accepted and regularly used.

#### d) Management Restructure

Some of the possible contributory factors identified by the IRT included a poor handover and distractions to the Field Manager who had just returned from holiday[14]. A clearer handover process was also suggested by the DoL. Lack of role clarity was also identified. Since the tragedy OPC has spent quite a bit of time considering alternative management structures and roles and the Tongariro Centre has been restructured. The most relevant change is the implementation of a Duty Manager system. This role rotates between management and specifically trained senior instructors. The Duty Manager's primary focus during this period is on managing and supporting the safety of groups and instructors in action during that time. A clearly defined handover process has also been devised, documented and is in action. Keeping a clear log of intentions, events and decisions is an important part of this role and responds to some of the Department of Labour's suggestions.

The new structure also divides the responsibility for management of instructors between three managers, decreasing the load on any one individual. New instructors are now all managed by the Training Manager who is able to invest a much greater degree of time and attention to them.

Similar systems have been implemented at our Great Barrier Island Centre where the Duty Manager role is held by the Centre Manager, Assistant Manager and specifically trained senior instructors.

#### e) Learning from the Past and from Others

OPC has one of the most comprehensive incident histories of any outdoors organisation in New Zealand and yet failure to learn from previous incidents is cited as a possible contributory factor in both reviews, and feedback from the DoL. 'OPC had changed policies and procedures following ... incidents, but the circumstances of the incidents were not being used as a learning tool for instructors.'[15] The new SMS includes a booklet of historic accidents and incidents which aims to better capture this information for current and future OPC instructors.

Internal safety committees have played an important role in analysing incidents for many years. Recently OPC has set up a Safety Advisory Committee (SAC) to supplement our internal committees. This committee discusses safety issues from both Centres and OPC policies and procedures. Industry experts have been employed to give an external view point and peer review at these meetings and to physically review activities at the Centres to help avoid complacency. We believe this external view point is vital considering that, despite analysis of the gorge trip through OPC's safety systems and many discussions within the internal safety committee, the IRT found that there was a 'general failure to adequately comprehend the hazardous nature of the upstream gorge trip'[16]. The trip involved walking upstream into a gorge approximately 200 meters then turning around and coming out the same way. This was seen as much lower risk by staff than a fully committing downstream gorge or canyon trip would be seen. The assumption being that you could turn around at any time and leave the way you had come.

## f) Financial Constraints

From staff interviews the IRT concluded that financial pressures may have been a root cause of the tragedy[17] and recommended that 'where a substantial margin of safety in a programme cannot be funded direct that the programme be not offered'[18]. The OPC Trust and Chief Executive are emphatic that finance has never been a factor when it came to the need for safety and of course that is the case today.

Finances do continue to be a hot topic at OPC though as they are across the globe during this time of recession. As part of our programmes review we will be looking closely at how to provide the best quality, safest opportunities for young people to take part in outdoor education at affordable prices.

## g) Crisis Response

Both reports comment on the crisis response to the Mangatepopo tragedy and make recommendations. The IRT comment that they do 'not consider that any different approach to the emergency response would have resulted in the saving of any lives'[19]. The Coroner however felt that vital time was lost in confirming that there was indeed a crisis occurring due to poor communication[20]. This has been partly addressed through refinement of policy and procedures around instructor intentions and requirements for updates and communication during the day. Further communication challenges are discussed in section 11.

OPC's Crisis Management System (CMS) is currently being redeveloped. We are adding response plans for high complexity sites like the Mangatepopo gorge to the existing plans for specific events. Simple systems for both internal and external communication are also being set up. This has involved building stronger relationships with other local bodies, such as the police, search and rescue and local ski patrol during winter at Tongariro. This will enable OPC to seek support and advice from a wider group of experts as soon as it becomes apparent that there may be a crisis occurring and will reduce time lost in any handover of responsibility. The goal is that everyone who may be involved in the response to a crisis will be trained in a response plan specific to them.

Last year, OPC expanded seasonal group training blocks for all instructors and crisis management training and scenarios have been a focus of this. Considering what could go wrong and practicing and reviewing the decisions people make under pressure is important. The gorge incident highlighted an example of an instructor instigating a whitewater towing system that did not follow any established practice – clearly a decision made under pressure. Practicing scenarios stimulates discussion around the limitations of rescue procedures such as throwbagging, avoiding people 'over relying' on their ability to rescue rather than avoiding the situation in the first place[21].

## h) Review of OPC's Programmes

The IRT have recommended to OPC that we review the Adventure Challenge course to ensure it is 'driven by educational aims' and to 'incorporate a substantial margin of safety'[22]. Before the release of the IRT report OPC was already working on aligning our school programmes to the objectives of the 2010 New Zealand Curriculum. We also made changes to the way the programme is structured and described, for example removing the concept of a 'water day' which may have resulted in instructors feeling pressurised to do a water-based activity despite adverse conditions. We have also visited schools and talked to teachers about the value they perceive in outdoor education and OPC.

In 2010, OPC added to our internal programme review processes by employing two external outdoor education experts to review the Adventure Challenge course. This report was received in December and coincided with a Strategic Review process where we made a strong commitment to focus on our educational programmes for young people. In June of this year, we will be running a two day curriculum workshop involving internal experts (our staff) and a range of external experts from a variety of areas, including our two reviewers. This workshop will aim to redevelop OPC's core educational philosophies and reconsider all of our programmes for youth. Following the workshop we have resources budgeted to develop new programmes and to set up a Research Advisory Group to assist us in our ability to 'measure' against our outcomes.

The review team note that 'all of the educational aims espoused by OPC can be achieved in relatively safe environments.' The role of risk in learning is an area we will be looking at closely.

### i) Solo instructing

Both reports discuss the increase in risk posed by a solo instructor working with a group[25]. Although there was a teacher and an instructor with the group in the Mangatepopo gorge, the teacher was for all intents and purposes a participant in the activity as he was not trained to manage the safety of a group in that environment.

The FLASH system defines certain sites and activities, in certain situations, as not being suitable for a solo instructor. In these situations, a second trained instructor is necessary, or in some situations two groups may work together. The decision is based on:

- The overall level of risk
- Level of risk in key areas including water, height (IRT recommend two instructors when these risk factors are present[26]) and speed
- Group factors
- Environmental conditions
- Instructor experience
- The impact of either the instructor becoming incapacitated or the risk to the rest of the group while an incident is managed with one student.

Activities such as the Mangatepopo upstream gorge trip are permanently classed as two instructor activities as recommended by both the IRT and Coroner[27] while others are only classed as needing two instructors when additional risk factors come into play. Many of the decision making processes which were developed as part of the FLASH tool have now been incorporated into wider OPC practices and the use of this tool at OPC is now a lot more flexible than described in the original paper by Grant Davidson.

It should also be noted that there are other types of risk, such as risk shift (assuming the other person's responsibility and control of the situation), which could be associated with having more than one instructor with a group. OPC is also considering how to best manage these risks when two instructors do work together.

#### j) Informed consent and information sought from parents

The IRT comment that 'in light of the tragedy, some parents might believe that information provided to them about OPC was inadequate'[28] and recommend revising information to 'ensure that parents are able to make an informed judgement about their child's participation'[29]. OPC have revised this information, in particular our medical and consent form, and have had positive peer review from our SAC. We do however recognise that it is not possible to educate all parents and participants to a level where they can make a fully informed decision. Risk disclosure has always played a key role in OPC's safety systems, but it is hard for any person to truly understand the degree of risk without considerable experience in an environment. The goal here has to be to provide as much information as is practical for a prudent parent to digest and understand. Information will be available on the website and on CD to enable participants and care-givers to be better informed.

An area we have identified where we can continue to improve information given to parents and students is in the way we use and explain 'challenge by choice' and voluntary participation. The use of challenge by choice on the day of the tragedy is questioned by the IRT[30]. One of the most powerful outcomes for students of taking part in an OPC programme is overcoming perceived barriers and so realising that they can achieve more than they originally thought possible[31]. Encouragement plays a big role in this. The challenge by choice philosophy ideally leaves the final decision to participate and the degree of participation to the student. Our Student Information Booklet now clearly states that 'it is up to you whether you take part in an activity, however OPC staff and your team mates will support and encourage you to participate to a level which challenges you.'

The IRT and the Coroner also question information sought from parents about swimming confidence[32] which failed to identify one student's 'fear of water' and another's 'slight physical impairment'[33]. The IRT comments that OPC 'tended to regard swimming ability as relatively unimportant for the gorge activity ...they need to be able to float (with) a wetsuit and PFD'[34]. With our SAC we have spent quite some time exploring the idea of practical swimming tests and have developed one for the Great Barrier Island Centre. Next steps will be working out how to define when a practical swimming test is necessary before an activity and what options to offer to students who may not be able to take part in a water-based activity.



## k) Wilderness Communication

The Coroner carefully considered the communication challenges posed by the gorge environment[35] and made nine related recommendations[36]. These include that 'there be adequate radio communication between OPC instructors in the Mangatepopo gorge and OPC Tongariro base (and if necessary a repeater be installed)' and that 'OPC further investigate a fall back method of communication of distress'. The DoL has also suggested that OPC better document policies for managing radio dead zones.

Wilderness communication is an ever developing industry, but does not yet provide the technology to allow instant communication from all wilderness sites. The challenge comes when we try to extrapolate this recommendation to other settings. Any number of repeaters will not allow radio communication from within a cave for example. OPC uses a wide range of wilderness communication depending on the locations in questions: VHF radio (local area communications through our own repeaters and DoC channels), mountain radio, satellite phone, cell phone and personal locator beacons. We also try out new technology as it comes onto the market and have recently bought booster aerials for our VHF radios. We have also been working hard to build better pictures of how and where wilderness communication can be used and to train staff in how to get the best from communication. This includes mapping of areas where different forms of communication are effective.

### **3. Future use of the Mangatepopo Gorge by OPC**

OPC is working hard on responding to the various safety recommendations resulting from the tragedy, and achieving best practice safety systems. When we can confidently say that we have systems in place which address these recommendations and which will prevent any future groups from becoming trapped in the gorge during a flash flood, then re-opening will be considered. Any such decision to take groups into this environment will be externally reviewed, and discussed with key parties.

### **4. Sharing the Learning and Moving Forwards**

The IRT comment that 'it hopes the (OPC) Trust will see fit to share the conclusions herein fully'[37]. We hope that this paper and this safety section of our website go some way to meet this recommendation. Moving forwards, we will continue to focus on addressing the recommendations as part of an ongoing process of continual review and improvement.

Belinda Manning and Simon Graney, in collaboration with OPC staff and Trust Board members 9/8/10, updated 3/5/11.

# Summary of Department of Labour Recommendations

The Department of Labour (DoL) carried out an investigation into the Mangatepopo tragedy and pressed charges against OPC. The Department of Labour did not produce a report detailing recommendations to OPC, however suggestions were proposed during meetings between the two organisations. In addition the DOL staff commented on OPC's own proposals, in relation to meeting their requirements. The following list encapsulates the changes that OPC has made as a direct result of their feedback. These relate to the OPC systems as they existed before the accident:

- Weather reports (subscribe to severe weather warnings, more frequent checks of weather situation)
- Improvement of systems to vet instructor intentions, and more detailed recording of intentions
- Better systems to check that procedures are followed in the field (for example having a checklist against policy when observing instructors in the field)
- More holistic communication of historical information and hazards
- Changes to RAMS forms as a method of communicating hazard information (hazard identification system to include severity ranking of the hazard, and explicit mention of whether the hazard is eliminated, isolated, or minimised)
- Re-analysis of all of our hazards in the field
- Re-analysis of our competencies, and incorporating experience on the ground into competency decisions – experience and judgment in a range of situations.
- Use of realistic training scenarios to test judgment
- Documented evidence of activities being cancelled, or instructor requests to run activities being denied
- Documented evidence on ongoing field management decisions and changes (e.g. some sort of radio log of significant transmissions)
- Policies around closure of activities when severe weather warning are in place
- Vetting of instructor intentions before the morning meeting for less experienced instructors
- Communication policies around dropping into and out of radio dead zones
- Clearer handover of field management roles when personnel change

The new systems which we have developed in response to these discussions are detailed throughout this section and in particular within the summary report found under the 'Mangatepopo Introduction' section.

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## Coroner's Recommendations 9th August 2010

Since the incident OPC has closed the gorge and has focused energy on systems based improvements covering all activities (the new systems can be viewed [here](#)).

Once this process is complete and shown to be effective for all other activities OPC will re-assess future use of the Mangatepopo gorge trip applying our new systems and make decisions on the ways we can use it again safely. At that stage, each of the Coroner's recommendations which are specific to the gorge will be addressed and responded to. Once OPC is satisfied that the substance and intent of the Coroner's recommendations in respect of the gorge have actioned, OPC will consult with the Department of Labour, DoC, local iwi, Elim Christian College and the affected families and other relevant interested parties before opening the gorge for future OPC courses.

Note- OPC has changed the organisational structure at the Tongariro Centre, so references in the recommendations to the "Field Manager" would now be to the "Duty Manager".

To download a copy of the full Coroner's report click [here](#) – please email us to request this document

<b>Coroner's Recommendation</b>	<b>OPC's Actions</b>
<p>The catchment for the Mangatepopo stream be identified and all relevant staff at OPC (and in particular Field Manager and instructors) be made familiar with that catchment.</p>	<p>The new safety management system includes catchment area maps where appropriate. One has been developed for the Okupata caves (the other key site at Tongariro used with school groups which has a flood potential) and will be developed for the Mangatepopo gorge before its use is considered again. These will be part of an activity management plan which staff will carry with them to these sites.</p>
<p>A more accurate map of the Mangatepopo gorge be prepared by OPC for instructors including showing points of exit and places of refuge.</p>	<p><b>As above.</b> Maps are being developed for all high risk sites where knowledge of escape routes is essential.</p>
<p>Instruction be given to OPC staff leading gorge trips (from historical records and observation) of what conditions in the catchment result in water levels rising in the Mangatepopo stream and the extent and duration of rising.</p>	
<p>There be adequate monitoring of rainfall in the Mangatepopo stream's catchment (including visual and rain radar monitoring) during and 3 hours prior to entry into the Mangatepopo gorge. Rainfall is monitored through a series of websites including the met service and at Tongariro the Genesis Energy web site which lists river flows at their structures (based all around the OPC Tongariro main operational area).</p>	
<p>Rainfall is also 'informally' monitored by all staff in the field who radio updates to the Duty Manager on a regular basis. OPC Tongariro are considering installing a river gauge upstream of the Mangatepopo gorge at the road bridge to provide more detailed information for this high risk section of river.</p>	
<p>New weather systems clearly define the conditions under which certain activities and sites will be closed. The final decision is made by the Duty Manager.</p>	
<p>The Activity Management Plan for the Mangatepopo gorge, once this is developed, will clearly define conditions under which the gorge trip will be closed. There be more emphasis placed in instructor training on the skill in assessing the likelihood of water levels rising in all competencies where such skill is relevant. Improved seasonal group training has had a strong emphasis on water safety and crisis planning. All new competencies contain a written assessment of an instructor's understanding of the main hazards and management strategies in that environment. Rising water levels would be expected</p>	

to be identified within this for relevant activities. A conservative approach be taken to entry into the Mangatepopo gorge if there is heavy or steady rain in the catchment within 3 hours prior to a gorge trip (Any decision will depend on the adequacy of monitoring of rainfall in the catchment, and may extend to no entry into the gorge if any heavy or steady rain has fallen in the catchment within 3 hours prior to a gorge trip. Such a conservative approach is even more important if OPC is unable to devise any rescue plan that would be effective in the situation encountered by Ms Sullivan on 15 April 2008). OPC has a clear procedure in place for 'rating' weather (green, yellow, red) and has clear policies for activity closures related to this.

A conservative approach is mandated in the philosophy behind all safety decisions.

The new safety system and associated policies clearly define closures of activities under certain environmental conditions and these are implemented in practice on a regular basis. There be a policy and culture for communication by OPC staff with the Field Manager of any event that may cause danger to OPC staff and students/participants in OPC led activities. Communication with the Duty Manager now happens regularly and openly and the time lapse between a staff member feeling uncertain about a situation and making the call is very short. Recent interviews with a selection of instructors at both Centres indicated that staff feel comfortable asking for help, admitting to mistakes or near misses and contributing safety observations. The safety culture was described by most people as open and comfortable. OPC continues to invest energy into this. There be radio communication by OPC instructor to the Field Manager when entering and exiting the Mangatepopo gorge (so that the Field Manager is aware that an instructor is in the gorge and time of entry and time of exit).

This extends to information about other environmental conditions including wind, tides and avalanche risk as appropriate. The Field Manager be responsible for having the "overall picture" of environmental conditions from information obtained directly by the Field Manager and provided to the Field Manager by OPC staff. The practices for radio communication have been reviewed. When weather conditions are rated as 'red' staff must be contactable. At yellow they must seek regular weather updates and expect closures at short notice. Several activity management plans also specify approval immediately before commencement, an estimated completion time and confirmation after completion. This includes caving and will include gorging. When entry into the Mangatepopo gorge is communicated to the Field Manager by an instructor, the Field Manager have the responsibility to review the decision by OPC staff to enter the gorge with a group, with the Field Manager having the authority to countermand an OPC instructor's decision to enter the gorge. This is clearly happening for other activities and is clearly documented as a responsibility of the Duty Manager. The Duty Manager is also required to consult with the Centre Manager over any activity outside of their 'scope' to authorise. There be 2 instructors on a Mangatepopo gorge trip. OPC, lead by Dr Grant Davidson, have developed a tool called FLASH (Factors Likely to Accentuate Serious Harm) which forms a part of the new Safety Management System. This provides standards by which to rate the level of risk involved with an activity and the necessary management strategies including number of instructors required. This system rates the Mangatepopo gorge trip as a two instructor activity. Other activities with similar ratings now run with two instructors. Both instructors on a gorge trip in the Mangatepopo gorge carry radios. Policies like this will be captured by the new Activity Management Plan for the Mangatepopo gorge. It is normal practice for all instructors to carry a radio. There be adequate radio

communication between OPC instructors in the Mangatepopo gorge and the Field Manager/OPC Tongariro base/other relevant OPC staff (and if necessary a repeater be installed to ensure such communication).This will be re-tested and the suggested repeater installed if necessary before the gorge is reopened.

Clear mapping of radio dead zones and improved instructor training in radio use is improving the effectiveness of communication across the whole operation.That radios used in the gorge be waterproof.OPC radios are waterproof and OPC will continue to purchase waterproof radios on replacement. Unfortunately the technology is not 100% there and waterproof radios do still leak so radios will continue to be carried in sealed watertight bags to ensure their longevity.Earpieces be provided for radios used in the Mangatepopo gorge to assist where conditions permit use in overcoming the difficulty in hearing because of ambient noise.This technology will be tested by OPC to see if it can be made to work before the gorge is reopened.That radios be audible and kept on by users in the Mangatepopo gorge throughout the gorge trip (or if not possible, that there be a schedule of radio communications during the trip agreed between the Field Manager and Instructors prior to entry into the gorge).There is significant risk of damage to radios if carried openly in this environment, so again, OPC will need to test different approaches to improving communication in the gorge until an approach is found which is sufficiently effective. This will be detailed as part of the Activity Management Plan which instructors will learn and carry with them.That OPC further investigate a fall back method of communication of distress between a group in the gorge and the Field Manager/OPC Tongariro base if radio communication fails or is not available.OPC continues to investigate and trial new communication systems. Currently we use VHF radios, cell phones, mountain radio, personal locator beacons and satellite phones as most appropriate to the activity. Personal locator beacons currently have a lag time before a response and their GPS would not have pin-pointed the exact location of the group in the gorge. We will continue to test different forms of communication as they develop and continue to select the best forms for each purpose.That all adults accompanying a gorge trip be aware of exit points, safety positions and how to use the radio and fall back communication devices.It is current policy for students to be trained in the basics of VHF radio use and students regularly practice this to improve their confidence in non-crisis situations. OPC would require the second adult on a gorge trip to be a fully trained OPC instructor who would have this knowledge. The Activity Management Plan for the gorge will contain a map with detailed descriptions of escape routes and this will be carried by both instructors. The sample Activity Management Plan for a cave site, shown on our website, gives a good idea of what the gorge plan may look like.Instructors leading gorge trips be fully trained and have competencies in all available exits from the gorge.The fully reviewed staff competency system sets the framework for this specific competency module to be added to before the gorge is re-opened. The 'Principles of Safety Management at OPC' document which is the core of our new safety management system requires that there is a rescue plan that is achievable and efficient.That there be included in policies an instruction that all endeavours should be made to immediately exit the gorge when a rise in water level is observed;**As above.**

This policy will be stated in the activity management plan.A time plan be given by an instructor to the Field Manager of a proposed trip, so that the Field Manager will know if a group is overdue;As described above, this process is in action for other relevant activities.There be a written plan of action covering seeking assistance and performing a rescue if a group is overdue or encounters difficulty in the gorge and assistance is required;OPC has

developed and instigated a new Crisis Management System involving close working relationships and shared means of communication with relevant local bodies such as the police and search and rescue. This has been trialed with a student who fell ill in the mountains. The situation was easily resolved by OPC personnel, but the local police listened in through our radio channels and were on hand to assist at any moment as required. Instructors have recently been trained to use this new system at Tongariro and further work is underway to develop specific plans for complex sites like the Mangatepopo gorge. Rescue exercises be undertaken to cover the event of rescuing a group that is overdue or encounters difficulty in the gorge. Seasonal group training blocks have been improved and extended at both Centres and have had a focus on rescue exercises. This has not been done in the Mangatepopo gorge, but if this is reopened then considerable training, including rescue scenarios will be undertaken by staff before this happens.

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## Independent Review

The following document contains all the recommendations from the independent review into the Managatepopo tragedy which was instigated by the OPC Trust Board. If you would like to see a full copy of this extensive report please email us, [safety@opc.org.nz](mailto:safety@opc.org.nz), with your postal address and we will send you a copy. You can also direct any questions you may have to this email address.

Independent Review document – please email us to request this document