Stretton Group

Fire - Flood - Mud - Water

Wednesday, May 28, 2008

Luncheon Seminar: 12 noon – 2:00pm

Morgans at 401

401 Collins Street, Melbourne

Following the 2003 fires which devastated about 2 million hectares of the Murray Darling Snowy River Catchments – the relationship between fire and water has never been more starkly demonstrated. In 2006/2007 fires in North-East Victoria and Gippsland created a similar catastrophe in another 1 million hectares of those water catchments.

In the Macalister Valley, the Glenmaggie Weir filled rapidly with floodwater and debris. Licola and essential infrastructure was wiped out by flood and mud-slides. Floods were of huge proportions as a result of the rain falling on forested catchments which had been stripped bare of all protective vegetation by intense bushfires in December 2006. These floods washed millions of tonnes of topsoil into the Macalister River and its headwaters.

The key policy question facing all urban populations, including the 4 million inhabitants of Melbourne, is what will happen to ***your*** water if the catchment is devastated by a hot intense bushfire, as was the case in Gippsland in 2006/2007.

Speakers:

Rob Gilder, Licola farmer (Gippsland)

Professor David Dunkerley, Monash University, Landscape Water and Runoff

About the Stretton Group

The Stretton Group is an apolitical, not-for-profit group established in December 2003 following the disastrous south east Australian bushfire crisis in 2002/3. The Stretton Group comprises a disparate association of volunteers who support the protection of the natural environment through greater transparency of the public sector processes involved. Named after the respected Royal Commissioner into 1939 Victorian Bushfires, Justice Leonard Stretton, the group proposes that government managed national parks and forests should be provided with a balance sheet value which encapsulates the environmental, cultural and economic value of these assets.

The Stretton Group is committed to ensuring that our intergenerational responsibility is met by Governments committing appropriate funding to the maintenance of this public property – commensurate with its asset value. The Group advocates the preparation and publication of performance indicators which enable the public to assess the quality of the management being provided to the natural environment. This would bring publicly owned wilderness into line with reporting required for hospitals, schools and other public institutions. The Stretton Group is committed to ensuring that the public debate about conservation is conducted on a balanced and informed basis – which may often disturb political myths or common preconceptions about the present quality of environmental preservation.

Members of the Stretton Group:

Simon Paton is a 5th generation farmer and cattle breeder from Callaghans Creek, Mitta Mitta and owns and operates the Bogong Ski-Hire centre at Mt Beauty. Simon has been a major spokesman for NE Victorian communities affected by the bushfires and is campaigner for community involvement conservation and forest management. (Tel: 03 5754 4555)

Peter Attiwill, PhD, BScFor, AssocDipFor, is Principal Fellow in Botany, and Senior Fellow, The Australian Centre, The University of Melbourne. He has researched in eucalypt ecology over 40 years, with a concentration on soils and nutrient cycles, and on bushfires and ecosystem recovery. He has published extensively in the international journals, and his latest book is Ecology: An Australian Perspective (co-editor BA Wilson, Oxford University Press 2003). (Tel: 03 9870 3034)

Athol Hodgson, BScFor, AssocDipFor, has more than 50 years experience in fire management and forest fire research in Australia, USA, Canada, France and Spain. He was formerly Commissioner for Forests, and then Chief Fire Officer, Department of Conservation. He was a Member of the Board of the Country Fire Authority and a Member of the State Disaster Committee and is a graduate from the National Advanced Fire Behaviour School, Marana, Arizona. (Tel: 03 9580 4964)

Bill Middleton, OAM, DipFor, has some 50 years experience in management of forests, of nurseries and of vegetation habitat in rural areas and he is an Honorary Life Member of Birds Australia. He was Supervisor of the innovative Potter Farmland Plan for ecologically-sustainable agriculture, and a Board Associate for the Trust for Nature. (Tel: 03 5254 2332)

David Packham, OAM, MAppSci, worked for 40 years in bushfire research with CSIRO, Monash University and the Australian Emergency Management Institute. He was responsible for fire-weather services in the Bureau of Meteorology. His extensive research concentrated on the physics of bushfires, and he applied this research to practical issues including the development of aerial prescribed burning, non-evacuation of properties, modelling of fire behaviour, and forensics.

Stewart McArthur, MA Cantab, was the Federal Member for Corangamite 1984 – 2007, a Camperdown farmer and company director. He was an active member of the all-party House of Representatives Select committee Inquiry into the 2003 Australian Bushfires whose report *A Nation Charred: Inquiry into the Recent Australian Bushfires* was tabled on Wednesday 5 November 2003.

Stretton Group Forums and Seminars:

Inaugural Oration Phil Cheney "The Green Inferno" (the Politics of Bushfires and Conservation) (November 25, 2004)

Forest Industries: "Their Contribution to Global Sustainability" Tricia Caswell (September 29, 2005)

"Lock 'em up and let 'em burn" – Public forum on Grampians and Anakie fires 2006 (February 23, 2006)

Acknowledgement and thanks

The Stretton Group are grateful for the very generous support by Gary Morgan and Michele Levine of Roy Morgan Research for their most generous assistance in helping with the production of this quality document. Without their help, and that of their staff, the important environmental messages provided by both our speakers could not have been available to the public at large.

Speakers:

The Stretton Group thank our two guest speakers for their excellent presentation:

Rob Gilder, Licola farmer (Gippsland)

Professor David Dunkerley, Monash University, Landscape Water and Runoff

Photographs:

The Stretton Group also thank **Aircraftman Warren Derment RAAF Sale** for the photographs presented in this document and acknowledge their copyright and high quality which has enhanced the report.

The State Parliamentary Environmental Committee Report

The State Parliamentary Environmental ENR Committee tabled it's report in Parliament in June 2008. The Stretton Group wish to show their strong support for the two recommendations:

- **Finding 3.5:**
  That previous land management practices, in particular an insufficient level of prescribed burning at a landscape-scale contributed to the scale and intensity of the 2002/03 and 2006/07 bushfires, thereby increasing the the severity of the recent flood and its environmental impacts.

- **Recommendation 2.2:**
  That in order to enhance the protection of community and ecological assets, the Department of Sustainability and Environment increase its annual prescribed burning target from 130,000 hectares to 385,000 hectares.. This should be treated as a rolling target, with any shortfalls made up in subsequent years.

The Stretton Group have advocated increased fuel reduction burning and is very pleased that the All party Committee have agreed with this strongly held Stretton Group position.

Fire - Flood - Mud – Water

Stewart McArthur: Ladies and gentlemen. Could I formally open our proceedings here this morning and welcome you on behalf of the Stretton Group. We're delighted with the turn-up and we appreciate the number of you who have travelled huge distances to be with us and I'll mention them in dispatches a little while later. Could I firstly thank Gary Morgan, and his wife Genevieve, for the wonderful hospitality we're receiving here today. They've gone to a lot of effort with Roy Morgan to ensure that the Stretton Group get the best of attention, and also to Michele Levine, the CEO of Roy Morgan and Associates.

Just by way of background, I'll tell you what the Stretton Group does, and how we came to be in existence. I'm Stewart McArthur and I'm the convenor of the Stretton Group. I am the first among equals. The Stretton Group emerged after the 2003 fires. I was a participant in the Federal Parliamentary Enquiry, and I saw the devastation in southern New South Wales and northeast Victoria. My view having participated in that enquiry, was that government agencies were derelict in their duty and the way in which they handled public land. The Stretton Group was formed in December 2003 and named after Judge Stretton. He provided a very comprehensive report of the 1939 bushfires, and it is an epic work on the kinds of problems they faced at that time. Conditions on 'Black Friday' have not been encountered before. I think, as I recall, 70 people died, and that was the start of the problem we face in southern Australia with bushfires.

The Stretton Group are a public advocacy group for good policy. We acknowledge the help of Allan Myers QC when we commissioned him on a pro-bono basis to challenge the Esplin Report. The Espen Report was a report which, in our view, was flawed about the 2003/2004 fires. So the Stretton Group, I think, were instrumental – very much helped by Allan Myers' wonderful report – in making sure that the Espen Report did not become conventional wisdom. We advocate that if people lock up public land in forests and parks, that they look after it. We are, of course, a strong advocate of fuel-reduction burning, so that those intense bushfires do not totally destroy the flora and fauna and the timber that has taken place on some of these very big fires. The Stretton Group have also, in recent times, put a submission to the State Government enquiry into bushfires, run by that standing committee, and that submission was well received.

Since our formation, we have run a number of seminars like this one because our attitude is one that we want to advocate our position; we want to put it on the public record. Our first seminar was by Phil Cheney, 'The Green Inferno: the Politics of Bushfires and Conservation'. Phil Cheney is a world-renowned expert on bushfires. He comes from Canberra with the CSIRO and he made a number of submissions on the Canberra bushfires, which some of you are very aware of. Tricia Caswell from the Forest Industries made another oration, 'Their Contribution to Global Sustainability by the Forest Industries'.

We also had a Report on the bushfires in the Grampians and in Anakies. The Stretton Group advised the government that that would be the next big fire to take place, and sure enough it happened in the Grampians. We were unhappy about the way that fire was handled and we've got a very good report from participants who were in the fire and some of their observations on what actually took place.

Could I just introduce our Stretton Group members? They might just tell us who they are in about one sentence. Simon Paton, if he just stands up, he's not short of a word.

Simon Paton: I'm Simon Paton and I'm a beef farmer from the north-east of Victoria. We got involved in how not to put out fires in about 2003 and we've been about it ever since.

Professor Peter Attiwell is one of our strong members, he's not with us today, but he's a world expert on fire and the impact of fire on forests. **Athol Hodgson** has also had some family problems, he's a leading member of the group and he has a long history in forest and fire management. Bill Middleton, he's here - Bill?

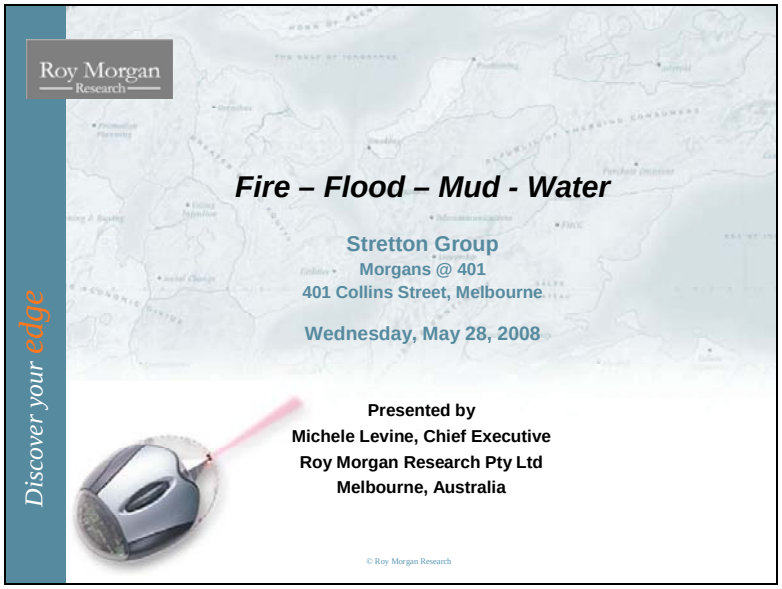
Bill Middleton: My name's Bill Middleton, I'm a retired forester, interested in everything natural and just a natural to the Stretton Group.

Stewart McArthur: Now, David Packham.

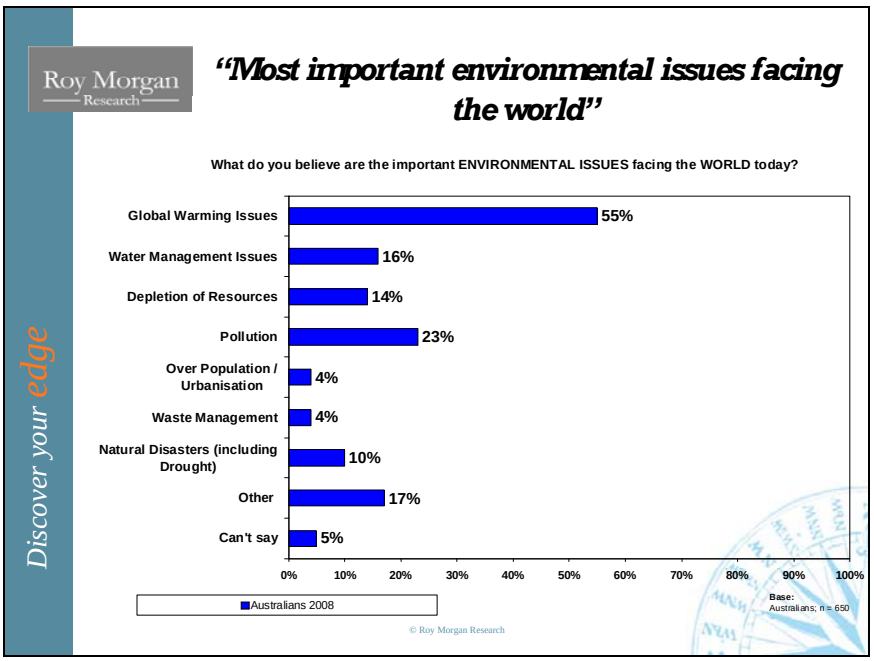
David Packham: My name is David Packham and I am a senior researcher in Geography and Environmental Science at Monash University but unfortunately in about another couple of months I will have been involved in bushfire research for just on 50 years.

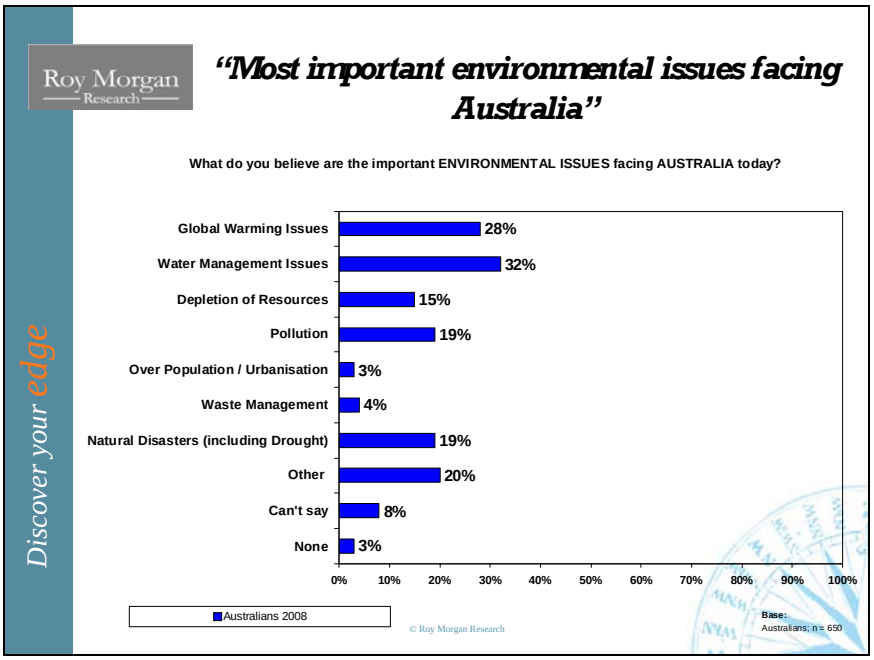
Stewart McArthur: Thankyou. As I say, I'm Stewart McArthur and I was formerly the member for Corangamite from 1984 to 2007. I'm a farmer by background and I have a very strong commitment to the Stretton Group and the sort of things that we have been advocating.

We thought it would be appropriate that Roy Morgan Research might give us an overview of where the environmental issues sit and we do appreciate Michele Levine, who will give us a very quick overview as Roy Morgan sees some of the environmental issues both internationally and nationally. And she will give a very good presentation, right now. Thank you Michele.



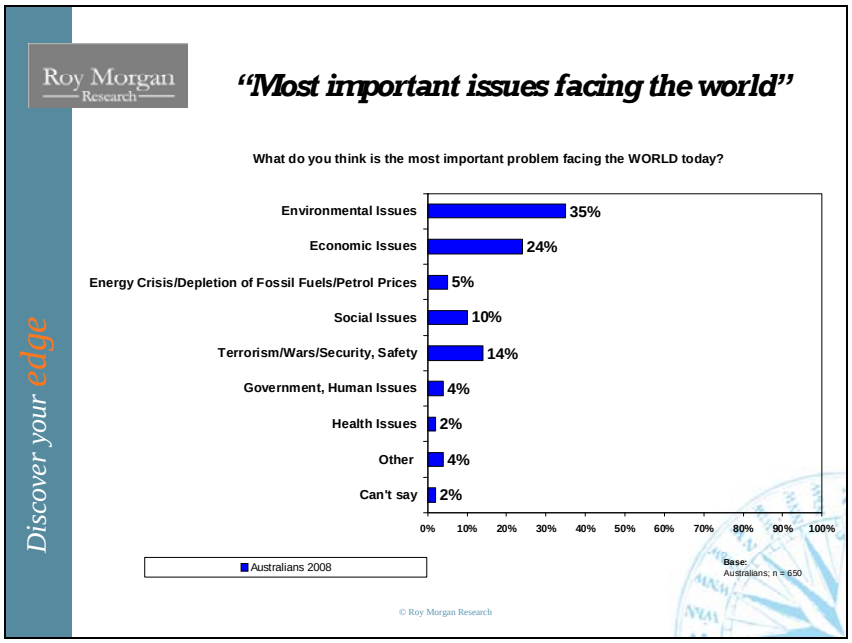
Michele Levine: Thanks Stewart, I will try and give a very good presentation right now. My job today is to provide some context for this meeting, I suppose. So to start, the environment – including things like climate change, global warming, water resources, drought and famine - is the most important issue facing the world, and facing Australia, according to the last Roy Morgan Research, which was done really to coincide with the Future Summit.

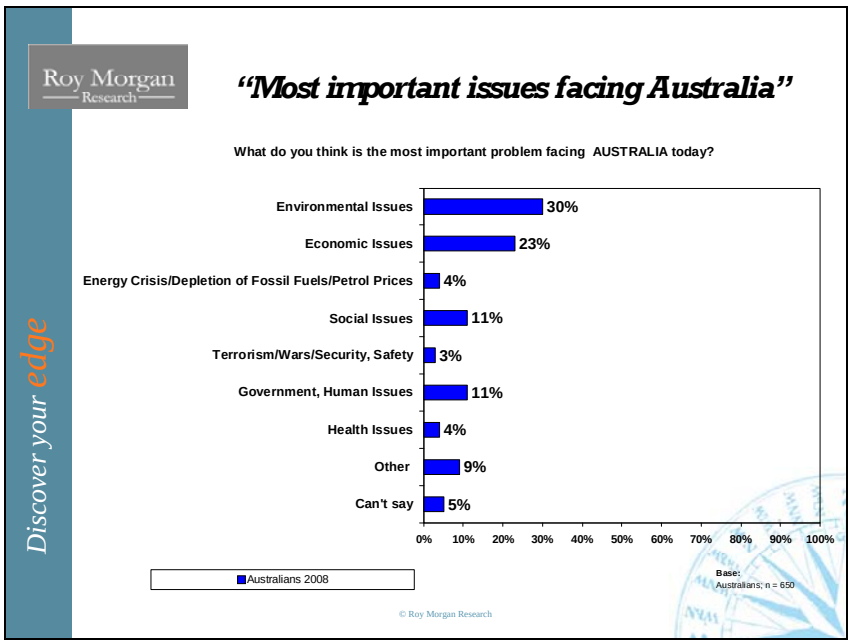




So, essentially what we do in this company is we ask people a whole heap of questions and find out what they're thinking about things. What we did in this case is ask people, firstly, what do you think is the most important problem facing the world, and then, what do you think is the most important problem facing Australia? The environment came up tops in both cases. So, as a world problem, 35% of Australians consider the environment to be the biggest problem, and just two years ago in 2006, that number was 14%. So you can see that over time, the environment has really raised its profile. So, the environment is ahead of economic issues at 24% - they're also up in two years – and ahead of terrorism. So, two years ago

terrorism was really the big issue on the agenda, and now that terrorism has now faded as a major issue in people's minds, we see the environment coming right up tops. Now when it comes to Australia, again environmental issues top the list. So 30% of people in Australia say that the environment is the biggest issue facing Australia. Again in two years that is up an extraordinary amount. Just two years ago, 8% of Australians were saying that the environment was the biggest issue facing Australia. So then we drill down a little bit and we say, well what exactly about the environment is the big issue? So, what's the most important environmental issue facing the world and what we see is that, for the world, 55% of people are saying global warming issues and water management issues are coming up at 16%. If we include drought in that, so water management issues and drought, it actually goes to 21%, and it's up about 5% in the last couple of years. When we go to Australia though, water is *the* big issue. So when we were presenting at the Future Summit, essentially to try to set the agenda from the perspective of what do Australians think, we said environment was the big issue, worldwide and for Australia, and within Australia, water management, drought and issues associated with water, were the top issues. So we have there water management issues at 32%, but if we add drought we have 46% of Australians saying it's the biggest issue facing Australia. So these are major numbers and pretty important findings.





Now the next set of numbers were, I guess, a little surprising to me because despite this big swing, this importance of the environment as a world issue and an Australian issue, when we asked people whether they think concerns about the environment are exaggerated or whether they think if we don't act now on the environmental issue, we will be too late, or is it already too late, we're actually seeing a bit of a softening in attitudes. So that we've got slightly more people saying that concerns are exaggerated. So that was a bit of a surprise to me, but it may be a bit of a response to perhaps some of the very powerful debate that's going on. So they are some of the key findings from this major research. But just in terms of the more general research that we're doing at Roy Morgan, what we're finding is that over the next ten years Australians have become more progressive, more interested in new things, and definitely more concerned about the environment. But what we're saying about the environment is that environment as an issue has come of age. For a long, long time, for ten years, if you mentioned the environment, nobody says that's a bad thing, let's do bad things to the environment – it's never been like that, everyone has always sort of supported the environment, like we all support motherhood. The issue is coming of age because we're actually seeing people changing their behaviour. We're seeing people taking up opportunities that they're presented with, to do the right thing on a personal level. So, intention to purchase hybrid cars is going up. Intention to purchase small cars is going up and intention to purchase large cars is going down. So on all of these behavioural dimensions, we're actually seeing Australians eager to participate and eager to take advantage of doing the right thing for the environment. So I hope that provides a bit of context for some of really targeted discussions

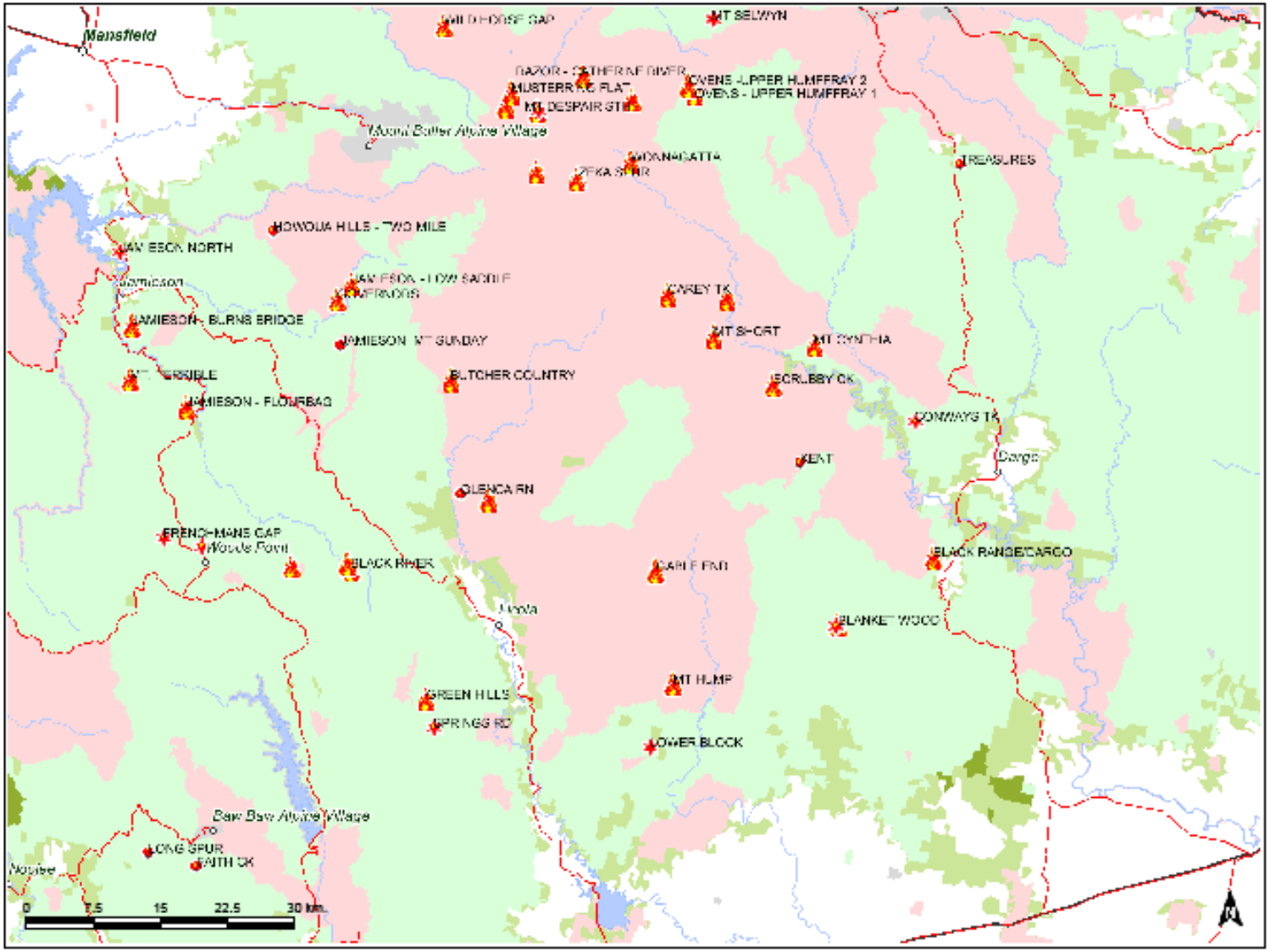
that you'll be having today, and to say that whatever discussions that you have, you're actually presenting them to an Australian environment that's really ready to hear them. Thank you.

Stewart McArthur: Thank you very much Michele, and thank you for setting the scene for the issues that we want to raise today, which are basically water, bushfires and floods. We have two speakers who will give some expert commentary on those matters. So we appreciate your in-depth analysis Michele. On the ground, the Stretton Group think water is a big issue, we're picking that up from people we talk to and that will be part of the theme today. So thank you for your presentation. We have got copies of that, if people would like a copy of that presentation. In another five minutes, we'll introduce our next guest speaker. Thank you.

Simon Paton: Ladies and gentlemen, it's my privilege today, on behalf of the Stretton Group, to introduce you all to Rob Gilder, from Glenfalloch Station up at Licola. Rob's a farmer up there, in a fairly reasonable sort of a fashion, and he had a fairly reasonable sort of a workout earlier this summer. Rob's family, incidentally, owned Warrangatta Station for a period of time and his grandfather was at Glenfalloch at the same time, I understand. So there's been a fair run of Gilder's hanging on to Glenfalloch on the Gippsland side. Without further ado, I'd like to introduce you to Rob, and he'll tell us what happened.

Heyfield Fire Complex - 0600 03-12-06

Department of Sustainability and Environment



TOWNS
- Major Town
- Large Town
- Town

Fire Origin - Controlled
Fire Origin - Contained
Fire Origin - Going

ROADS
- Highway

ROADS
- Freeway
- Highway
- Arterial

WATERCOURSES
- Major Watercourse

WATERBODIES

PUBLIC LAND
- Parks and Reserves
- State Forest
- Softwood Plantation
- Other Public Land
- Marine Parks and Reserves
- Tree Cover

Map Scale 1:604,114

GDA

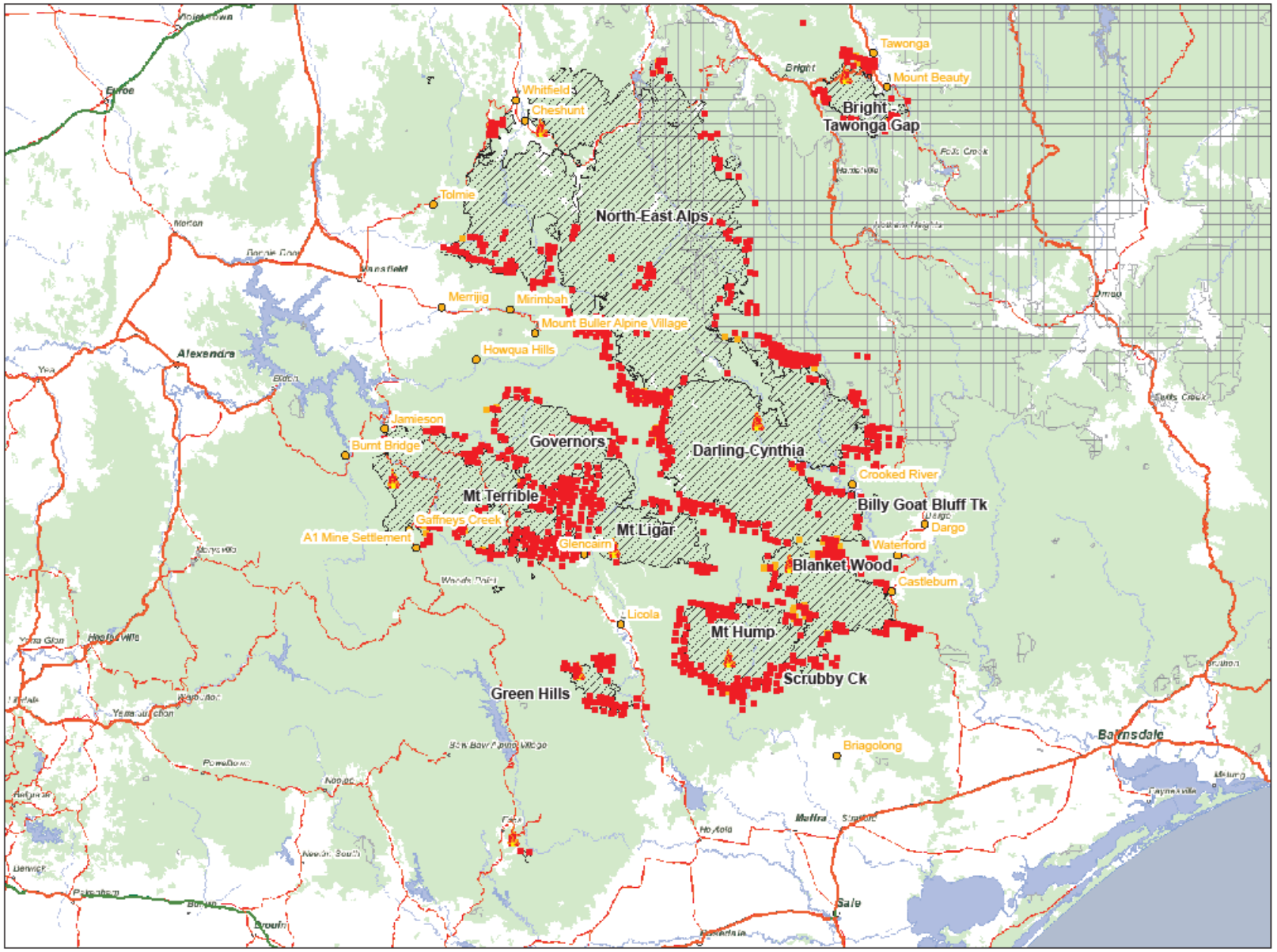
Victoria The Place To Be

Firemap

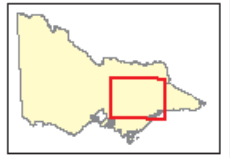
Produced on 3 December 2006 0:10:27

North East - Gippsland Complex 14 Dec 2006 - Media Map

Map Produced: 1400hr 14 Dec 2006



Department of Sustainability and Environment



Fire Origin - Going

- Burnt Area
- Freeway
- Highway
- Arterial
- TREE COVER
- Towns under threat
- Other towns
- Fire History 2002-03
- Hot Spots last 12 hrs
- Hots Spots 12 - 24 hrs

0 4 8 16
Kilometers

Victoria
The Place To Be

Map Produced: 0350hr 13 Dec 2006
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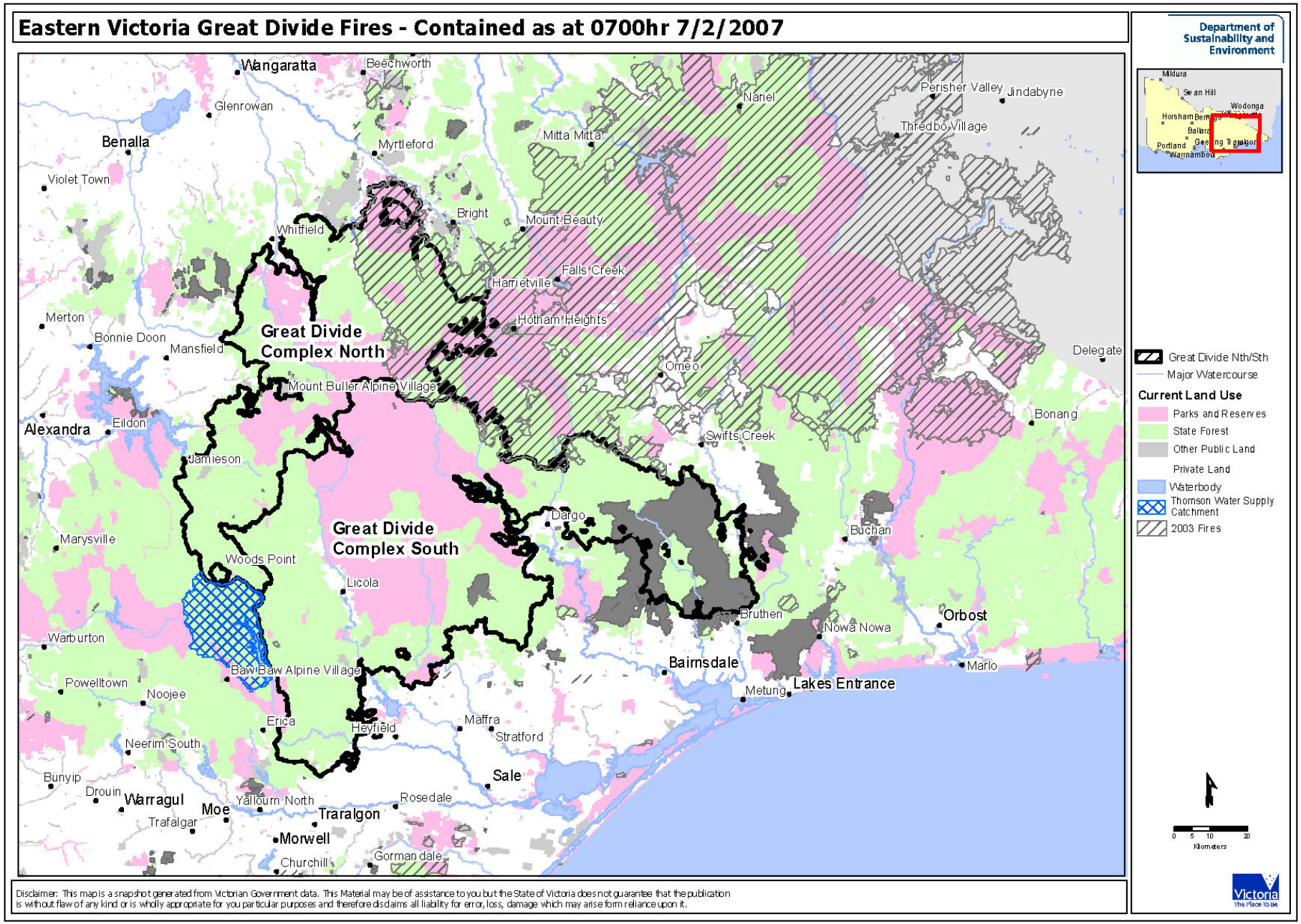

Eastern Victoria Great Divide Fires - Contained as at 0700hr 7/2/2007
Department of Sustainability and Environment
Wangaratta
Beechworth
Glenrowan
Benalla
Myrtleford
Violet Town
Whitfield
Bright
Mount Beauty
Mitta Mitta
Nariel
Perisher Valley
Jindabyne
Thredbo Village
Falls Creek
Harrietville
Hotham Heights
Merton
Bonnie Doon
Mansfield
Great Divide Complex North
Mount Buller Alpine Village
Omeo
Delegate
Bonang
Alexandra
Eildon
Jamieson
Swifts Creek
Great Divide Complex South
Dargo
Buchan
Marysville
Woods Point
Licola
Bruthen
Orbost
Nowa Nowa
Warburton
Baw Baw Alpine Village
Bairnsdale
Marlo
Powelltown
Noojee
Metung
Lakes Entrance
Erica
Heyfield
Maffra
Stratford
Neerim South
Bunyip
Drouin
Warragul
Yallourn North
Rosedale
Sale
Moe
Traralgon
Trafalgar
Morwell
Churchill
Gormandale
Great Divide Nth/Sth
Major Watercourse
Current Land Use
Parks and Reserves
State Forest
Other Public Land
Private Land
Waterbody
Thomson Water Supply Catchment
2003 Fires
Kilometers
Victoria
The Place To Be
Disclaimer: This map is a snapshot generated from Victorian Government data. This Material may be of assistance to you but the State of Victoria does not guarantee that the publication is without flaw of any kind or is wholly appropriate for you particular purposes and therefore disclaims all liability for error, loss, damage which may arise form reliance upon it.

Rob Gilder – Glenfalloch, Licola, Gippsland: Thank you Simon. Glenfalloch, the farm that Simon was mentioning, was passed down to me from my family, is about three hours drive east of Melbourne. It's just south of Mt. Buller as the crow flies, on the southern side of the range, and it's on the Macalister River; a long narrow valley and it's a long narrow farm. It's about 30 kilometres long and a kilometre wide. The rainfall around there is about 600 millimetres; it's pretty dry. This photography is just a Landcare photograph I had done a few years ago, and these are some neighbours up here and the property goes from about there, down to about there. So, it's long and narrow. The Macalister River runs down here and the Wellington River comes in across here and down here. North of here there was a lot of logging after the Second World War and south of that are towns like Heyfield, Maffra and Sale, and down to Traralgon. As far as you can see, around the farm, it's all surrounded by Crown land and forest, so you couldn't really pick a worse place to be endangered by bush fires.

Macalister River post flood showing timber removed by huge floodwaters.

But it has never been burnt out for as long as my family has been there. So we didn't get burnt out in 1939, but we definitely got burnt out in December 2006. There were lightning strikes that started off the fires on the second of December, and the lightning strikes were all around. There was a fire to the north-east, a fire to the north-west and a fire over on the western side, which is over here. After the lightning strikes, they were all burning fairly slowly, and it went for about two weeks. They'd have a bit of a run, and then they'd stop, have a bit of a run, and stop, and there was smoke where you couldn't see a thing. We were starting to wonder whether they might just peter out, or whether they'd actually reach us. We'd get a warning saying there's going to be a bad north wind on the Saturday, so we'd all get ready for it and then nothing would happen. So it was going along like that. I had taken all my sheep off all the higher ground, and put them down on some paddocks which were barren from an old oats crop and in the yards and places that I could defend in the fire, because there's some river flats in the floor of the valley, which obviously you can't tell from the photograph but the sheep are all on the hills, on the steep sides and they'd really have no chance in the fire.

So I got all the sheep together and all the cattle. I really couldn't get them all together to defend them because it was just too much mustering and things to do. I had to just leave them on the river flats and hope for the best. As it turned out, it worked not too badly. With all those false alarms, I couldn't muster the whole farm and let it go again, muster again, it just wasn't practical.

What actually happened then on the 14th of December 2006, the morning started off very still. You couldn't see anything because of the smoke, and it was dead still but they were forecasting a windy day. We got to almost lunchtime and it was very still, nothing was happening. But I had reports from the farmers, who are up here, that there was an inversion layer, so it was very windy, blowing 100 kilometres an hour higher up. But we were under the blanket of smoke so it was dead still. But eventually as the day warmed up, it broke down and then this wind came down and pushed the fires straight towards us. Leading up to that, the DSE were fighting the fires in various places and national parks, and we had a lot of CFA tankers – I say a lot, we had 10 or 12 CFA tankers in at Licola. They were camped there and they would rotate around every few days. You would have personnel come up and they would be there for about three days, then they would go home and another group would come up and take over those tankers and things that were there. So it was rotating around a bit. But as the fire got closer, the DSE left. I think they viewed the whole thing as pretty un-defendable

and it was more of a CFA job and not their thing. So they had gone several days before the fire got there, and they'd gone over – a lot of them – to the western side over here, which is the Thompson Valley. The Thompson Valley dam is exactly west of my farm and they were furiously defending that as Melbourne's catchment, which I can understand, but it certainly wasn't any help to us in our situation.

Getting back to that particular morning, the fire came through at about 3 o'clock. It was up here at about 11 o'clock; it moved about 30 kilometres in a couple of hours. From there it came straight down, through the whole valley. It burnt absolutely everything. There wasn't a single thing that it didn't burn, apart from some of the river flats and areas along the river that are a bit greener and a couple of lucerne crops. But there was a furious wind ahead of it. It was all orange in colour, embers and things just catching fire all over the place, and there were trees getting uprooted all over the place. It only lasted a short time but it was an extremely strong wind. It took half the roof off my shearing shed and a wall out of the shearing shed. You can't see much at all when the fire is coming. It came down the valley, not really in a wall of flame across like that, it comes one big finger going up there, and then you see that side of the hill just take off and flames hundreds of feet high going up the side of the hill. Nothing happening over here, but then a bit later that will go up.

As I say, it came through at about 3 o'clock in the afternoon. It was pitch black, you can't see anything. You're so busy that you lose track of time and all of a sudden it is 9 o'clock at night. My main stockman was defending about 1,200 bales of hay, which I had between my farmhouse, so I wanted to defend that so that I had it after the fire. I had been promised three CFA tankers: one to help at the hay, one at the house and one over at the shearing shed. When the day actually came, they didn't want to give me any CFA tankers. So my whole plan for defending the farm had gone out the window because the person who was in charge of all the CFA tankers in Licola, that person rotates around as well. It was actually a lady in charge on this particular day when the fire came through and she wasn't as competent or as knowledgeable as the person beforehand. She'd actually sent about four CFA tankers down to Cheynes Bridge, which is the only access – well it's not the only access, but it's a one-way road going down there and it's my only access going back to civilisation and the way to get in and out was over this bridge. So she sent the tankers down there, and there were tankers stuck up here; it all gets extremely confusing and plans sort of go out the window.

Without wanting to spend too much time on it, I lost a few hundred head of sheep and maybe 20 cattle or something like that, which is not bad. I was carrying about 500 cows with calves and about 8,000 sheep, so it was a successful outcome in the sense that I managed to keep most of my livestock. But every blade of grass and everything was gone, and most of the hay I managed to save.

Come round to February 2007, we had a rain storm in February – not very big, only a couple of inches that fell in a thunderstorm in a couple of areas and the whole valley was so denuded of all vegetation that we ended with a lot of mudslides. I lost a tremendous amount of topsoil; the tonnage would be just incalculable. A lot of the mudslides went through Licola and I lost a few of the fences that I rebuilt after the fire. The river then became totally unusable, it was just this black, oily, ash mud. It's a crystal-clear, beautiful stony river – was – and it's all full of mud now. Every time it rains, every time the rives tries to clean up a bit, we get more mud and top soil and everything goes down into the river and it gets dirty for a few months.

That was February, and then the large flood was on June the 26th, 2007. We had eight inches of rain at home and there was about fourteen inches of rain up on Mount Wellington, which is over here, and in the Wellington River. As I said earlier, all of the area surrounding the farm is Crown land, and it's quite dry, bony hills and it's not very fertile. Low rainfall, rocky sort of ground. Most of the trees were still there. On some of the very hot northern slopes the trees were just black sticks and not regenerating, but all the undergrowth, all the vegetation, all the gumnuts, the organic matter, anything there at all was burnt back – it was just gravel. This all just slipped off the side of the hill. The analysis I heard someone say with the rainfall in a situation like this, it's a bit like turning a garden hose onto a carpet versus turning a garden hose onto your kitchen floor, onto the lino; that was the sort of effect. So, we ended up with this massive flood.

It has totally changed the course of the river in many places. It's covered – I haven't calculated exactly – but it has covered 50 or a hundred acres of my property in rock and gravel and rubbish. Apart from all the flats being covered in logs and debris, some flats are just covered in rocks. Some of the flats are just gone as the river has changed course, and this massive flood was a direct result of the bushfire. We had a large flood in 1990, in which we had about twelve inches of rain at Easter time in 1990 at home, and it was a large flood and did a bit of damage. But it never came out of the banks and over the flats, and the

amount of water would have only been about a third of this flood, which was less rain but three times the amount of water. I've been most affected by the flood because I'm fortunate enough to have 25 kilometres of river-frontage, but in this instance it's been my undoing. I'd been fencing off various parts of eroded river banks with fences that hadn't been burnt in the fire, because they were by the river, but they all got taken away in the flood. With the fire and the flood I would have lost about one hundred kilometres of fencing. I made the mistake of not insuring it. My father had never insured the fencing. I looked into it after 2003, but it was going to cost me about $8,000 a year to insure it all and I decided not to, which was a mistake because at $10-12 a metre to replace it, it works out pretty expensive.

Also the flood washed away that bridge that I spoke about, south of me, which they've almost replaced, they've almost finished it. It washed away part of the Licola bridge and other access points. So in the winter time we had to go through the snow country over this side and come back down into the north of Licola to get home. After the floods, the local people – we all became a lot tighter community afterwards – and we actually built some of the bridges ourselves. Just out of fallen timbers, making do with what we could find, because it was hard for the government agencies to get up there. The main access bridge - and it is quite a large bridge, I think it's cost about $4 million to replace it – was not there.

So my story now is that it's now just a matter of rebuilding everything that I've lost. It's really put me back many years as far as work goes, it's probably put me back 20 years financially. As I said earlier, I'm in a terrible area for bushfires. It's a miracle we hadn't been burnt out earlier in a way. But hopefully it will be the last one I have to deal with in my lifetime. The other thing is, Melbourne's water catchment is just here and that's an area that hasn't been burnt. They've put a lot of resources into protecting it. While we were trying to fight our fire here, they actually called the army in and they put a fire break about 50 metres wide with all these army bulldozers, around the Thompson Valley dam. I'm not sure exactly what they're doing, but they must be very apprehensive about the Thompson Valley burning, because this whole catchment here would be ruined for years. If that happened in the Thompson Valley catchment, which is one of Melbourne's main catchments – even though the dam has only filled once since it was built in the early 80s – it would be disastrous for a city of 3 million, 4 million people. So, there's a million policy issues. All the timber resources, which they've been logging since the Second World War, they lost millions and millions dollars worth of timber resource in the fire. They've been frantically trying to salvage it, but when the trees are burnt

and they die, they dry out and they're no use for sawn timber or anything. You've got to grab them quickly in the first couple of years and then they just become wood chips after that. The fire in my area has cost millions of dollars in lost timber resource. The government has spent – to their credit they have tipped a fair bit of money into the Valley. The catchment management authority would be spending about $150,000 a month, rehabilitating the river with excavators; doing a lot of work there. They've had to rebuild a lot of the roads. It's cost them millions; millions of dollars just in our little area. There are only about six permanent residents that live there with me - there's me, the couple that live at the shop, the manager of the Lions Club camp, which is at Licola, a couple of farmers up there – so there's not many people living there at all. And Ralph Barraclough! He's just here.

STOCK & LAND

June 12, 2008

Rebuilding a disaster zone

HOW much topsoil was lost as a result of the 2007 Licola fires and subsequent floods will never be known. DON STORY reports on one producer's bid to rebuild his operation – and stop a repeat performance.

LAST year's catastrophic events put Rob Gilder of Glenfalloch Station back 20 years financially.

Not only that, years of fencing and rehabilitation of the flats along the Macalister River remain ahead of the Licola beef produceer. And it will "take a lifetime" to get organic matter back into what's left of the topsoil on surrounding hills.

This is the personal business and environmental toll of the 2007 fires and floods – the scale of which many have sheeted home to state government mis-management of public lands.

Mr Gilder told a recent Stretton Group forum in Melbourne that government forest and park management policy and the lack of fuel reduction burns were instrumental in the scale of the catastrophic fires and wild floods that changed the Macalister River valley forever.

Like many in the mountains Mr Gilder says the frequency and severity of environmental disasters of the past few years might have been avoided had a more active management policy been pursued.

Glenfalloch Station lies at Licola along the Macalister River. It is about 30 kilometres long and one kilometre wide in a 600 millimetre rainfall environment.

While it's surrounded by crown land and forest the property had never burned – until lightning strikes started fires nearby in early December 2006.

The fires burned for a couple of weeks, would run and then stop, depending on the weather.

"We were starting to wonder if they were going to reach us," Mr Gilder said.

Mr Gilder moved their sheep off the high ground down onto holding paddocks and the river flats – areas they thought could be defended.

On December 14, Mr Gilder said he got reports that the wind was blowing to 100km/hour higher up the valley but a temperature inversion layer was protecting the country lower down. Then the inversion layer broke down. The fires started to push toward Glenfalloch.

He said Department of Sustainability and Environment (DSE) crews had been fighting the fire in the nearby Alpine National Park and a dozen Country Fire Association tankers were on rotation at Licola.

DSE had bulldozers putting in firebreaks around Licola and Glenfalloch but then the firefighting crews left for the higher-priority Thompson valley dam.

The fire burned everything, Mr Gilder said, except the green river flats and the lucerne crop.

"There was a furious wind, orange in color, with embers striking everything. It was so strong it uprooted trees," Mr Gilder said

"The whole plan for the allocation of tankers failed as a result of the rotation of staff and the severity of the fire.

"We were promised three tankers – we got one."

A member of Mr Gilder's team stayed at the hayshed and saved 1200 round bales – hay that would be needed for the stock. They saved the hay and homestead but lost the woolshed.

Fortunately, stock losses were minimal – about 100 sheep and 20 head of cattle. Not bad out of a herd of 500 cows and 8000 sheep.

January and February were spent assessing the damage and in post fire recovery, including spending $10,000 in hay and pellets a week and $10,000 a week to fencing contractors.

A thunderstorm in February dumped 50mm on the catchment. The valley slopes, totally denuded of vegetation resulted in mud-slides and lost topsoil – and fences rebuilt after the fires were swept away.

This was only a dress rehearsal. The real flood came on June 26.

Two hundred millimetres (eight inches) fell at Glenfalloch; nearly twice that on Mt Wellington, higher up the valley catchment.

The entire Macalister River valley and slopes had been burned to gravel and all this slipped down the hillsides.

"It changed the course of the river in many places and covered 800 acres of river flats with rock, gravel and rubbish – all the flats were covered. This was the direct result of the bushfire."

Mr Gilder said a large flood in 1990 from much more rain never ran a banker far onto the flats.

The June 26 flood had less rain but three times the volume of water racing down the river and its tributaries.

With the fire and floods, Mr Gilder lost 80km of fencing – all uninsured.

To replace it he's looking at a cost of $10-$12 a metre.

"The events of 2007 put me back 20 years financially and we're now in the process of rebuilding. Hopefully it won't happen again."

The events of 2007 put me back 20 years financially and we're now in the process of rebuilding. Hopefully it won't happen again.

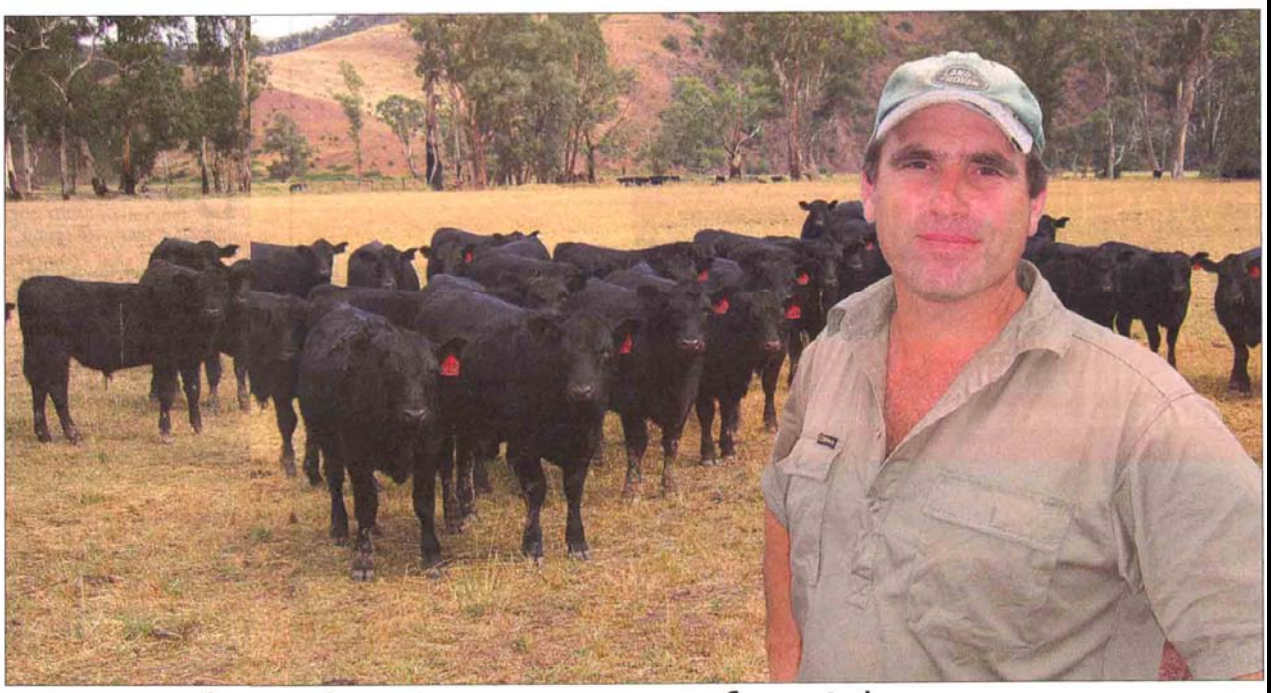
–ROB GILDER, Glenfalloch Station

The Stretton Group

THE Stretton Group was named after 1939 fires Royal Commissioner Judge Stretton in response to what many believe to be a flawed parliamentary report on the 2003 fires and "government dereliction of duty in the management of public lands".

It's headed by former Corangamite MP Stewart McArthur, who says is public land is locked up it must be looked after "including maintaining a regime of proper fuel reduction burns".

STOCK & LAND, June 12, 2008



Hazard reductions a must for risk management

ROB Gilder says there's major lessons to be learned from last year's fires in the Macalister Valley which ruined the entire catchment for many years.

Had the result of the fire been repeated in the Thompson River catchment to the west, it would have spelt disaster for Melbourne and its already drought-depleted over-drawn water supply.

Millions of dollars worth of timber was also lost.

Some of it is being salvaged but after a major bushfire event, much valuable timber dries and cracks. It becomes suitable for woodchip only.

"To the credit of government, they have spent money in the valley," he said.

"The local catchment management authority has been spending $150,000 a month just on our little valley, much of it stabilising the river banks."

Mr Gilder said there should be more controlled burns but acknowledged that "once you start dropping matches it's hard to control".

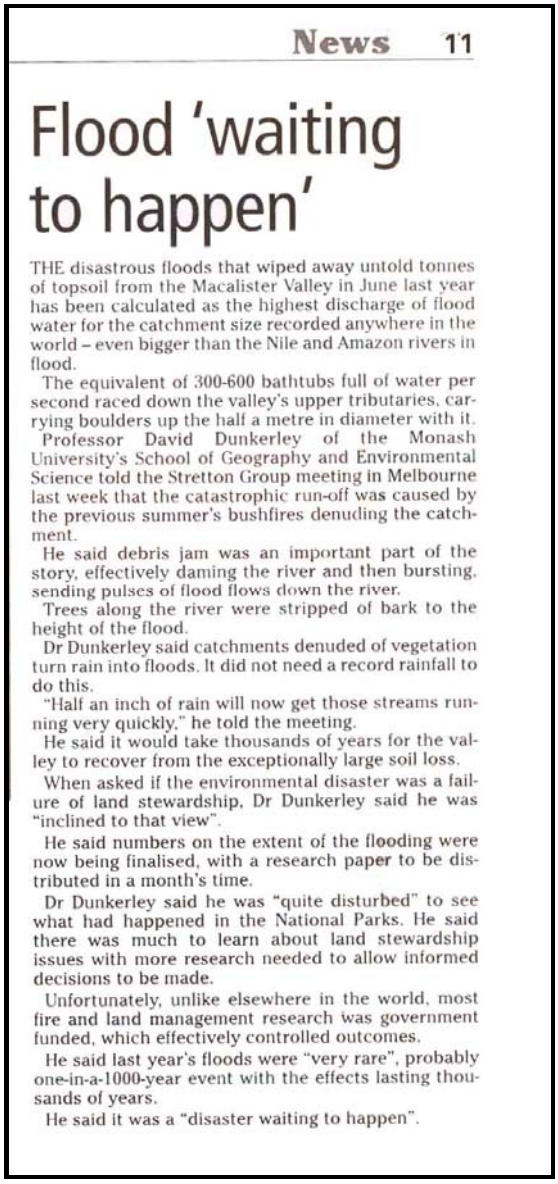
He said records going back to Captain Cook show fire to be a natural event in Australia.

But, he said, there had not been enough fuel reduction burns in the Macalister Catchment. Where there had been, the bushfire damage was much less severe.

"It will take another couple of years of fencing to get stock management back in order.

"But we won't be able to replace the topsoil lost. It will take a lifetime to get the organic matter back into the soil.

"We face many years of a dirty, unstable river and fragile slopes."



News 11

Flood 'waiting to happen'

THE disastrous floods that wiped away untold tonnes of topsoil from the Macalister Valley in June last year has been calculated as the highest discharge of flood water for the catchment size recorded anywhere in the world – even bigger than the Nile and Amazon rivers in flood.

The equivalent of 300-600 bathtubs full of water per second raced down the valley's upper tributaries, carrying boulders up the half a metre in diameter with it.

Professor David Dunkerley of the Monash University's School of Geography and Environmental Science told the Stretton Group meeting in Melbourne last week that the catastrophic run-off was caused by the previous summer's bushfires denuding the catchment.

He said debris jam was an important part of the story, effectively daming the river and then bursting, sending pulses of flood flows down the river.

Trees along the river were stripped of bark to the height of the flood.

Dr Dunkerley said catchments denuded of vegetation turn rain into floods. It did not need a record rainfall to do this.

"Half an inch of rain will now get those streams running very quickly," he told the meeting.

He said it would take thousands of years for the valley to recover from the exceptionally large soil loss.

When asked if the environmental disaster was a failure of land stewardship, Dr Dunkerley said he was "inclined to that view".

He said numbers on the extent of the flooding were now being finalised, with a research paper to be distributed in a month's time.

Dr Dunkerley said he was "quite disturbed" to see what had happened in the National Parks. He said there was much to learn about land stewardship issues with more research needed to allow informed decisions to be made.

Unfortunately, unlike elsewhere in the world, most fire and land management research was government funded, which effectively controlled outcomes.

He said last year's floods were "very rare", probably one-in-a-1000-year event with the effects lasting thousands of years.

He said it was a "disaster waiting to happen".

Are there any questions?

Audience member: Having been softened up by fire and two very severe floods, would it be your opinion that one of the best solutions to the problem of the Licola Valley would be to turn it into another Eildon, and use it as a water catchment? Of course, you may recall when the Thompson was built, that the Aberfeldy River be diverted into the Thopson, which is still shown on the map but never been done, and also that there be a dam at Mount Useful, just north of where you are?

Rob Gilder: No, Mount Useful is directly west, just here.

Audience member: In that case, then you're the Mount Useful site, as it's called. But my old uncles, who did a lot of hydro-electricity work, had three dams planned on the Aberfeldy River; one below the junction with the Caledonian, another one near Mount Useful and the bottom one at the bottom of Licola. So to turn Licola into an Eildon, which means that the six people on compensation can, with the guidance of Stewart, find a nice little place in the Western district and solve the whole problem. The further benefit is, that Melbourne gets an incredible addition to its water supply – so that technically from the Aberfeldy, which is to the west of you, then there's the Thompson - and the Thompson is the smallest of the three, because the Aberfeldy, I think, is bigger than the Thompson and you're in the Macalister, which is several times the Thompson catchment. So that by connecting those, Melbourne's water supply is certainly augmented by many times. If you don't want to leave the area, you could always go to above water-level and indulge in tourism.

Rob Gilder: Well I've heard about the dam, not in quite as much detail as that, but below Licola down near Heyfield is a town called Glenmaggie, which is on the Glenmaggie Weir, which is fed by the Macalister. It feeds the whole Macalister irrigation district, which has a tremendous amount of dairy production in that area and the Glenmaggie Weir itself has trouble filling. They want more water and they want another dam up here, the dairy farmers want one. They're talking about damming the Barkley River, which is a smaller river that runs in here. If they're going to dam it I wish they'd tell me now because I could save a lot of work and a lot of money because I'm sure they won't pay me enough to get out of there. The Macalister catchment is a very large catchment, but it's a very low rainfall catchment. The Thompson is a smaller catchment but higher rainfall. The weather comes from the west, it hits up against Mount Baw Baw, and drops it all in the Thompson Valley and those areas. There's a much higher rainfall – a 50 inch rainfall, a 60 inch rainfall over Mount Useful, Mount Baw Baw, where I am – 24 inch rainfall.

Audience member: There was research done on the Aberfeldy River about 30 years ago, and it was dismissed as a possible source of water for Melbourne because it's flow was equivalent to only nine days water a year. It wasn't considered that that was a sufficient bonus to spend so much money on the engineering.

Stewart McArthur: Further question?

Audience member: I'm just interested Rob, what the fuel-burning regime has been in your area by DSE? Has there been a history of it, fuel-reduction burning? And the other question I have is, how many acres did you roughly lose along the river, and that's all going to end up in the Glenmaggie Dam I presume, so it's getting shallower and shallower.

Rob Gilder: The fuel-reduction burning regime – to the east of me, is national park. The Alpine National Park is above me and down to the east, which is where it finishes, and they've done very little in there, none anywhere near me. This was a concern to me, although the pattern of most bushfires is wherever they start – it appears to me – the winds push them in a southerly direction, and an easterly direction. They don't often, in our area, come back westwards. So, the fuel-reduction burning was limited, but they did do some. In fact, a couple of years beforehand, there was a fuel-reduction burn just in here, which got away from them and came right up onto the back of our place, just ten months before the main fire. That area that they did the fuel-reduction burn in, didn't burn anywhere near as severely, and it greened up straight away. It was quite a successful strategy. There's a lot of argument about does it work, doesn't it work, and I seem to think it does work. But the logging companies don't want you to do fuel-reduction burning because it destroys all their logs and so there are arguments everywhere.

Stewart McArthur: One more question.

Audience member: Thank you for an interesting talk. Could you tell us about your views on the future and how long do you think it will be until you've got the land back to something like the way it was?

Rob Gilder: It will be another couple of years of fencing before I've got all the fencing rebuilt. The top soil that I've lost, it was a very dry year leading up to there, and the top soil I've lost – I don't know how I'll ever get that back. It takes lifetimes to get organic matter back into the soil. The river, with the help of the catchment management authority and the other government money, to fence it off and replant all the banks, will take several years, but it will never be what it was. I would hope that in a couple of year's time that it will be organised again with the fences, and manageable with my stock and workable.

Peter Jonson: If you were John Brumby, with money running out of your ears, what would you do about it? Would you try and manage the area so that it never happened again, or would you just fix it up?

Rob Gilder: I think there should be more controlled burning. I wouldn't like to be the person who is responsible for it or in charge of it. There's a population of people living all over the place in the bush and once you're the person who starts dropping matches everywhere, they're very hard to control once they get going. If you read some of Captain Cook's diaries of when they're sailing around, there's smoke everywhere all over Australia. It seems that in history there was a lot of burning done before, and that needs to be continued, but it's very hard when you've got people living everywhere. They might want to use this valley – the conspiracy theorists like Ralph Barraclough – think that this Macalister Valley and Licola, they used that as a firebreak for the Thompson Valley dam, and that's why the DSE let it all burn. The DSE were lighting a lot of back-burns and everything all out of the Thompson Valley dam. While I was waiting for the fire to come down here, they were lighting up the border between the Thompson Valley dam and me to get all that burnt so that when the fire came down it didn't go into the Thompson Valley. With the northerly wind, the fire came right through, and only about an hour later we had a big southerly change and it all came rushing up from the south. All the back-burning fires that the DSE had lit all down here that all came up to me from the south and burnt everything that hadn't been burnt before. Whether they're going to dam it or not, I think there's such a strong feeling in the community about not having more dams, but yet everyone wants green lawns. I don't know how that argument is going to go, building more dams. The cost would be immense and it's a very low catchment that doesn't even fill the Glenmaggie catchment half the time. Like Eildon has only been full once or twice in last 10 or 15 years, so I don't know whether building more dams is the answer.

Stewart McArthur: On that note, could I just thank Rob Gilder, it has just been a fantastic, personal exposé of the problem. From the Stretton Group's point of view, Rob has demonstrated what has happened to him personally and he raises a number of policy issues about the collection of water, he's demonstrated about that huge run-off that took place after the fire, he's a worked example of what bushfires do to hardworking farmers, and he still looks confident. He's young and active, and we wish him well in the future, and we thank him very much for coming to join us here this morning.

Professor David Dunkerley Monash University, Landscape Water and Runoff

David Packham: Now if I can just interrupt what you're all enjoying at the moment, both with the food and obviously the conversation. I'd like to introduce Professor David Dunkerley. David is a rare and threatened species on at least two accounts. Firstly, he is a geomorphologist. In my view, possibly the best geomorphologist in Australia. Please hide your blushing David, and a geomorphologist – notice how we're looking after our carbon footprint – studies why Australia looks like Australia. It's about the earth and the shape it's got - the mountains and the cliffs and the flats – it's understanding how that happens.

David said of course we're divided up into two groups. One is a historical geomorphologist, which doesn't mean one with a grey beard, but does mean someone who looks into the past to see how things were a long time ago. The other one is a process one, how does it happen? Why does it happen, why is it so? So, he's a threatened geomorphologist, but he's also a very threatened species in this bushfire area on another basis.

And that is, regrettably Australia has reverted in its bushfire research, despite the large quantities of money, because independence is no longer there. If you have a look at the amount of bushfire research in Australia, that is funded by government and government agencies, compared to the independence of the rest of the world, we are twice the controlled research environment than they are anywhere else, especially the Untied States. Now David is threatened because he is truly independent.

He is not funded by DSE or the Bushfire Research Centre, or anybody else. So what he finds, he can tell you about; there are no inhibitions. You are about to get something that is really quite rare in the bushfire area. You are about to told the truth, the whole truth and nothing but the truth. So, Professor David Dunkerley from Monash University.

Mud, water, Macalister River post flood.

Prof. David Dunkerley – Monash University, Melbourne: Thanks very much David and thanks to Stewart and the Stretton Group. It is a privilege to be here and have a chance to talk to you all. It's a special pleasure for me I've just finished a big semester of teaching and I never see a face older than about 19. So it's great to see some grownups, jolly good!

Now Rob set the scene for me beautifully with that excellent talk about the 2007 fires. I'm actually going to show you results from just to the east of Rob's place over the ridge in the Wellington river catchment. I hope you've all had something to eat because I've got a lot of

photographs and it's going to be a bit hard to talk and see these. Probably many of you in the room know where the big bush fires were in 2003 – the area in red there in Victoria and the adjoining parts of NSW. Followed, of course, by major fires in 2007; kind of adjoining, abutting the 2003 area to the west in the Great Divide complex of fires that Rob talked about before.

I'm not going to spend some time talking about those in detail, because I think it was beautifully covered before. Of course, almost everything over large areas was scorched very badly in the 2003 fires, that's on the road to Mount Hotham in the Victorian High Country in alpine ash forest. When we come to the Licola area, to Rob's home-ground, the aftermath of the fires and the floods is the thing that I'm going to talk about. There was a huge amount of infrastructure damage to the roads and bridges and so forth, as Rob outlined. Before the road was re-opened running up the Wellington River, into the Alpine National Park, cut in many places by the catastrophic runoff that I want to talk to you about.

Now what we've been doing – I'm basically a desert geomorphologist, my background. I work in the dry country of western NSW and Alice Springs, those sorts of areas, working out – as David Packham was suggesting – how things actually happen when it rains. Rain is very rare and it's rare to actually see the rivers flooding out in the desert, though I have a few times.

Through the last 20 years or so I have worked out a number of techniques that are called paleohydrologic techniques, where you can go to a dry stream – a tributary to the Wellington – and using evidence crudely described perhaps as bath rings left when the water was in the channel, the size of the material carried along the channel by the floods; there are some quite well-refined techniques now for working out what the flow was like, how much water passed down the system, and how fast it moved. That's what we've been starting to do in the Wellington catchment, north and east of Licola.

We've done some of this as well in the Omeo, Benambra area, in the aftermath of the 2003 fires. This work is still ongoing. I've got two senior students out collecting the kind of evidence that I'll show you in a minute, from streams of this sort that were really very heavily disturbed in the floods last year. Looking up from the Wellington river into the heavily burnt hill country, many of what were streams formally are now just enormous piles of boulders and gravel. There's no surface flow of water at all now. It passes through the great accumulations of gravel were swept down by the flash floods. So the landscape is quite extraordinary.

In many places the river was obstructed and there were great ridges of boulders running alongside the stream here, a very characteristic feature in the Licola area. I haven't convinced myself yet whether these were mud-flows, mass movement features, or actually river floods, but the evidence that has been left behind has been very spectacular indeed. There's another view up one of these streams, not very much like a river anymore, it's really a pile of boulders.

Downstream red mud and floodwaters.

This is the alpine national park, I don't know what Parks Victoria thinks of this kind of event in their territory, but I can't see any of this being flushed out until an event as big as last year's floods. It seems to be me these are semi-permanent changes now in the landscape of the alpine national park. What our management response to these ought to be is an interesting question. The boulders that were moved are quite extraordinary. There is one of our technical officers standing next to some of the rocks that were trundled along, just for scale. They were moving, by our estimate, up to five metres per second, when they're trundling along. So it's not an environment you want to be in when there's actually something happening. So what

we’re doing in working after the evident, of course, is the clear way to study these kind of catastrophic flow events.

Glenmaggie Weir, timber, mud and debris.

Now Rob Gilder talked about the amount of timber that swept down. Of course, there were spectacular piles of material. This is some debris jammed against some trees on the bank of the Wellington, left by the floods. That’s one of the students who is out there, a senior engineering student from Monash who is out there building a bigger picture of what happened in those floods. Here’s a debris jam on quite a small tributary of the Wellington. These are important to the story I’m going to tell you because, though I don’t think anyone has actually seen these during the floods, these great piles of debris accumulate and periodically burst. We’re all hearing about that in the Chinese earthquake at the moment, the quake lakes they’re talking about. Well this is a post-fire log-jam lake. Of course, they sweep down the river so the flood flow comes in enormous pulses we think, every time one of these major log-jams bursts.

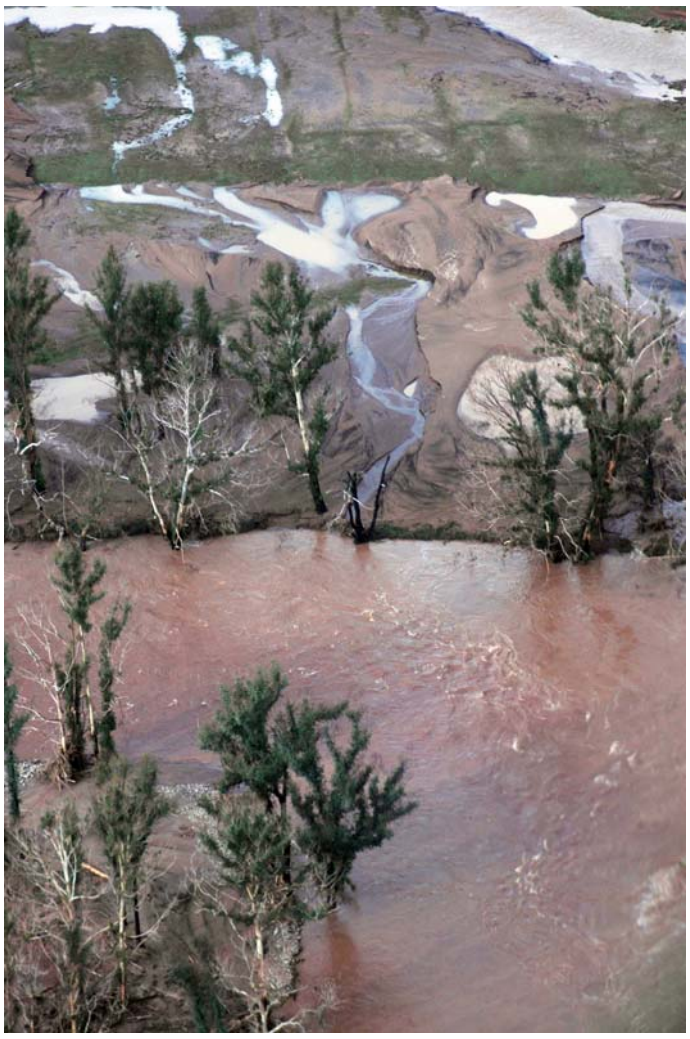
Of course the huge amounts of material swept down did a lot of road damage, as I showed you in an earlier shot. Many of the culverts that were built in the early days, of course turned out to be far too small to carry the post-fire flood and its load of debris. So they blocked the flow, over-topped the road and chewed the bitumen out, as I showed you in an earlier shot. I haven't worked along this area yet, along the Jameson Road, but very spectacular, again, obstruction to transport and communication in this area but these enormous piles of materials swept down in the aftermath of the fires. Very spectacular indeed. I was caught in a thunderstorm in 2003 after the fires, and saw some of this happen.

Now what we do, technically, is try to reconstruct these floods, see how big they were and what was really going on there. I wanted to show you some of the evidence that we're using to reconstruct the floods. Rob will know this very well, I'm sure, but we very often see the bark as being pounded off trees growing along these rivers at the height at which there were boulders bouncing along the bed. Very often – it's a bit hard to see in the perspective of this photo – but here's a line of sand and gravel part-way up the bank and very often that line of sand and gravel sits at about the same height as the top point of where the bark has been stripped off. So we have two ways of knowing how deep the water was.

There's another example, a bit hard to see perhaps with the light on, a great group of boulders here piled up against a tree, downstream is to the right there. Once again the bark has been pounded off pretty much to the height at which the boulders obviously were moving along as the floods were very large. Little bath rings are, as I said, often very clear, lines of quite big boulders, the size of a shoe box that sort of size, just marking the water level of the floods. Of course, we go out with light and survey these, and measure their height above the bed of the stream to work out the depth of the flow. Sometimes, if we're lucky, a blackened tree stump will have a line of mud on it, mud left by the water just below the flood peak and ordinary blackened char on the trunk of the tree above the flood line. So we use all that kind of evidence to reconstruct the size of the flood, which did all this kind of road infrastructure damage. The idea being, in part, to learn what the floods were really like, but to have some basis in the future for designing culverts and so forth, which will cope better with these kinds of flood events. The two senior engineering students who are working with me are partly interested in designing better culvert systems to cope with these things in future.

Here is the area on Rob's photo – that must be your valley up in there Rob - so we're on the Wellington over here, largely in the alpine national park. I want to show you some results from various of the little stream catchments there, running down from the eastern side of the Wellington river into the Wellington and Licola's just off the bottom of the photo over there.

I don't want to bore you with data but just have a quick glimpse at this. They're little catchments, ranging from about a third of a square kilometre up to about five square kilometres, and from top to bottom just kind of one to four kilometres. So these are quite small tributaries. But many of these punched through the highway and blocked the Tamboritha Road in consequence, and we wanted to know what the floods were like coming down, tributary by tributary to build up the big floods that swept down the Macalister. I'm going to have to tell you some numbers here. We talk about the amount of water coming down a stream in units of cubic metres - cubic metres per second. Now a cubic metre is about three bathtubs full of water, and so we express the amount of water coming down in cubic metres per second. So that's several bathtubs full per second. Then of course you tend to get more out of a big catchment, and less out of a little catchment. So we can compare one site with another, what we do is express the volume of water in cubic metres per second, in terms of the area of the catchment. So it's cubic metres per second, per square kilometre of catchment. Here are just some results of studies following fires, internationally, that show the size of the flood that you can get out of basins of varying size that you can see here. The maximum is 24 – you have to bear this number in mind - 24 cubic metres per second from each square kilometre of burnt catchment, 24 metres per second. Now what I wanted to know, was there anything exceptional about the floods that come out of burnt catchments like that. Here's a little table of catchments that have generated big floods without fire, so this is just very intense rain over undisturbed catchments. Here's a little alpine stream from the English Uplands, for example, that made 148 cubic metres per second, per square kilometre. Now, that's actually more, per square kilometre, than is coming out of the previous set of studies, which are of burnt catchments. The message here is that you can get very big floods out of undisturbed catchments. There's another one of 30 from a flash flood in Spain; no fire involved, just heavy rain.



Water velocity destruction and residual topsoil.

Alright, I'm just going to tell you a little bit about what we did in detail and then look at the results to see what comes out of the Licola area. So these little catchments we're working in are quite steep. There is about an 800 metre drop from top to bottom, so the water's got a good gradient to run on. Steep hill slopes up to a bit over 30 degrees, feeding into these little channels that I've been showing you in the photographs. What we did was measure the size of the rocks sitting in those great boulder jams. We typically measured 20 per site and we've done ten or 15 streams now. They're typically about half a metre, that sort of size. We measure the length, breadth and depth - the prime axes as they're called – of 20 of the biggest boulders that we can find and we use relationships that I won't go into to work out how fast the water has to flow – the critical velocity - to move a boulder of that size. The bigger the boulder, the faster the water has to be going. Then, from knowing how deep the water was from the bark that was smashed off trees and so forth, we can work out the cross-

sectional area of the flood. Multiplying the two, gets you the discharge cue. So, cross-sectional area in square-metres multiplied by the velocity in metres per second, gets you cue - the discharge in metres per second. So that's basically what we've been doing.

Now, let's see some results. Here is a compilation, not of Licola data, but this is from a published study of the biggest floods from the United States and from China – two very large continental flood databases. What we're looking at here is the basin area along the horizontal axis, now that's a log scale so there's a million square kilometres, for a very big river, coming down to ten square kilometres and one square kilometre. On the vertical axis is this cubic metres per second per square kilometre – the specific discharge. What you can see is, out of very big catchments, you get a lot of water but when you divide it by the area it's only a tiny amount – 0.1 of a cubic metre per square kilometre. Now as the catchments get smaller they become more efficient at pumping out water, and the biggest in this published database is this top one here – 78 cubic metre per second per square kilometre. So that's a pre-published study of the kind of floods you can get in record rains. The wettest catchments, the biggest floods, anywhere in the world.

Here are our results from four of the Licola catchments. Same axes – log of the catchment area, so a million square kilometres, 10,000, 100, 10 and 1, and the log of the specific discharge in cubic metres per second, reconstructed by these paleohydrologic techniques after the flood. Well the only point you've really got to take in, is this little catchment up in here - 160 cubic metres per second per square kilometre. Now that's 300 to 600 bathtubs full per second, coming off each square kilometre of this terrain. And that number just there, is the highest specific discharge, ever reported from anywhere in the world, by a considerable margin. The contributing factors are, of course, as Rob described, incredibly hot fire, steep terrain, and everything burnt off the surface – no twigs, no leaves, no bark – nothing but a bare soil and mineral surface. It is clearly exceptionally efficient at turning rain into runoff. The really interesting sideline to this is, these weren't our record rainfalls, these were just the rainfalls that followed the fires. All the other points on this graph are from the strongest possible tropical cyclone, the most persistent low-pressure system, record rainfalls and how much flooding they generated.Well, here in the Licola area we're seeing comparable or bigger yields just from the rain events that followed in natural course after the fires. If we were to combine the Licola area with a humdinger of a rain storm, I think we could push these points potentially considerably further up the page. So they're world-record figures.

I just wanted to finish with some unknowns. In the literature on fire, it's amazing what we don't know about the behaviour of flooding after bushfires. A lot of people internationally, argue that the soils become coated in waxes distilled from the eucalyptus oils and things after a fire, producing hydrophobic or water-repellent soils. But I don't think that's necessary to argue in the Licola case, I think just the bare, steep hill-slopes is quite sufficient. But there isn't a good analysis in the scientific literature of how important the bareness is, in other words the intensity of the fires; we really just lack the data. So the Licola data, adding to an international database on this, and I presented this work at a conference last month in Vienna at a big geoscience congress where there was a lot of interest in it.

Rob touched on the soil loss associated with these catastrophic floods, and I've tried to show you that they really are exceptionally large. We're dealing with the large boulders that were left behind, but all of Rob's soil, and everyone's soil, the alpine national park's soil, presumably went down the river and is sitting in Glenmaggie, or somewhere at the moment. I suspect that it is going to take thousands of years to recover from that catastrophic soil loss. Of course lives are also lost in these sorts of flashfloods. I think that one of the things we need to do once we can put numbers on of the sort that I've shown you, is to draw up some guidelines and have them widely known so that people are quantitatively aware of how big a flood they can expect from a catchment of a given size after fire. Then of course the issue of most concern, I guess, among the Stretton Group is, was this exceptional flooding? A land stewardship issue? Was it in fact failure to use fuel-reduction burning more often and I must admit I'm sort of inclined to that view, that it's a land stewardship issue. The long-term enduring effects in the landscape that I've tried to show you, and seriously I think millennia for the recovery of the soils, that's a very serious consequence if it's our poor land stewardship. I think we need to get to the bottom of these issues and putting numbers on – I hope it hasn't bored you silly – putting numbers on and putting it into the international perspective and so forth, I think is a vital step along the way to getting a really soundly based picture of what happened.

Stewart McArthur: Questions to Professor David?

Question: I wonder if the Minister Gavin Jennings is aware of your work because I think it needs to be pushed right up his nostrils.

Impact of high velocity floodwaters on infrastructure.

Prof. David Dunkerley: Yes, disseminating results like this is a really important phase and some of this work has been published in one international journal already but we'll have a much bigger paper for distribution in about another month's time when we've finished the work. I'll then be sending copies of that around, including to DSE and Parks Victoria and places of that sort.

Question: Secondly, is the Environment and Natural Resources Committee of Victorian Parliament aware of your work? Did you put a submission into them?

Prof. David Dunkerley: No, this is quite new. I've only just finished these numbers last month and as I say we still processing the data from the other ten or twelve sites. We won't be finished for about a month, but we certainly will circulate the results widely because I think they need to be known. There is much more we need to do of course, we need to be quantifying the bareness of those hill-slopes, looking at their rates of recovery and year by year putting numbers on all of these things so we know how long-lasting the effects are. I think all that needs to be done. The trouble is there are so few people actually involved in the research.

Question: It's just that on June the 30th, the results will be presented to Minister Jennings and we don't know how long after that before it's released, but it's a good time to get right into them.

Prof. David Dunkerley: Thank you, yes, we'll try.

Question: Can I take it that you're in favor of flood mitigation structures in such areas and what is your view, as a result of the work that you've done, of the best possible use from a community point of view, of such areas and how do we go about making the best use of them, protecting the people and utilizing the water/hydroelectricity capacity, and so on.

Prof. David Dunkerley: Look, that's a complicated question. What we work on, of course, is the little of the boulder debris that's left after the floods. One of the things that is virtually impossible for us to estimate is how much passed by and is now down the Macalister. Of course, if you were designing a flood-retention structure, by which I presume you mean a dam, it's very important of course to know the rate at which the storage capacity will be lost by

sediment inflow. That's one of the things we don't know yet. I'm going to deflect your question by saying we need to do more research before I could give you an honest answer. But I'm quite disturbed to see what's happened in the national park, because I suspect that it is a land stewardship issue, and we bungled. So, I think – for me – whatever we do, it would be a fatal and disappointing mistake if we don't at least learn and get ourselves the information on which to base a decision about future land management. But I think facts first and then an informed decision, after we've got all the numbers, is what I'd say. I'm not sure what I'd vote for in the end until I get the numbers.

Question: A very quick question Dave. I was fascinated to hear you and Ralph discussing how often this has happened before in that area. I was wondering if you could let us know what you think about that?

Prof. David Dunkerley: Yes, that's another very good question. We can look for signs, the very enduring sort of signs in the landscape, we've looked around for those. I've seen a little in the Omeo area and really a tiny, tiny bit in the Licola area. I suspect the evidence of that kind will last for thousands of years. We're just not seeing in the sediments, layer after layer after layer of boulders. My suspicion is that the evidence that we have seen is thousands of years old. So I think these are rare events on the geologic timescale. This is not a hundred-year event, this is not a five-hundred-year event, I suspect it's at least a thousand year event. That's my view; very rare. Whether the previous events were comparable to this, is a question we haven't really researched, but I can imagine a longish interval without fire and then a lightning strike 1500 years ago could produce something like these effects, perhaps, but I think it's incredibly rare.

Question: I don't remember hearing you mention specifically the shape of the Macalister catchment, have you had any opportunity to compare the outcomes from that with the south-flowing streams after the 2003 fires?

Prof. David Dunkerley: The answer is no, but catchment shape is a really important question, I actually should have touched on that. The catchments for which I showed you data – the sub-catchments – are very elongated, they're very long, thin catchments. The importance of that I think is that when you've got this enormous boulder transport, the streams join at very low angles. When you have streams joining at very steep angles near to

a right angle, the boulders coming down one can form a barrier in the other. So, these catchments were very efficient at funneling the bed-load and the water out. So their geomorphology is actually very important. So I think if we had a different topographic situation, we'd probably see different flood behaviour. So I think your point is a perfectly valid one, the geomorphology is very important, and that will be in our report for sure.

Question: Coming back to this historic question, I seem to recall the magnitude of the rainfall was about the same as that in 1934, the big 1934 flood, which was further to the west. But the 1934 flood, I think, was over three days. Do you have any idea of the rainfall intensity and how long this storm took?

Prof. David Dunkerley: No, we're in the process of trying to get – there is no good pluviograph records, Leon, as you probably know, from the area where we're working. We're going to try to work back from the radar if we can to work out the radar intensity. Btu the anecdotal reports that I've been able to pick up from the area, don't suggest that it was anything extraordinary. No more, I don't think, than 50 millimetres an hour, that sort of rain-rate. Rob, can you fill us in with numbers about rainfall intensity?

Rob Gilder: Rainfall in the Wellington catchment there? Well no, apart from the Bureau has a record on Mount Wellington, I think, which I understood to be 14 inches, whatever that is in millimetres. But those streams that you've measured, do seem to have responded just while those fellows have been mending those culverts. They have replaced, by the way, those two culverts with one culvert. Don't ask me why. But even half an inch of rain gets those streams flowing now. It's nothing at all and they start flowing very quickly. As to what the rainfall was – as I said the flood we had in 1990 was more rain than this event but this event was three times the amount of water, at least.

Prof. David Dunkerley: So with catchments that steep and that bare, I don't think you need an exceptional rain. That's what I was speculating about, if we had a hundred millimetres an hour, I think we could see some absolutely extraordinary flood behaviour.

Question: Have you done any work on the head of the Buchan River? After the 2003 fire, I've got some pictures of the catchment up there and it's pretty bare, and they're still getting mud in the river five or six years later.

Prof. David Dunkerley: No, I haven't. I'd love to see the photos if we could get together some time. Certainly with the work we did on the road north from Omeo Road to Angler's Rest and up the Mitta, I was caught there in thunderstorms and couldn't get through in the four wheel drive there were so many logs and rocks on the road. They had the road crews in to clean it up and the next thunderstorm it all happened again, and the next thunderstorm it just happened again. It was just a recurring event. I think it's stabilized now, but it certainly lasted a year or so there – the road would be blocked every time there was a decent storm. So the effects can be quite long-lasting.

Question: David, our group has been debris flows in these kinds of events up in the north-east and we're just looking at the moment at three sites where there's been fairly good rainfall collected by local farmers, and it agrees quite well with your estimate, they're about 70 to 80 millimetres an hour. So, 20 to 30 minutes is able to generate those kinds of figures. So across three sites we're getting numbers around that mark. Because it was kind of unknown before what level of threshold you need.

Prof. David Dunkerley: Yes, and that's something I'd love to pin down more tightly, because in some of American studies of post-fire flooding, of course, they're able to go one step further than I was able to go and express the specific discharge in cubic metres per second, per square kilometre, per millimetre, pre hour. So, it's many steps back from the raw flood data. But it really does just give us a measure of the efficiency with which the catchment responds to rainfall intensity. So, it would be really interesting to have numbers like that.

Question: David, was the area particularly susceptible geologically, because I know a lot of the rivers and a lot of the land around that area. Would the same water flow cause the same damage, I can't imagine it would anywhere. Would it?

Prof. David Dunkerley: It's another good question. I think the area probably was susceptible, especially susceptible, to the sort of damage I've shown. In the work we've done in the Omeo/Benambra area, the effects are very different on meta-sediments and granitic rock, so there are a lot of variations in response, with the kind of density of joiting that you have in the bedrock – so the size of the glass that can be released from plucking of the stream beds and stream banks and so forth. So I think there is a very strong degree of geologic

preconditioning, if we can use that effect, in that landscape. I think it was bound to respond very strongly to fire.

Stewart McArthur: One more question? I thought I'd invite Gary Morgan to make a few remarks, which he is unaccustomed to do.

Gary Morgan: Thank you Stewart. I'd like to say how pleased I am, on behalf of Roy Morgan Research, how pleased we are that you could join us today. We like these sort of meetings and particularly we like them at our conference centre. This is why we set it up, so we could have stimulating discussions like today. We've also given Stewart an office on the Mezzanine, so you can come in any time you like and have a very worthwhile conversation with him. We're not bored silly by putting numbers up. We like numbers. Roy Morgan Research lives on numbers and we live on facts. Of course, today we've had some wonderful facts put to us. A few questions have said, well would it happen in other areas around the world, I'm not sure whether that's known, but even yesterday on the TV we saw in China, for instance, the massive floods that are happening there right now. They're evacuating 100,000 people in the last few days in the area where they had the earthquake. So, what we're all well aware of, which hasn't been made well aware to the politicians here, most of them are fairly simple – not Stewart, most of them, I said! – what we have to do with this sort of information is get it out into the market place to people who do think and who do worry about these things. It's just a disaster waiting to happen again. I can't believe that after the 2003 fires, we then go and have 2007 fires, and low and behold next year we'll have another lot of fires. It's a shame there's not enough debate on these issues.

Now Michele and I have been measuring what concerns people, we know the environment is number one on the top. So what we've got to do as a group – I'm saying we as the Stretton Group – is make people aware of the facts. It's the facts that really get the point across. If we publish these – and we're going to get a website for Stretton – then people who write stories, you can then refer them back to the facts. What we do at Roy Morgan Research, we keep reminding people of what the people think about an issue, what the facts are on how many people read a newspaper or magazine or watch a TV program, or travel overseas or come to Melbourne. Yesterday, for instance, we published – for about the third time – the fact that about 1.6 million people are going to be effected by the changes in Medicare. If you keep

reminding people of what you've just done, finally you'll get the message across to the politicians, and people will care. Thank you very much for coming here today.

NOTE OF THANKS

Stewart McArthur: Can I just acknowledge our two guest speakers and thank them very much for their free contribution today. Thank you for coming. Particularly Rob Gilder, he has travelled all the way from that drought-stricken, flood-stricken, soil-stricken territory. He didn't know where 401 Collins Street was, but he eventually found it with his friend and a bit of direction. So thank you very much Rob for being with us. We appreciate it. And to David, thank you very much for your erudite work. You know where Collins Street is, we know where Monash is, we appreciate the thoughtful policy positions you've put forward, we think that the sorts of things you're putting forward are very much in line with what the Stretton Group is advocating.

Could I just acknowledge John Mulligan and John Connelly. John Connelly has come all the way from Cann River, please stand up. He's travelled six hours to be here today, and six hours home again. John Mulligan has been with us before. They are genuinely concerned about these issues. They come from East Gippsland. That's the sort of commitment they've got to the environment and to support debate on the issues. Could I just say thank you for coming, along with many others, we appreciate your wonderful support on vital issues for Victorian people. Can I just finally thank all the staff here at Roy Morgan, for their help in organising today, getting the tickets right, getting the list right, getting the money, and all those other things, we've appreciated your help. And finally, we are going to try and distribute the proceedings for today, we'll try and get that in an orderly form, so that we get on record, the points of view that have been made. What we're saying at Stretton is in fact Melbourne's water catchments are at risk. We're saying if you burn out the catchment of the Thomson dam, that 30% of that water will be reduced. As the trees grow, over time, you'll have 30% reduction in the amount of water that goes into the Thomson dam. That's the fundamental issue facing all of us in this room. The Stretton Group are trying to make that a public debate, because there are some misunderstandings about protecting the catchment, about fuel-reduction burning, about logging, about all those issues that the facts – as Gary said – are not on the record.

Thank you ladies and gentlemen for being with us. Thank you for your support. We are hoping to run another seminar on water some time in the future. John you want to make one comment?

Question: Just a very quick one. Mr Morgan said we've got to deal with facts, and the facts are that our forests, parks are mismanaged. We have to get that message across.

Stewart McArthur: Thank you John. The final thing is that on your program that's on the desk there, you will find a couple of letters that are attached to that program. I would encourage you to read them. They are a letter to Mr Peter Hall, who is the Member for Gippsland, by a local resident, about the issue of water and fuel-reduction burning, and then from Mr Buck Rogers talking about a similar issue. You'll see some very telling evidence from somebody on the ground. Thank you ladies and gentlemen, thank you for being with us. I declare the luncheon closed.

Macalister River post flood - impact of fire, flood, mud and water.