

REPORT OF PROCEEDINGS BEFORE

**STANDING COMMITTEE ON NATURAL RESOURCE
MANAGEMENT (CLIMATE CHANGE)**

**INQUIRY INTO MANAGING CLIMATE CHANGE IMPACTS ON
BIODIVERSITY**

At Sydney on Monday 22 June 2009

The Committee met at 9.30 a.m.

PRESENT

Mr D. R. Harris (Chair)

Mr T. George

Mr G. F. Martin

Mr G. M. Piper

Mr R. C. Williams

KARRIE ANNE ROSE, Australian Registry of Wildlife Health Manager, Taronga Conservation Society Australia, PO Box 20 Mosman, sworn and examined:

WILLIAM DEAN MEIKLE, General Manager, Scientific Research and Wildlife Conservation, Taronga Conservation Society Australia, PO Box 20, Mosman, and

DAVID JOHN SLIP, Taronga Conservation Society Australia, PO Box 20 Mosman, affirmed and examined:

CHAIR: I welcome the representatives of the Taronga Conservation Society Australia, Mr Meikle, Dr Rose and Dr Slip. Thank you for coming today to provide evidence. The Committee also thanks the Society for its submission. I am advised that you have been issued with a copy of the Committee's terms of reference and also a copy of the Legislative Assembly's Standing Orders 291, 292 and 293 that relate to the examination of witnesses. Is that correct?

Dr ROSE: That is correct.

Mr MEIKLE: That is correct.

Dr SLIP: That is correct.

CHAIR: Will you please state your occupation and in what capacity you are appearing before the Committee today?

Mr MEIKLE: I am the General Manager of Scientific Research and Wildlife Conservation, based at Taronga Zoo, Mosman.

Dr ROSE: I am the Manager of the Australian Registry of Wildlife Health, which is a diagnostic centre and wildlife health resource centre. We also work very closely with the Australian Wildlife Health Network, and we host that in conjunction with the Department of Primary Industries of New South Wales.

Dr SLIP: I am a research biologist on marine mammals at Taronga Conservation Society Australia.

CHAIR: I draw your attention to the fact that your evidence is given under parliamentary privilege and you are generally protected from legal or administrative action that might otherwise result in relation to the information you provide. I also point out that any deliberate misleading of the Committee may constitute a contempt of Parliament and an offence under the Parliamentary Evidence Act 1901. Would you like to make a brief opening statement before we proceed to questions?

Mr MEIKLE: The Taronga Conservation Society Australia is a statutory authority known as the Zoological Parks Board of New South Wales. It operates the Taronga Zoo and Taronga Western Plains Zoo and falls within the Ministry of the Environment. Associated with the change of name or trading name to the Taronga Conservation Society Australia has been a change in emphasis and role of the organisation as it seeks to contribute more towards conservation research endeavours and not be, as it is most commonly seen as, a tourist destination and place to see animals. Associated with the changes that are being brought through the organisation we are seeing an increased emphasis on and involvement with conservation programs, working with other universities and wildlife agencies, in New South Wales, Australia and internationally. I might offer David the opportunity to talk particularly to our submission.

Dr SLIP: I will take you through very briefly the outline of the submission. I am trying to be as brief as possible because I know you have all read it. Basically, the submission was designed to bring to your attention some of the activities the Taronga Conservation Society Australia already undertakes but also the potential for further activity. At Taronga we feel we have great potential to do more and we are working on developing in a number of specific areas.

The submission gives you an overview of management strategies, where we begin highlighting the areas that we feel strongly about. One is the long-term monitoring of species in the wild and the other is using an adaptive management framework. This is something that has been used and bandied around as something that one should be doing but if you look for examples of where in practice it has been undertaken you will find there are very few good examples of that. Basically, it means that those managers who are trying to make policy

decisions really should be taking on board scientific advice and modifying their management actions accordingly.

There are a number of issues in doing that. One of the first recommendations we have come to there is that increased and better coordination among government departments and agencies would further that activity. As a small agency we can often suffer that and we find out that things in the greater department are happening and we think it would have been nice to know that a little earlier on. Having had personal experience in larger agencies, I know how a smaller part of the department can be overlooked. But we feel there is quite good reason for increasing the coordination activities.

Under the area of weed invasion we have made a recommendation that suggested that pest management be undertaken as an integrated program. We have given you a little example of something we have been working on, which involves using native rats and reintroducing native rats in an urban bushland environment with the aim of replacing the introduced rats. So far it seems it has great potential for a successful program, with maybe the potential to increase that approach to pest management. It is certainly something that has been done. As anyone who is a gardener knows, if you have the plants that you want there then you get less weed invasion. It is the same principle, I guess, with animals.

Next we go on to look at areas of species distribution, ecosystem, composition and the risk of extinction. I guess our submission is focused on taking an ecosystem approach to addressing these issues of the potential of species going extinct. Trying to increase our understanding of ecosystem function leads to us being able to prioritise things such as reintroduction programs, which, of course, by their nature are very expensive items. I think it is very important to prioritise that so we know that what we are doing is going to be successful and will actually do what we intend.

The next area is life cycles and reproduction. We have suggested prioritising research into how some sort of reproductive parameters may change with respect to climate change. Having animals in captivity gives us an opportunity to measure a lot of those things over a long period, and we also have the opportunity to manipulate them under experimental conditions and then to apply that information to situations in the wild. We have then gone on to the marine ecosystem and recommended prioritising research that increases our understanding of ecological processes. In fact, at the zoo some of the things that we are currently doing with marine mammals is using the animals that we have in captivity to quantify some techniques that we can then use in the wild. One of the difficulties with working on marine mammals, for example, is that you only have access to them in the wild for a very short period of time, and then they go off into the wider ocean, which is an area where we do not survive quite as well and have great difficulty understanding what is going on.

If we can have access to animals in the zoo and work out some clever, I guess, forensic techniques to look at simple questions like, “What are they eating?”, “How much are they eating?” and “How are these things likely to change with climate change?”, then using the zoo animals gives us a great opportunity to do those sorts of things. Of course, our other recommendation is to not forget the importance of the sustainable use of marine resources because that, of course, has a big bearing on what happens in the marine environment. We have then gone on to talk about other threats to species and ecosystem health, which is an area that we have been working at quite extensively for sometime.

We have made a series of recommendations concerning disease surveillance, increasing investigations in interactions of habitat health and disease ecology. I guess this is something that is relatively new. It has been bringing together the research ecologists with, I guess, people with a more veterinary background, and I think there are certainly some lessons that we have with some diseases, particularly things like phytophthora dieback and chytrid fungus. Chytrid fungus, of course, is having a great impact on some of our frog species. That gives us a really big indication that something is not right, and I think putting some effort into having integrated programs that link ecosystem health models with disease outbreak models will give us an ability to suppress some of the potential things that may happen in the future. Our final recommendation was almost similar to the first one—increased communication between agencies is something we really should spend a bit of time on getting right.

CHAIR: In relation to communication between agencies, currently in New South Wales the process is to develop conservation strategies for each of the different regions. Have you had an opportunity to feed any information into that work? Is that work important in terms of conserving biodiversity?

Mr MEIKLE: No, to my knowledge we have not been involved with any of the regional conservation developments. We are involved with individual threatened species programs so where the Department of Environment and Climate Change [DECC] has indicated that certain species are under threat, and that captive amplification through breeding programs in captivity is a possibility, we have been engaged in some of those projects, particularly the Corroboree frog and more recently the Booroolong frog. But that is on a species-by-species basis.

CHAIR: Do you believe you should have some input into the development of those conservation strategies?

Mr MEIKLE: Yes. I think we should be more involved. I think, as David alluded to before, there are sometimes communication gaps that occur. We are a fairly small agency in the portfolio and I think some communication gaps might have occurred simply because of our size in relation to the greater department of DECC.

Mr GERARD MARTIN: In relation to Western Plains Zoo, do you have any communication with the Catchment Management Authority?

Mr MEIKLE: I believe there is some communication with the Catchment Management Authority associated with the revegetation of Macquarie River, which they have been involved with.

Mr GERARD MARTIN: Is that directly linked to what you have just talked about with the threat to frogs and such?

Mr MEIKLE: Yes, that would be an example of the Catchment Management Authority working with the Taronga Western Plains Zoo looking at river ecosystem reconstruction.

CHAIR: In relation to the passing of diseases between species and also their transmission to humans, is that an issue of species migrating as their ecosystem is ruined, particularly in coastal regions, and they are pushed to different areas? Is there a great deal of evidence to show that that is having an impact on other species just through the general migration of species?

Dr ROSE: Species migration is probably a small component of the potential impacts of climate change on health. What we are more likely to see our conditions ripe for is the incursion of new invasive species and whether that invasive species is a weed or a vertebrate pest like the fox in Tasmania or whether it is a pathogen. We are certainly seeing changes in the patterns of mosquitoes and other agents that transmit disease and we are seeing changes in water usage and water temperature that really would make it much more conducive to outbreaks of botulism or algal blooms and algal blooms that produce toxins, which could have impact on human health, livestock and wildlife.

We are sort of seeing a variety of different changes and largely we are likely to see shifts in host species, shifts in the vectors and shifts in the pathogens themselves. You have to look at all of those different factors that are likely to change with climate change, but we do not know which one is likely to change and how much change there will be. But as far as changes in wildlife health as a result of climate change, we already know that we see outbreaks of mortality in flying fox populations—they drop dead when the temperature is over 40 degrees. In those instances there are a number of threatened species in flying foxes but there are also a number of viral diseases of flying foxes. Then we have to go in and make sure what is the cause of the outbreak, because they have great potential as a human health threat; we have to rule out things like Hendra virus, Lyssavirus, Menangle virus and a variety of different things that grey-headed flying fox and other species of flying foxes are known to have.

We have already seen outbreaks of mortality plant toxins as the drought conditions reign, and macropods and other species are forced to eat plants they would not otherwise eat. We see outbreaks of plant toxins. We have also seen outbreaks—this is one that really interests me—of marine-based events associated with drought. There is the single-cell parasite that lives in the seagrass beds and when there is zero inland and coastal rain, that parasite builds up in the seagrass beds along with algae and algal toxins, and we see outbreaks of mortality in green sea turtles along the coast along New South Wales and Queensland.

We have been able to take the data in the registry and note the weather bureau data and look retrospectively and show that all of those occur in the exact same conditions in the El Niño years. We are always

seeing changes and weather-based events. We know that episodes like Cyclone Larry and extreme weather events have massive impact on biodiversity in certain regions and we also know that biodiversity in itself is a very good buffer to the incursion of pests and weeds. Our best protection is really a very healthy ecosystem because species biodiversity will eventually assist our health protection as well.

We prefer to make those diagnoses, linkages and changes in wildlife before they make the jump to livestock or to human health. We have been involved with Murray Valley encephalitis virus diagnostic work and salmonella. A lot of diseases that we are focusing on are really the ones that live at that interface between wildlife health, human health and livestock. I guess it depends on how much interest you want to maintain on biodiversity because there are bigger, broader biodiversity impacts as well. We have chosen not just to focus on biodiversity but also to keep a broader horizon because wildlife health forever is the property of the Crown and the Crown is not paying.

The history in Australia is that wildlife health and ecosystem health fall between the gaps of the environment, the agriculture department and the human health departments. That is why it has really landed in Taronga's lap, which has a relationship with all of those organisations and has been the only one willing to foot the bill for 23 years.

Mr RAY WILLIAMS: Within the work you have been doing, I notice that work has been undertaken with the grey-headed flying fox. Would you have a comment in relation to the current numbers of their population, whether they have grown or decreased over the past five years and whether it should still be a threatened species?

Dr ROSE: Not us, no; that would be more in relationship with the environment department. I guess that is where it is really imperative that we work together because we have the health data and they have a lot of the population-based data. We really need to have one system that overlays population size with the known disease entities, along with vegetation and climate—one mapping system that allows us to map all of that out.

Mr RAY WILLIAMS: I would have thought that with all these diseases becoming more prevalent—and flying foxes passing on things such as Hendra virus, which has now been proven to be an equine species and then passed on to humans—there would have to be an increase in population for that to happen; hence it has not happened or we have not noticed that it has happened before. You would think it would have had to come from an expansion in the number of those particular species, would you not?

Dr ROSE: No, that is not necessarily the case. A lot of times it is the interaction between those species. More and more, as we are making incursions into their habitat and bringing livestock into their habitat. Species like horses are a great amplifying host for this virus. Bats and horses do not usually coexist, so we are changing and modifying habitats and bringing different species into very close association. Often we see it when those decreasing population sizes are pushed to the margins of their habitat.

Mr RAY WILLIAMS: Can I explore that further? The Hendra virus in relation to VicRail and the one recently in Queensland is that it is not so much an incursion of the equine species onto the bats' natural habitat; it is more an incursion of the bats on to the equines' habitat. We are talking about a city area. This is an urban interface.

Dr ROSE: Yes, that is right. I think a lot of that is because they are being pushed out of other habitats and they are congregating in habitats that they would not normally have lived in. You are finding a lot more in the botanic gardens. The overall population size is declining but they are being pushed into tighter, smaller, large colonies in unusual places.

Mr RAY WILLIAMS: It just seems to fly in the face of a report that was done by Patrina Birt in 2005, which said that their numbers had increased quite substantially, and that seems to stack up; if you have more disease and you have more problems, one would think that the population is increasing, not declining.

Dr ROSE: Yes, that population data is more within the department of environment, and there is certainly a lot of work out there to try to better understand factors that lead to disease emergence. Our feeling is that we need to have better communication and a national health information system so that we can put all of those pieces of data together and better understand the process.

CHAIR: We might talk to the Department of Environment and Climate Change about the population.

Mr GERARD MARTIN: Just for curiosity, you referred to your rat program, which involves introducing the native rat. I presume the native rat is just a predator of the black rat.

Dr SLIP: No, I guess it is more a competitor. Actually, if you have a healthy population of native rats, then the black rat actually has great difficulty in establishing itself. The black rat is a really good one; it follows humans around the world. If you look at its distribution, wherever humans have gone, the black rat has gone with them, basically. If you have bush remnants and you have a strong population of native rats, the evidence suggests that they can keep the black rats at bay.

Mr GREG PIPER: In your recommendation you seek to increase resources into a number of areas. Obviously resources ultimately come down to finances. How is your organisation placed as far as its existing programs? I am sure you could always use more money as far as your budget, but what do you see as the needs for your organisation to be able to invest in the kind of research you are talking about here?

Dr SLIP: One of the things about this submission was that we were not necessarily recommending that the increased funding should go to us.

Mr GREG PIPER: I recognise that. In your recommendation you say a number of areas need increased resources but they do not all necessarily fit within your all organisation.

Dr SLIP: That is right.

Mr GREG PIPER: I appreciate that, but your organisation obviously has a significant role in research in a number of these areas with respect to some specific examples you have given. Is your budget adequate to do the types of research that you would be looking to take on?

Mr MEIKLE: The funding that is provided for the internal research programs is provided by our Board funds and supported also by external grants and applications through linkage grants with universities and funding from other foundation sources. We could always benefit from having increased resources because we could focus on the particular research disciplines that we have chosen to focus on. Wildlife health is one of our organisation's research priorities and Karrie has been seeking funds from Commonwealth sources to support expansion of work in her area.

Dr ROSE: Yes, I guess with the biosecurity scenario at the moment it is a bit frightening really, because there is a recent report out in Nature that wildlife health is the most important and growing threat to biosecurity and public health around the world. Every emerging disease in the last 10 years, and most of them in the last 30 years, has come from the wildlife reservoir. Ebola, HIV, avian influenza—most of them have come out of wildlife. Yet in Australia we are in a situation now where there has really been no funding flowing through as a result of the recent Beale review into quarantine and biosecurity in Australia. We have had our largest network of biosecurity-related research, which adopted a one-health platform of trying to bring in human health, wildlife and environment health, and livestock. The Department of Primary Industries had engaged at Commonwealth and State level all across Australia, but their re-bid did not get funded. We have also been engaged in the Australian Biosecurity Intelligence Network, which is a part of funds under the National Collaborative Research Infrastructure Strategy and, despite three years of engagement, we have had no funding.

I suppose I put on this suit today thinking maybe this would be a good interview suit, because I think it is an important area. Just last week we were tallying the nation's Murray Valley encephalitis virus data and we had to absolutely pull it tooth and nail out of two health departments, three departments of primary industry—and this is not a virus of wildlife, this virus kills people—and it is handwritten scratch notes and incomplete rubbish data. A lot of money has been spent on collecting it and it is sitting in individual little repositories. I think that, for trying to find out what climate change might do to health, we need to have a system that gives us a baseline and then we will address the change.

Mr GERARD MARTIN: Who, from a government agency, do you think should be driving that?

Dr ROSE: We are leading the wildlife and environment component of it.

Mr GERARD MARTIN: But in terms of funding, is it Federal or State, or from the Murray Darling—

Dr ROSE: Quite often it is a cost-sharing agreement between Commonwealth and State, but it depends which program you are looking at.

Mr GREG PIPER: The point is that you feel your organisation would be a suitable target for increased resources in these areas.

Dr ROSE: Yes.

Mr GREG PIPER: That would be an effective tool to address at least some recommendations for additional research.

Dr ROSE: We have developed an online wildlife health information management system that allows us to draft and map all of this data in a secure web-based environment, and we are due to go live with that in August, but quite frankly I do not know that we will have the resources to issue that many passwords and log-ons.

Mr GREG PIPER: Dr Rose, I would like to ask one more question that is much more specific than that global issue in relation to the example you gave of a parasite in seagrass based on dry weather patterns and the impact on the green sea turtle. Is the impact on green sea turtles singled out because it is a particular species that is being researched and therefore it is a good indicator species? Is it possible that this parasite is impacting on other marine biota or marine fauna?

Dr ROSE: The parasite itself is very species specific. The way we got involved is that we are under contract and we receive \$20,000 a year from the New South Wales Department of Environment and Climate Change to do the diagnostic work. They do not have veterinary facilities, they do not have veterinarians on staff, so they pay us a little bit of money and when they have whale stranding or mortality events or mortality in threatened species they bring them to us and we do what we can to assist in any way possible. These events have been large numbers of turtles stranding, dead and floundering in the surf, so they have come to us that way. They were not necessarily part of an ongoing population study within the Department of Environment and Climate Change, but the public outcry of having lots of them found dead on the beach was such that they came to us. They are a threatened species nonetheless and obviously one that the Department of Environment and Climate Change would want to come have an answer for.

That parasite in itself is not a threat to human health or other species, but we also identified algal toxins at the same time this event was going on. There were algal blooms—again no water flushing the seagrass beds—and we identified a microsystem that is an algal toxin at concentrations that are about 20 times the maximum recommended in drinking water for humans. That is a toxin that is teratogenic—it causes birth defects in anybody who might come across it—and carcinogenic. It causes liver tumours. It is a pretty nasty thing. I think with the green sea turtle, the fact that we are there to investigate and find out what is going on let us know that there were algal toxins and they are right where we are growing oysters and other shellfish.

Mr GREG PIPER: Have you been looking at *Caulerpa taxifolia* and its impact on marine systems as well? A lot of the New South Wales coast is obviously threatened by that.

Dr ROSE: We have not, no. It is really just an offsider and me—we are pretty low on the ground.

Mr GREG PIPER: Does it come back to resource issues?

Dr ROSE: Yes. Fisheries would be someone to ask.

Mr GERARD MARTIN: Most Australians would see the CSIRO as the iconic organisation that drives a lot of these things, but has its charter changed in recent years? There seems to be a great big void here—no-one is pulling together.

Dr ROSE: The CSIRO used to have a variety of different departments. They used to have a lot of wildlife health and ecosystem health departments. I think now they have really trimmed down, so they have really cut that down and all of those agencies went into entomology, which is a very specific area and a lot of the people are involved in the health aspect of it. I know that CSIRO's Australian Animal Health Laboratory did have an individual responsible for wildlife, but she left Australia because there is just no investment through CSIRO to help it. I know that CSIRO did put up a bid to host the Australian Wildlife Health Network and that

they did come to us eventually. By and large the group that focuses on health within CSIRO has a very strong livestock focus, but when something like Hendra comes along and there is a compelling argument to be involved in wildlife then they may well do that.

Mr THOMAS GEORGE: In your submission you mention investment in developing additional research findings for the sustainability of marine resources that will be impacted by climate change. What type of research were you looking to do?

Dr SLIP: For that particular issue, a lot of the research that we do looks at foraging ecology of marine mammals, and of course that sort of thing may change as a result of climate change given that climate change will affect the distribution of what they eat, so we will have some sort of changes within the environment. We have put that in because the sustainable harvesting of marine resources is a really important issue and I think we have put that in there not necessarily to suggest that we would be doing that sort of research, but perhaps it is something that we see as very important to our colleagues in fisheries that that sort of work be looked at.

Mr GERARD MARTIN: I do not want to get into an argument about whether you are climate change sceptics, although I would think there is a fair chance that you are not. In relation to time imperatives, most research is time consuming as well as requiring a lot of resources and so on. Are there any major issues that the clock is ticking on that concern you in relation to a specific species, or is there a general argument that no-one can be too specific about, in terms of the timeframe needed before it will be too late to do some of these things?

Dr SLIP: I would be reluctant to identify any specific species that the clock might be ticking on. One of the points we have made in our submission is that long-term monitoring is a pretty important thing in order to understand what is going on with biodiversity. I do not think we have terribly many long-term data sets in the world—purely because of the fact that funding is usually done on a three-year cycle. Occasionally you might get a longer bit; sometimes it involves cycles of less than that. It is very difficult for researchers to set up a long-term monitoring program. There are a few examples of them that have gone on, and some of those have given brilliant data. There is a long-term data set on the green turtles in Queensland that is a remarkable piece of evidence of what is going on.

I think they are the sorts of things we need to be looking at: getting some of those things in place. The ecosystem is going to change. Regardless of whether it is climate related or not, and regardless of who is causing the climate change, things will change within the ecosystem. Perhaps it would be a good idea if we had an idea of what was going on, and perhaps we could look at it. They are the kinds of things that I think would be important to get started on pretty early.

In terms of individual species, where we know that there are species whose numbers have clearly been going down—and again that is probably more for the Department of Environment and Climate Change to talk about—where the species population is in decline, it is pretty important to get a handle on how those ecosystems as a whole are functioning, rather than just focusing on that individual species. If we have lots and lots of species that are all going downhill, I think it is better to address the ecosystem as a whole rather than focus on one particular species.

CHAIR: Recommendation five states that resources be dedicated to species recovery and that ecosystem function should be targeted to investigate and incorporate knowledge on the role of species within ecosystems and the service they provide and facilitate. Do you think enough research is being done on the role of species within ecosystems and the service they provide? In the general community, if a certain species of cockroach disappears, people really do not care. But in the overall health of the ecosystem that could be quite huge. Is enough work being done to investigate those impacts?

Dr SLIP: I would say, no. I think that is an area in which we are lacking. Again, that is alluding to what I was saying before, about understanding the whole ecosystem as a whole. Perhaps it is not necessary to know the role of each one of those species, but we know that this group of species has a certain role and that we need to have a good variety of biodiversity to cope with any sort of change, and they are the sorts of management aims we should be aiming at in maintaining those sorts of things. If one cockroach becomes extinct, perhaps that means that those nasty ones we have in our kitchen will suddenly increase, and that sort of thing. But again, it is very difficult to explain that kind of thing—the importance of a cockroach as an individual species. But the importance of the whole ecosystem in providing us with clean air, clean water and those sorts of things is much easier. No, I do not think there is enough focus on that.

CHAIR: Thank you very much for coming along this morning and speaking to your submission. I certainly have had my eyes opened in terms of health and climate change. It was something I had not considered, but it is probably one of the most important things. I wonder whether the State and Federal climate change strategies have that factored in. From my reading, I do not think it is even mentioned. I think a lot of it is on land use and other impacts, but health is not there. We may get back to you on that aspect.

Dr ROSE: We would be happy to provide any additional information you might need.

CHAIR: Thank you very much.

(The witnesses withdrew)

FRANCESCA ANDREONI, Senior Project Officer, Department of Environment and Climate Change, seconded to the Namoi Catchment Management Authority, P.O. Box 528, Tamworth 2340, affirmed and examined:

CHAIR: Dr Andreoni, thank you for your attendance this morning on behalf of the Namoi Catchment Management Authority [CMA]. The Committee also thanks the Namoi Catchment Management Authority for its submission. I am advised you have been issued with a copy of the Committee's terms of reference?

Dr ANDREONI: I have.

CHAIR: I am further advised you have been provided with a copy of Legislative Assembly Standing Orders 291, 292 and 293 relating to the examination of witnesses?

Dr ANDREONI: Yes.

CHAIR: In what capacity are you appearing before the Committee today?

Dr ANDREONI: The Department of Environment and Climate Change [DECC] employs me as a senior project officer, but I have been seconded to the Namoi Catchment Management Authority to provide expertise on biodiversity and threatened species. I appear today neither representing my personal views, nor the views of the Department of Environment and Climate, but I am representing the Namoi Catchment Management Authority.

CHAIR: Your evidence is given under parliamentary privilege and you are generally protected from any legal or administrative action that might otherwise result from the information you provide to this Committee. I point out that any deliberate misleading of the Committee may constitute a contempt of Parliament and an offence under the Parliamentary Evidence Act 1901. Would like to make a brief opening statement before we move to questions?

Dr ANDREONI: Yes, thank you for the opportunity. I have prepared a brief statement highlighting a couple of themes from the Namoi Catchment Management Authority's submission. The Namoi Catchment Management Authority's submission to the Inquiry is part of a range of steps that the Namoi Catchment Management Authority is taking to try and help manage the impacts of climate change. The Namoi Catchment Management Authority invests both at a strategic level and on ground in its responses to this. The significant impacts that climate change will have, and is having, on biodiversity and biodiversity-dependent industries—most importantly for our catchment—are a key concern for the Namoi, particularly in terms of the Namoi Catchment Management Authority charter to deliver on its Catchment Action Plan and its targets. That is essentially what the Namoi Catchment Management Authority is about.

As stated in the written submission, biodiversity has significant and often understated or not well-captured benefits and values for the catchment community. In fact, the discussion the Committee had earlier about how well ecosystem services are captured or not, is really one of the key challenges. We are not so good at quantifying, particularly in an economic sense, or encapsulating the services that biodiversity is providing. Climate change presents not only a whole new series of threats but it has a multiplier effect: It exacerbates a series of existing threats, which are well understood but poorly managed, in terms of threats to biodiversity.

To give you a snapshot, biodiversity in higher altitudes in the catchment are particularly vulnerable; ecosystems that are already fragmented are particularly vulnerable; ecosystems or species with specialised requirements or restricted distributions will be at even greater stress; loss of key resources for fauna species, whether it is hollows or nectar-bearing trees, et cetera; soil is at increased risk of erosion due to changes in climate and vegetation patterns, et cetera; and fluctuations in water availability and greater extremes. All threats that we know about and have been well studied. I will not labour the point but essentially that whole suite of impacts is expected through the Namoi catchment.

A key threat referred to in the submission is the distribution and density of invasive species. This is already a critical issue and one of the key threats. We know with climate change that potential area of existing invasive species will shift and we expect a whole new suite of species to take hold and take off. The capacity to respond to invasive species and to apply effective control regimes is critical and one of the great challenges in that—and in this I do not envy the task of the Committee in a sense—is the coordination of all levels of

government and across all land tenure and across the range of activities, whether it is education, on-ground action, enforcement of existing laws or what have you. But the whole element of better coordinating our responses is critical in invasive species.

With regard to already threatened native species and ecosystems, we know that the climatic variables will shift, and the distribution of species needs to shift, but given the existing levels of fragmentation across the landscape—and the Namoi catchment is a case in point for that—that will be very problematic because the capacity to move and shift through habitat is gone, largely through a whole range of development activities, agricultural lands or whatever it is we have lost connectivity through the landscape for biodiversity. A key point that the Namoi Catchment Management Authority made in its submission was that ecosystem and species level in situ has to be made a much higher priority. Zoos and genetic banks and all this sort of really clever stuff are all great but the crux of it comes down to what we can retain in the landscape.

If we are to retain any level of resilience in our natural systems, we need to be retaining what we have got currently in native vegetation or functional ecosystems essentially. Otherwise we will simply suffer further catastrophic loss of species and a further breakdown of ecosystem processes. So the extent and condition of native vegetation is absolutely critical to strategies to support and sustain biodiversity in the landscape. That is where things like the use of offsets, which is part of the whole land clearing and vegetation management mechanism, must only be used where it really does maintain or improve the environment. That is a very hard test to meet if your baseline data is poor. In New South Wales vegetation mapping is still, quite frankly, a bit of a debacle. We do not have statewide consistent, thorough, up-to-date veg maps. Any first-year natural resource management student will know step one is to know your resource. So there are a couple of ongoing knots to unravel at that level.

Another key issue, and I guess this is very much for the Namoi but right across the Murray-Darling Basin and no doubt east of the divide as well, is that aquatic and riverine systems become even more critical. We already know they are essential refuges and really important hot spots for biodiversity across the landscape, whether it's rivers or wetlands or what have you. They are going to be under even greater stress, we know, as hotter and drier conditions take hold and the issue of water use, for example, water-sharing plans, et cetera, is key to how those systems are sustained or not. The point that the Namoi Catchment Management Authority makes is that essentially water plans need to be based on both surface and groundwater together—you cannot separate them and come up with something sensible—and it has to be based on a sustainable yield. We can then debate for the next three years what a sustainable yield means and that is what community debates are all about, but that is the crux of managing our water resources in relation to biodiversity and climate change.

Again, if we are seriously trying to sustain biodiversity in the landscape, we need a network of protected areas that crosses public and private land that essentially creates those linkages and allows for that biodiversity flow to occur. This is where, for example, the fate of our travelling stock routes [TSRs] and reserves comes into play because they are an existing network. In our region they contain some of the better remnant vegetation around. Quite a few threatened species and threatened ecological communities occur on these TSRs. Their fate hangs in the balance a little, so that is again why we thought it was worth raising here. That is an opportunity to keep a little more resilience and connectivity in the landscape, depending on what happens to them and how they are managed.

Another key point, which I just touched on earlier, is having good baseline data—that whole monitoring, evaluation, reporting and improvement cycle. That Namoi Catchment Management Authority, for example, has invested something like \$5 million of State and Federal money in developing a set of really good baseline catchment data. It is looking at things like soils, salinity, pollution, wetlands, riverine condition, aquatic biodiversity, groundwater, surface water, threatened species, native vegetation, weeds, invasive animals, the socioeconomics of the community, and future scenario planning and what it means for various industries. That investment has been made out of a sense that it is such an important priority and also that we cannot wait always for State-based and Federal programs to get up and get going, to finish their work or what have you. This CMA—like many, I suspect—has just bitten the bullet got on with developing some baseline data.

Another thing to bear in mind in terms of strategies responding to this issue is that those regional natural resource management [NRM] bodies, it is variable depending on how their priorities are played out, but they are repositories of a significant amount now of information, science, data, evidence, maps, et cetera. That interaction between the regional NRM bodies and the various State agencies with information flow going both ways is important. The Namoi CMA has undertaken a whole set of initiatives from fora to workshops. We showed Al Gore's film across the catchment very early on, and there was a huge turnout. So we are very much

responding to the catchment community's interest in this. We have water reuse efficiency programs, decision support tools for project officers wherever they develop a project so that they are starting to integrate climate change thinking into what they are developing, and facilitating better weed control management.

We have a weed tracer program that links up with all the local government areas across our catchment. It is no extra work for anybody but every individual council is going out and weeds officers are recording data in the field or doing up maps, et cetera. We also get them to send it to the weeds officer at the CMA. He manages a centralised database so we can work as an early alert system. I can say, "This local government area over here as a new thing that has come in so I can let you guys know, the neighbouring local government areas, that it has come in." Again, it is not adding to the workload but just trying to coordinate a little better and get us on the front foot as new innovations come through.

We are researching fire regimes. We know that fire is another thing that is going to change significantly, which has big impacts for biodiversity. As you can imagine, there is a whole suite of on-ground projects with landholders and land managers—again, all that standard, sensible biodiversity conservation stuff, retaining and restoring native vegetation, et cetera. Another key approach in terms of being proactive is that the Namoi CMA has developed a whole nature conservation strategy for the whole catchment, which essentially outlines priority areas for conservation, priority areas for restoration and, thirdly, key areas to link up. It is in that order of priority those are the key things to do to retain biodiversity in the face of climate change in the landscape.

Another point just to finish up is that the Catchment Management Authority's focus is very much on education and incentives. We fill a unique position in terms of being able to bring the catchment community along with policy or social, cultural or legal change, as it occurs. It is essential that on the one hand the compliance and enforcement activities, which are conducted separately by another agency, and on the other hand the incentives, the social change and the education are pushing in the same direction. Whilst they are done separately, they need to be very much coordinated and linked. It is on that note that any strategy to tackle climate change impacts on the ground should take advantage of this position of the regional bodies that they do have a different level of entry and capacity to engage and talk to landholders and land managers on the ground across the regional areas.

CHAIR: I will start and then open questions to other Committee members. In relation to land clearing, you obviously have concerns about the current legislation. Would you agree that the principles of the legislation are there but that the application is possibly lacking, or do you think the principles themselves have issues?

Dr ANDREONI: On the one hand, offsets as a policy instrument are fraught. So, yes, it is a mechanism that can work, but it is a challenging mechanism to make work well, particularly in the absence of really good baseline data. The legislation and regulations are being applied well and thoroughly and diligently across the State. But it is something to really watch because the idea of the legislation is to end broadscale land clearing. Intuitively, we all know what that means—we are trying to stop what was a massive pattern, historically well traced, of the sheep-wheat belt of New South Wales. We started first in the south and worked our way north developing our agricultural land. There is a perfectly sensible reason why particular landscape gets targeted first. What can be a concern is in areas where there are significant remnants remaining that we not continue to repeat the same pattern of fragments in the landscape too much and create further problems. The key to that is the test to maintain or improve.

Mr GERARD MARTIN: In the Namoi, cotton has been the big crop and has been blamed by some people, such as the green movement, for just about every ailment known to mankind. Do you suggest it is inappropriate land use in your area? What impact has it had on the biodiversity generally?

Dr ANDREONI: It is up to the catchment community to decide what land use they feel is appropriate, whether that is agriculture, mining or plantations for carbon sequestration. In a sense, that is a whole other set of discussions about what the community wants to see and what they feel is appropriate. Cotton, undeniably, like any other form of agriculture that involves the removal of existing vegetation or existing ecosystems, has a significant impact. The other elements are water use and also some of the chemicals, et cetera. The cotton industry has made huge improvements in both fields. In fact, the Namoi CMA has a very significant partnership with the cotton cooperative research centre out at Narrabri, very much working to get cotton growers up to best management practice in what they do. You cannot escape the fact that whatever you develop and however you develop has an impact on biodiversity. I would argue that in the Namoi we are a long way from yet having resolved our water use issues, not just about industry but for a whole suite of industries and, indeed, urban areas.

Mr GERARD MARTIN: Groundwater is a big issue in the Namoi.

Dr ANDREONI: Yes.

Mr GERARD MARTIN: The irrigators group there is well organised. Are they making a positive contribution through your process?

Dr ANDREONI: Again, I have not been privy to a lot of those sorts of discussions, but I know that our general manager certainly has at length and at various points often discussed with the irrigators group where they are at and what their needs are—again, in the context of the CMA trying to meet the Catchment Action Plan targets. So that sets out a whole series of things. One of the key areas of the four is water. There is no doubt that there is a lot of interaction between those groups.

Mr THOMAS GEORGE: Whilst this is not on the Namoi, I want to give you an example. You are calling for the strengthening of the measures existing in New South Wales legislation. Let me give you an example of the Richmond. You have got a dairy farmer who wants to improve his productivity. He is working with the Department of Climate Change to become a more efficient irrigator and he wants to put in this new, efficient system. He is then told that to be able to put in a better, efficient system he will have to clear 32 trees that are around the farm off a 300-acre property. But, no, the legislation will not let him do that.

So we have got one department telling a producer in this situation this is what he should be doing to become more efficient, responding to our needs today, Then we have got another department, through this legislation you are referring to, saying, “No, you cannot remove those trees unless you buy the property next door and plant every foot of that property down with trees”. He has to plant another 1,000 trees. You are calling for tougher legislation. How do we take farming into the future with this type of thing happening? I know it is not in your area, but it is the type of legislation we are calling on one department to strengthen, and yet another department is working with farmers and producers to try to become more efficient in using water. So we have this problem. I would like your thoughts on it. We are calling for tougher legislation on the one hand and, on the other hand, we are saying, “We want you to become more efficient” but we cannot become more efficient because of that legislation. How do you marry the two?

Dr ANDREONI: What you have hit upon is exactly the sort of trade-offs and dilemmas that natural resource management presents, and that is why it is never simple. If you look at the value of isolated paddock trees that may well be 120 or 150 years old, a lot of those trees pre-date agricultural development. So whilst it may not look like much—it is just a few trees in a paddock—in terms of biodiversity they are a critical resource. We know that throughout various parts of the State—it is by no means isolated to one area—the loss of those last few paddock trees is having a very deleterious effect.

If you are saying we will not have any more land clearing unless it maintains or improves the environment, the fact is you would be wiping out a 150-year-old tree that is on fertile land so it has high nectar value, high food value for a whole suite of species, and it has lived long enough to start developing a few hollows and is like an apartment building for a whole range of different species. That is why you cannot just knock it down and plant six trees in the corner. The way it is set is that one does not clear unless it maintains or improves the environment. That is the sort of issue that is readily faced by landholders all over the State, and depending on what other areas they have on their farm it may or may not be easy to offset.

Mr THOMAS GEORGE: In this case it was going to cost him \$1 million to buy the farm next door to be able to plant every foot of it down with trees.

Dr ANDREONI: What I would have done in that circumstance is get in amongst that and have a look at his property management plan and his water use and try to see whether there were not an option to say, “We are going to make these improvements in your water use efficiency et cetera, and retain your paddock trees.”

Mr RAY WILLIAMS: I think that is a great comment.

Dr ANDREONI: They are not mutually exclusive activities.

Mr RAY WILLIAMS: I think that is where we let ourselves down, especially in relation to private property management—it is working with farmers on the ground. Picking up on a couple of your comments, you

said that there is not enough mapping of natural vegetation. I would have thought that DECC had every square inch of New South Wales covered for satellite mapping, but it is properly not accurate enough to you lot, from what I have seen through my council life.

The replenishment of native vegetation across the wheat-sheep belt that you spoke about from the south up through the Central West and up through the north in particular in the last 20 years has been astounding to me. Every time I travel through those areas—and I travel fairly extensively each year, or every couple of years, through those areas—it seems extraordinary. I remember back to what it was when there was a scorched-earth policy, but now you look at the corridors, the stock routes and the riparian zones. There has been an extraordinary amount of work that I know the local communities, and hence the farmers, have done. Surely that is, as you said before, working with these people and some of this new technology—we visited them in the Central West and saw the carbon farming techniques. Surely that has got to be the way to the future, where we can strike a balance.

It seems to be an extraordinary situation that in the Sydney Basin we cannot increase our urban fingerprint. Why? It is because we need to maintain our agricultural industries. I do not think there are too many out there—they disappeared about 50 years ago. But if you go over the Blue Mountains, which is the root of all evil for farmers, there seems to be this huge contradiction in what we are doing. We have to maintain our food, and we need to feed our country—and, hopefully, perhaps other countries around us. Surely the balance has to be struck. I think you hit the nail on the head when you talked about going in, talking to the farmers and working with them, saying, “Maybe you cannot knock down these trees, but maybe you can get 20 over here and do X, Y and Z and then we can get an outcome for everybody.” I think that is a good comment.

Dr ANDREONI: Indeed. Look at, for example, the issue of historic land-clearing patterns. You are absolutely right, particularly if you look at the southern catchments of the sheep and wheat belt. There has been an enormous effort to restore and replace it. The reality is that to keep something in the landscape in the first place is way more efficient and effective than to try to reconstruct. Yes, there has been an extraordinary effort made, and landholders, farmers and the whole spectrum of the community have been involved with that. So, yes, it is very important to acknowledge the efforts that have been made. I guess this is where the legislative test comes in—to not repeat some of our historical errors in terms of clearing or developing things that were not sustainable or were not going to work in the long term.

I guess the other reason why the way our policy and laws are constructed is important is because if we take the catchments—and 95 per cent of land managers in the catchment are doing all the right things; they are trying to manage the best practice, they are trying to retain biodiversity in amongst their production systems, et cetera—it only takes a couple of people who do not care and are just going to go hell for leather and take what they can in the short term to stuff up the catchment for everybody else. So there is a real equity issue because the systems we are managing are at least catchment scale, if not bigger, and the things I do on my property affect you further downstream. So I guess it is an issue of striking a balance between harnessing and recognising and valuing all the efforts of good land management and supporting that with the smartest policy mechanisms you can come up with while still holding the bottom line in terms of trying to avoid further steps back.

Mr THOMAS GEORGE: I agree, and I am not being political when I say that the biggest problem for people at grassroots level is getting the departments to talk to each other.

Dr ANDREONI: Even not at the grassroots level, I would say. That is a challenge, yes.

Mr THOMAS GEORGE: As a farmer, trying to get native vegetation talking to Water or whatever, or Health talking to someone else—and it does not matter who is in power; it happens—is the biggest problem. Some of these people have to get five or six approvals to carry out one project on their farm. But to get the five or six departments together is a job that we cannot achieve even from where we sit. We put a lot of responsibility back onto the producer, farmer or landholder and then he is left with the burden of trying to get answers out of all of them. I praise you for saying that we have to get everyone together to talk about it, because a lot of the time it saves a lot of letter writing and it can be sorted out. I am sure that, as members, we appreciate that. The other problem that I see, and you must experience, is the vast difference just in this one catchment management area between the needs of the people at the top and the people down at the bottom. They have no idea what Ray Williams down the other end of the catchment area needs for his survival against what I need at the top or in the middle. We do not understand the full benefit unless we go out and learn, and that education will take a long time.

Dr ANDREONI: That is where there is the opportunity to take advantage of the position in which these regional natural resource management bodies sit. They generally have a greater understanding of the nuances and diversity across their catchment area than an agency operating remotely, often just by nature of being in there and amongst it. It is an opportunity to tap into the community needs and those differences across catchments, which can be quite significant.

Mr GREG PIPER: I refer back to your comment about offsets and the importance of them being genuine offsets. I have concerns about that myself. With regard to bio-offsets or bio-banking, or whatever policy is being enacted, have you had many conflicts directly between your organisation, the requirements of the Department of Environment and Climate Change and, of course, the Department of Planning?

Dr ANDREONI: Not particularly conflicts in the sense of the role the Catchment Management Authority plays. One example is vegetation clearing. The CMA has a team that is responsible for developing property vegetation plans with landholders. If there are offsets involved, they are sent up the line to the Minister. They are involved in the approval process. There is no conflict with DECC. The role of the DECC secondees within Catchment Management Authorities is to facilitate, coordinate and help with the information flow across those two agencies. It is the usual case of working together and being willing to work together. That is all good. As always with government agencies, it is not always as smooth, as fast or as organised as it could be. There is certainly no sense of any conflict between those two.

In terms of the Department of Planning, the CMA is not pro or against any particular development or land use. We are more about trying to ensure that the catchment community is informed about the potential impacts and what it might mean should they choose this route, that route or whatever. The authority is more a voice for the catchment community and tries to keep them informed rather than necessarily stepping in and saying, “No, you will not mine there”, or “No, you should not be putting a plantation there.”

Mr GREG PIPER: I would like to follow up on something that I do not know a lot about, but some of my colleagues do. I refer to the travelling stock routes. I have observed them in operation. My maternal family came from Nyngan and I spent a lot of time there. During that time TSRs were very heavily used. Is there a capacity to enhance them? Is that being done? Is there a capacity to build on the links that you need to create between those conservation areas that are being maintained or improved? Has the network been damaged over the years? Once again, I can be informed on this because my understanding is that some of them are under threat.

Dr ANDREONI: Yes. It is in such a state of flux that you are probably all in a better position than I am to find out exactly where they are sitting at the moment. The Namoi CMA identified the travelling stock routes and reserves as a critical resource, particularly in terms of the conservation strategy. It set up as a first pilot a project with the then rural lands protection board—forgive me, I cannot remember their new title—

Mr THOMAS GEORGE: Livestock Health and Pest Authorities.

Dr ANDREONI: The project was set up with the then rural lands protection board to manage six identified high conservation value sites. That was very much a first step in trying to consolidate the relationship with the managers of the TSRs. With all the restructure and flurry, I have yet to go back and see how that is progressing. Certainly, there is still a significant area of land that is in the TSR estate and there are significant management challenges. If you think about it, we are dealing with lots of long strips. Things like weed invasion and edge effects—

Mr RAY WILLIAMS: Massive edge effect.

Dr ANDREONI: That is why if you tried to give them to the National Parks and Wildlife Service it would probably run a mile. There are significant challenges. But it is certainly a resource well worth looking at. Yes, some parts have been leased or sold. It has taken a few hits; it is not like it was 50 years ago when stock could be driven from one end to other and they would never have had to step on to a road. It is certainly something well worth investigating.

Mr GERARD MARTIN: They are by their very nature small parcels of land.

Dr ANDREONI: They are strips and little paddocks.

Mr THOMAS GEORGE: They do not join up with each other.

Mr GERARD MARTIN: There is no interconnectedness.

Dr ANDREONI: Usually there is a road.

Mr GERARD MARTIN: They can graze along the road but—

Mr THOMAS GEORGE: They are resting paddocks.

Mr GERARD MARTIN: If you could amalgamate them there would be something, but as a linkage they may have some value.

Dr ANDREONI: That is why they are a management challenge. It is because of the configuration.

Mr THOMAS GEORGE: Was that suggestion well received by the landholders, or was it worked out in conjunction with landholders?

Dr ANDREONI: Landholders and rural lands protection boards. It was about a whole bunch of things that landholders are usually pleased to have going on next door—weed control, feral control. They got various outcomes in terms of grazing management and how it would and would not be done. It was before my time; I came in after it had been set up. But it was apparently quite well received and at the time the rural lands protection board put on a specific conservation management officer to help monitor and facilitate it.

Mr THOMAS GEORGE: You mentioned that councils, livestock health and pest authorities and Catchment Management Authorities are all working together with regard to weeds. You are coordinating a weed management plan.

Dr ANDREONI: It is called the Weed Tracer Program. It is essentially a coordination exercise. The idea was not to add any workload to the weed officers but to use whatever existing system they had—whether it was map based or written reports. When they report back to their local government they should also send the report to a centralised database that we have set up for the catchment. The invasive species officers with the CMA can then track what is happening across the catchments. If we had an early incursion of a new thing at one end or in one local government area, an alert would be sent out stating this is what it is, this is what we know about it, watch for it. It is more about trying to help those local governments to be proactive and well informed so that they do not get blindsided by something that comes in.

Mr RAY WILLIAMS: It gives you a way to track something.

Mr THOMAS GEORGE: To track it, but not to control it.

Dr ANDREONI: The people doing the weed control are the weed officers. That is part of their normal rounds doing day-to-day business for their local council.

Mr THOMAS GEORGE: So your Catchment Management Authority has a weed section?

Dr ANDREONI: Absolutely, and one of the key things we fund in all sorts of ways, in terms of on farm but also other key areas is weed control. It is one of the big areas.

Mr GREG PIPER: It is not just noxious, invasive exotics generally?

Dr ANDREONI: Yes. Things like the new kid on the block from an ecological sense would be Coolatai grass, which is a big issue and which invades intact stands of woodland, so it has a particularly nasty edge because you do not need to degrade something for Coolatai to walk on through. In fact, some of the agreements with the then rural lands protection board were to try to keep Coolatai out on a couple of key remnants of grassy box gum woodland.

Mr GERARD MARTIN: You have had more than a passing criticism of the New South Wales draft biodiversity strategy. Would you like to expand on that a little? It seems to be the implementation rather than the meat in that strategy that you are concerned about?

Dr ANDREONI: Yes, I think you are right. This strategy, like the previous one and like many such strategies, comes up with some really laudable goals. It is all good. The point we make is that unless those fundamental natural resources are managed well and retained—again, water, vegetation, soil—we can write the cleverest biodiversity strategy in the universe, but the biodiversity will still go extinct at a rate of knots. Again, it just trying to link up—

Mr GERARD MARTIN: So is it monitoring and implementation or control. The weaknesses in the past have not been followed up and monitored?

Dr ANDREONI: That is certainly one of the key things. In terms of our existing and prior legislation, it is really being able to say what has happened where and what has worked or not. As you point out, in an era where we have satellite imagery and all sorts of clever things, it was unfortunate that after the last round of reforms in 2003, when monitoring and regular satellite passes were going to be one of the key things and a lot of us were very pleased about that, because legislation is never perfect, policy is never perfect, but if you can at least see what is happening and see if it is working, it puts you in a much better position. All of those were very quickly wound back. Resourcing was reduced. There are less satellite runs, the vegetation mapping program was wound up that had been running this some years. Again, there are lots of maps around, there are lots of bits and pieces but in terms of having a consistent, seamless vegetation map—

CHAIR: Accurate.

Dr ANDREONI: Accurate, and consistent across all areas, we do not even have that, and we should.

Mr GERARD MARTIN: The database you have built up and spent the \$5 million on, is that entirely an in-house document or do you share that with anyone?

Dr ANDREONI: We share very much, depending on how the material has been developed. Often it is in collaboration with other agencies and other organisations. We absolutely gather that information on the basis of aiming to share it, to inform people. It is not about hoarding datasets. In a whole range of cases we share it via data licence agreements, like other agencies. You have a purpose for it, get signed off and it is yours. There is direct transfer via particular staff with the Department of Environment and Climate Change, in particular, for example. So, it is very much aimed at informing decision-makers, agencies and the catchment community. Some reports, like things with specific threatened species site locations, we have to manage quite carefully. We do not just throw them out into the universe, in the same way that the Department of Environment and Climate Change has protocols for what level of accuracy you will share, with what kind of audience. So, there are some of those caveats but essentially it is aimed at improving management of the catchment.

CHAIR: In your submission you have stated that additions to the reserve system should focus on unrepresented ecosystems. What ecosystems are unrepresented?

Dr ANDREONI: Essentially anything that occurs on flat fertile soil. Our whole reserve system for predictable reasons we have developed our agriculture on flatter fertile soils and we have reserved all the beautiful but poor fertility, scrubby stuff up on the hills.

Mr THOMAS GEORGE: Because you cannot do anything with it.

Dr ANDREONI: Exactly. So, what we are often looking at in terms of endangered ecosystems and threatened species is the stuff that relies on fertile soils. So, whether it is your woodlands on floodplains or what have you. I guess that is the key gap in our reserve system.

(The witness withdrew)

(Short adjournment)

JOHN WILLIAMS, Commissioner, Natural Resources Commission, Level 10, 15 Castlereagh Street, Sydney, and

DIANNE FLETT, Program Manager, Natural Resources Commission, Level 10, 15 Castlereagh Street, Sydney, sworn and examined:

CHAIR: Welcome. I advise that you have been issued with a copy of the Committee's terms of reference and also a copy of the Legislative Assembly's Standing Orders 291, 292 and 293 with relation to the examination of witnesses?

Dr WILLIAMS: Yes.

Ms FLETT: That is right.

CHAIR: I draw your attention to the fact that your evidence is given under parliamentary privilege and you are generally protected from legal or administrative action that might otherwise result in relation to the information you provide. I should also point out that any deliberate misleading of the Committee may constitute a contempt of the Parliament and an offence under the Parliamentary Evidence Act 1901. Would you like to make a brief opening statement before we proceed to questions?

Dr WILLIAMS: Yes, I would, thank you very much, and I appreciate the opportunity to sit before you. I guess the important thing to me is that we can see that natural resource management is about healthy functioning landscapes and communities. In New South Wales our biodiversity is in a degrading state and continues to decline—that is established—and climate change is going to be a major driver to accelerate this as our natural systems have a limited capacity to respond to that change. What we really do need is urgent, integrated, adaptive action by our communities, our government and industry to improve our biodiversity—at least maintain it—in order to remain healthy landscapes and resilient communities.

I guess the most important thing I feel I can say is that it is essential that any response to climate change for the protection of biodiversity needs to be regional and locally flexible so it is built to maximise regional delivery and community support and that the investment priorities are clearer, better aligned and more spatially explicit to better coordinate Australian and New South Wales Government policies and investments in New South Wales.

Addressing the impacts of climate change on biodiversity requires an integrated approach across catchment planning, water sharing and water management, land use planning and urban development, environmental regulation and conservation, primary industries and services to regional communities. We are advocating for Australian and New South Wales policies and programs to promote biodiversity values to be more coherent and supportive of the natural resource platform that we face as a challenge.

Catchment Action Plans prepared through the Catchment Management Authorities should become whole-of-government action plans that integrate delivery of all our policies and investments and crucially incorporate developments and emerging policy on climate change and water scarcity. As a result, Catchment Management Authorities require a whole-of-government support to integrate natural resource management, climate change and biodiversity within the Catchment Action Plan.

The Natural Resources Commission supports the effort by the New South Wales Government to develop a new biodiversity strategy and a climate change action plan, but we look to see these strategies being finalised and owned by all agencies of the New South Wales Government and the community, and effectively implemented by a means, and we think the Catchment Action Plan is one such means to actually implement, with local flexibility and regional frame, the strategies. I think we have suffered in the past by having strategies that are not nailed down spatially and explicitly and people are held accountable to delivery against that action plan.

I think New South Wales has put in place, in the Catchment Management Authorities and the Catchment Action Plan, an opportunity for us to tie down the strategies in a practical and on-ground manner. Our progress report, which we have provided to you, demonstrates to us that government priorities are more easily achieved when they are implemented in partnership with the necessary on-the-ground actions and understanding on a catchment scale.

The New South Wales Catchment Management Authorities are effectively building local literacy and the resilience of natural landscapes and communities. The Catchment Management Authorities facilitate landholders to achieve tangible actions that can deliver multiple public and private benefits. That is really important. As one example, the way we manage vegetation can increase soil carbon, provide habitat and carbon sequestration opportunities and help build more resilient landscapes with buffers for climate change impacts.

Natural resource assessments hold the key for healthy resilient landscapes on which all of us ultimately depend. A key point to me is that unless our society values natural resource assets on privately managed land, which occupy something like 89 per cent of New South Wales, these environmental assets on private land will be lost. One of the first ecosystem services to emerge is the storage of terrestrial carbon to help mitigate climate change. If implemented with foresight and planning, incentives and markets for ecosystem services can be a critical tool in the fight against climate change and also deliver the multiple benefits to our rural productivity, water resources, and the health of land, soils and biodiversity.

However, if they are not delivered in a planned, sensible way, with reference to regional planning, we could end up with solving one problem and creating quite a number of others. I think I would just like to leave the point now and say that I think the Catchment Management Authorities are a front-line solution to addressing Australia's future challenges in food, water, energy security, landscape resilience and, particularly, the response to climate change and its impact on biodiversity.

But the next generation of Catchment Action Plans could be, if adequately reformed, our best mechanism available for rural, regional, coastal and urban communities to plan for sustainable futures that identify the properties spatially and the priorities and the actions to improve the resilience of our natural systems and manage the impacts of climate change. Climate change, I believe, represents new opportunities for industry, including incentives for carbon markets, and a chance to get our house in order, to better manage our natural resources. Whilst we all acknowledge that climate change is a challenge, it is also an opportunity and it is not just a risk. Thank you, Mr Chairman.

CHAIR: I will start and then hand over to other members for their questions. You have mentioned the Catchment Action Plans. I was particularly interested in your submission where you talked about the State of the Catchment report cards.

Dr WILLIAMS: Yes.

CHAIR: You said that the underlying data sets a good foundation to inform policy and investment decision-making. Is that actually translating into action or is it saying thank you for the report and nothing else happens?

Dr WILLIAMS: Well, at the moment, the focus has been on producing the report card and the report. Our report has repeatedly urged that whilst that is to be commended, it is far from being sufficient because the data that sits behind those report cards needs to be and must be publicly available, and particularly available in forms that are readily accessed by the Catchment Management Authorities and local government. So in a sense the catchment report card is a mechanism that is a beginning—and that is good—but we really need to get serious about monitoring and evaluation information being readily available to track our progress against our natural resource targets.

CHAIR: In terms of other departments, are those report cards seen as being credible by the Department of Planning and the Department of Primary Industries, or are they seen as being unrelated to the job that they do?

Dr WILLIAMS: The Department of Primary Industries contributed very constructively, as did the Department of Water and Energy in the previous arrangements, to provide these report cards. I think the link we have in managing our catchments is making sure that the Catchment Action Plans and the data that sits around the catchment is integrated with our statutory planning that is in the Department of Planning and in local government. To me, unless we get alignment between Catchment Action Plans and Local Environmental Plans, and the data that sits around that at the scale, we have no way of knowing if we are making progress or whether we are investing in the best places. Our report, which we tabled to you, shows that the lack of monitoring and evaluation really makes it difficult to report against progress against the targets, although I think we are going to have another go at it this year. It is the issue of not having the information in a form that can inform priority

setting, where to invest, is that investment really paid off, do we need to revisit it, and put those funds somewhere else.

What our work does show is that where you are investing with a strategy, even though you know you do not have sufficient funds, and probably never will, at least if you are investing systematically over time with a strategy. We can show many good examples of where that small investment, consistent with a strategy, over periods of 15 or 20 years will have, and does have, good impacts.

Mr GERARD MARTIN: In your submission you say that the work of the Catchment Management Authority would be greatly enhanced if there were a better alignment of State and Federal legislation policies. Would you like to expand on that?

Dr WILLIAMS: Yes. I mentioned one earlier: where the actual Catchment Action Plan needs to be better aligned with regional planning and down to the Local Environmental Plan. But we do need to see, I think, the lack of coherence between policy federally and policy statewide. Whilst we all appreciate having a Caring for our Country program, at the moment it does not have the same alignment with the Catchment Action Plan as previously investments did. I think we are starting to see Federal action erode the value of the Catchment Action Plan and the Catchment Management Authority.

Mr GERARD MARTIN: Could you give us an example of that?

Dr WILLIAMS: Yes, I can give you examples of that. If the targets are set by the Commonwealth, they ultimately would be an asset in a catchment. So the catchment authority is going to be probably as well informed, along with the agency and local government, of what that asset is. It might be a wetland in the Macquarie Marshes. The Commonwealth would see that probably as being an asset with a migratory bird path or something for the Commonwealth to invest in. I have seen examples where the actual targets and asset that the Commonwealth select does not align very well at all with where the local regional body or the State agency would align that authority. We seem to have a top-down process that is not matched with the bottom-up process.

The opportunity to bring about correction on that is, I think, significant, and the Natural Resources Commission is certainly having conversations with the Commonwealth to correct it. But at the moment, I do not think we are getting the best value out of the systems we have established. If the Catchment Action Plan can identify spatially the assets we value and how they need to be managed to cope with climate change, and the New South Wales Government and the Federal Government invest systematically over that, we will get much better delivery for our dollar than if we do not.

Mr GERARD MARTIN: You also talk about voluntary stewardship. Are you saying that you really have to leave it to the man on the land, so to speak, in many cases?

Dr WILLIAMS: When we have something like 89 per cent of land that is managed by private individuals—certainly in New South Wales but I do not know whether that is true of Australia—I think we have to really look at all mechanisms we possibly can, to value that asset, which has a private benefit but it also has a significant public benefit. I think stewardship programs that are coordinated towards delivering a public benefit, that are actually sitting on private land, and are the ecosystem service idea, must have increasing importance in the way we invest in the future.

Mr RAY WILLIAMS: Would you like to expand on your stewardship program?

Dr WILLIAMS: The one that the Commonwealth has at the moment is the grassy box woodland, a small program of about \$50 million. Catchment Management Authorities tend to be managing that one, particularly Lachlan and Murrumbidgee. Where they call for tenders from landholders to look after and manage, the “maintain and improve” principle comes into being for the grassy box woodlands, and for that they enter into a financial agreement to operate the land in accordance with that so its long-term biodiversity is retained.

Mr RAY WILLIAMS: We were discussing the matter with the previous witness. I was commenting in relation to the revegetation of native species throughout that area, particularly the south-western sheep and wheat belt, which has been quite extensive and very productive, especially in the past 20 years.

Dr WILLIAMS: Yes, it has. I saw some extremely good examples of this working outside the grassy box woodlands but through the incentive programs that the Central West Catchment Management Authority had

in the water supply areas around Bathurst. That is something you would know about. I think that if you looked at that catchment a few years ago, and you look at it now in terms of the water quality in terms of the management of the riparian zone and the gully incisions, it is through a coordinated, consistent investment, and some of that is by way of stewardship.

But, of course, the real issue is that many of the Catchment Management Authorities are not in a position to offer ongoing stewardship payments because of the annual budgetary frame in which they are currently constrained. They are the sorts of things we need to have a hard look at federally and statewide, to enable us to recognise that this needs to be a natural resource ongoing expenditure. We all benefit from having clean water, habitat, and all the rest of it. It is also important so that natural resources moves from being a fringe, Sunday afternoon activity, or one that is funded by a chook raffle occasionally, to being mainstream funded and budgeted for, which I congratulate the New South Wales Government on. We all pressed hard to fund the core funding of the Catchment Management Authorities. Now not every state did that, but I think that is a good step forward. It is recognition that looking after our natural resources is core public expenditure, just like transport, health and education.

Mr RAY WILLIAMS: Do you think there would be some reciprocal benefits in, perhaps, drought assistance? Would it be asking too much of farmers after they have received drought assistance to perhaps, in turn, put something back? Put some biodiversity management into their farms or—

Dr WILLIAMS: I think that the Productivity Commission explored this option in its report, which the Federal Minister has got on his table but he did not bring into the budgetary session, but the principles in that are like the ones you have indicated. I think it is a way forward that drought assistance needs to be built into building resilience in the landscape essentially.

Mr RAY WILLIAMS: I need to make sure because it is on the public record, that is not just the taking away of that private land but in drought-proofing that land for the future?

Dr WILLIAMS: Yes, that is the point.

Mr RAY WILLIAMS: That is where the benefit is going to be for everybody?

Dr WILLIAMS: That is right. Trying to find ways of giving that landscape resilience to cope with the climate variability that it will always have and add to that the likely increase due to climate change. I think that is very important and I think to go through those sorts of private-public relationships where you are actually maintaining on private land public-valued assets to build resilience into the landscape in the long-term is a very good way to invest money.

Mr THOMAS GEORGE: The Namoi Catchment Management Authority indicated in evidence to the Committee that it has spent something like \$5 million in collecting baseline information. Were you aware of that authority spending that money? If so, is that something that other Catchment Management Authorities could or should be doing?

Dr WILLIAMS: I was aware. Namoi is a very progressive Catchment Management Authority and it has tended to build up the data for itself. Other Catchment Management Authorities have also done it but everyone has invested to that extent and in many ways this has been highlighted because of the problem. Whilst we have had the monitoring, evaluation and reporting program in place, it has not satisfied, for some of the reasons I have explained, the needs of the Catchment Management Authority. I think those two things need to be brought together so that we get a better outcome for some of the expenditure that some of the Catchment Management Authorities have had to do, and will probably need to do into the future. But it is integration with the monitoring and evaluation program that is run by the agencies—you need to bring those two things together. Other catchment authorities have invested. I think Murrumbidgee is another one that has invested significantly in monitoring this thing.

Where a lot of monitoring is also done, which is not all brought together yet it is all costing you and I money, is in local government. Wollongong City Council, for example, would have one of the best water quality data sets of anyone for the urban centres there, and I can point to many others. Local councils in the Sydney metropolitan area have often, Lane Cove and others, some very good data sets but somehow we are not bringing them together so we can help get a better outcome.

Mr GERARD MARTIN: So there is still a silo-type being done?

Dr WILLIAMS: There is and the technology is not the limitation. I mean, goodness me, when you can go into Google and get all sorts of things very quickly, the technology is not the limitation. We have got to find ways of having monitoring and evaluation done in a way that delivers the information as publicly available and that allows agencies like my own to be able to report progress against the targets that we set ourselves.

Mr GREG PIPER: We would all like a nice seamless approach to this process from the top down, with the Federal Government priorities and funding for this State; it is not perfect and historically it has been very problematic. Within New South Wales do you see conflict between any weightings being applied in State policy from the Department of Primary Industries and its particular desires, as opposed to the Department of Environment and Climate Change and the Department of Planning? Are we managing to get the nexus between those agencies right?

Dr WILLIAMS: I think there are real tensions between the three agencies in terms of objectives. One of the things that New South Wales has done that will help us go forward is agree on a set of targets that we are all trying to shoot to, and then I think we can start to say in the strategies and policies that each department follows, how are they going to facilitate the delivery of the State target in terms of that thing? That then becomes the question. So there are examples of conversations with the Department of Planning—that I like to believe we influenced strongly—to particularly influence discussion with local government, Catchment Management Authorities and the Department of Planning. We can see there is quite a lot of progress in that conversation. I think we need to further it. That is why I think the Natural Resources Commission is in one role, because it sits across agencies and departments and it can get this whole-of-government, but I think we have to keep at it. I think it will and it is possible to achieve it, but we must keep at it. But having a higher level of targets and goals, which the whole-of-government is committed to, helps it.

Mr GREG PIPER: Just to follow on—

Dr WILLIAMS: If I did not answer the question, then please ask again and I will try again?

Mr GREG PIPER: No, I think you answered my question in your first sentence and then you elaborated on it. I preface my question by saying I do have quite a bit of understanding of issues relating to Catchment Management Authorities and I will declare that I have not been a fan of the process, although I am seeing some improvements in the Hunter-Central Rivers Catchment Management Authority, as the Mayor of the city of Lake Macquarie and the chairman of the Lake Macquarie Project Management Committee over many years. There were tensions there. Within our region, and certainly within the city, one of the biggest changes in attitudes to natural resource management to the local environment seems to have been through, and certainly exhibited by, the massive increase in Landcarers—the volunteer conservation movement, whether through the Landcare network or through other voluntary conservation groups. I understand there are some concerns, not just through Catchment Management Authorities but also through the procurement of other funds for these particular groups, that there are perhaps some unrealistic expectations for the scope of the projects they have—for example, 15-year maintenance terms et cetera on projects when these are volunteer organisations that are being signed up to widely unrealistic expectations and the impact on them. The question is, do you see the volunteer conservation movement as being a significant part of our response? If it is, how do we realistically bring them in?

Dr WILLIAMS: That is a very important question because volunteers are absolutely critical to our future, whether it is through Coastcare or Landcare—I am involved in both through Landcare Australia. The fact is that I think we are in an evolving process. The answer to your question is yes, they are very important. We have got to have ways though to nurture them, and we have got to have ways to sit them inside the strategic regional plan so that the activities on this particular sand dune or estuary is linked to the other activities further up the catchment that is delivering the sediment to that estuary—you look at the whole thing.

I like to think of the Catchment Management Authority and the non-government organisations and Landcare and Coastcare and Greening Australia—they are the people on the ground—and the nurture of those. I can give you some good examples through the Catchment Management Authority where it has been very good but there are other places where it has been very bad. I think we have to look at finding ways in the discussions with Federal Government and others to provide lubrication and learn and nurture the volunteer process and at the same time maintain the vigour of the regional overview process, so that it is connected together. That is the critical thing. To overcome the issue of asking a volunteer group to sign up to a 15-year contract, when they are

struggling to get enough members to front up next week to do some planting on a sand dune, I cannot understand. But what is possible is that the contractual part needs to sit with the other body, local government or Catchment Management Authority, but be put into effect through some arrangement with the local volunteer groups. I can point you to many examples, particularly under Judy Henderson on the North Coast, where that works very, very well. It is working the two together and realising that we have evolved from one where the Landcare group was on the space first and the volunteers, then we moved to putting in a regional body and, naturally, there are tensions. Now we have got to move to the next evolution where we need a regional frame and delivery that is ongoing and enduring. We need to clip that together and nurture the volunteer and community engagement. Otherwise we will not get change on the ground. I know that is the long answer but it is important.

Mr GREG PIPER: It shows the sensitivity to the different types of issues. I appreciate there are differences and different approaches in different Catchment Management Authorities [CMAs]. You have covered that.

Mr GERARD MARTIN: In relation to Local Environmental Plans [LEPs], we are going through the process in New South Wales at the moment—at last count there were 152 councils. Given that councils are notoriously parochial, and I say that as someone with 25 years in local government before I came here, do you see any conflict there? If you try to implement a template system, there is an obvious reaction. How do you see that fitting with the CMAs?

Dr WILLIAMS: That is an important point in your question. It is one that I am thrashing around with at the moment. At the moment there is not in clause 117 a provision where the actual LEP, even though it is called a Local Environmental Plan, has any legislative responsibility to interact with the Catchment Action Plan [CAP] unless it is particularly instructed to do that. In some instances the CAPs are perhaps not good enough and not spatially explicit enough because they are the first turn to run through it. That needs fixing. I think there is a place where we might look at how the Victorians are starting to do this where they have an amendment to the CAP where the links to the local planning issues in terms of the environmental assets and values that we need to hold are well and clearly documented—so that there is a section of the CAP in the amendment that is specifically designed to facilitate the link to the statutory planning role. I think you can do it the other way and have that link in the actual template of the LEP. That is one way. It seems to provide tension at the moment and we still have not got it for natural resources, although there are lots of conversations happening about it in the local government area [LGA] and the LGA are doing it well. I think there are probably other ways of doing it as well. But we need to do it.

Mr GERARD MARTIN: In relation to your own organisation, which is basically an audit organisation, do you feel you have enough leeway to influence CMAs to change, the ones that are dragging the chain a bit, or is it more a matter of massaging?

Dr WILLIAMS: The audit process, the seven audits that are publicly available, generally, in my assessment of stakeholder reaction, has been positive in that it gives communities some sense of understanding in a transparent way of how their local CMA is performing. There are a couple of instances where I believe the CMA used the audit very well, the chair understood it and worked with the community. I do not want to mention particular names, but it was very positive. Others have had less maturity with where the audit is and how to use it to progress and improve their game. We do have a diversity of performance, as our report illustrates. For the next six audits, which we are doing now for the remaining CMAs, we hope we will have overcome some of the problems of learning to do it in the first instance.

At the end of the day, the implementation of the recommendations, which we agreed between ourselves in the audit for the CMA, I believe is the responsibility of the Minister and agency responsible for the CMA to ensure that those recommendations are dealt with fully and properly. We can, of course, report again that we still have the same problem and you are not cracking through on it, but I think it is really important that our Minister and agencies who are responsible for the CMAs make sure that the CMAs are responding to the audits. But also, as you said, it is about nurture as well as audit. I think our role is primarily audit but there are some times when we are a bit like a professor at the university: we are mentoring and coaching our students but when it comes to examination time it is examination time.

CHAIR: Are you aware of any economic modelling that has been done on the value of protecting biodiversity and ecosystems? In terms of looking at a project that is called State significant, they look at the

economic value to the State. I am not aware of any modelling that has been done on economic loss that could occur through operating projects. There seems to be an imbalance.

Dr WILLIAMS: I would not mind being able to come back to you on that because, I believe, there is some good work. What I do know is, for example, when you look at a place like Coffs Harbour and some of the resort developments on an estuary, you recognise that it is a good, healthy estuary because some private individual owns the salt marsh and has chosen because of their conservation ethic to leave it as a salt marsh whereas their neighbour has converted it to a car park. The value of that salt marsh to the resort is substantive. But our current system has no way to ensure that the resort owner can pay for those services being provided by the person who owns the salt marsh. We have had some contingent valuation work done that suggests the value of maintaining, say, a salt marsh that supports an estuary sitting on a nice blue lagoon. But I would like to come back to you with some evidence on that. Unless, Di, you can bring something to mind off the top of your head?

Ms FLETT: No, I think we will have to come back.

Dr WILLIAMS: We are certainly happy to come back because it is a very important issue.

CHAIR: Thank you very much for your presentation and your submission. I look forward to getting some information on the last question. You have raised some very important issues, particularly in that landscape approach, which seems sensible.

Dr WILLIAMS: I have left a copy of my opening statement for you. Thank you very much for your courtesy and your time. It has been a pleasure.

(The witnesses withdrew)

RALF CHRISTOPHER BUCKLEY, Professor, International Centre for Ecotourism Research, Griffith University, affirmed and examined:

CHAIR: I welcome you and thank you for appearing before the Committee today. I understand you have come down from Queensland and we certainly appreciate that. You have already provided the Committee with a short paper. Today we have received three more discussion papers, and I understand you would like these to be treated as additional parts of your submission.

Professor BUCKLEY: Yes, please.

CHAIR: You have been issued with a copy of the Committee's terms of reference and a copy of the Legislative Assembly's Standing Orders 291, 292 and 293, which relate to examination of witnesses, is that correct?

Professor BUCKLEY: Yes.

CHAIR: I draw your attention to the fact that your evidence is given under parliamentary privilege and you are generally protected from legal or administrative action that might otherwise result in relation to the information you provide. I should also point out that deliberately misleading the Committee may constitute a contempt of the Parliament and an offence under the Parliamentary Evidence Act 1901. Would you like to make a brief opening statement before we proceed to questions?

Professor BUCKLEY: Thank you very much for allowing me to appear today. My principal submission, which I understand you have, attempts to summarise all the major issues relating to conservation of biodiversity under climate change in New South Wales; but since many of the issues covered you will have discussed already with other witnesses, I will focus today on two key components: one is conservation on private land and the other is the role of the nature tourism industry. I have given you several additional submissions, which have been published in various places, relating to those two issues specifically, and there is one further submission that I will provide when it becomes free from copyright on 30 June. I understand that is acceptable.

The two key things are that of the various mechanisms available to respond to climate change so as to conserve biodiversity, the two that are the most effective and cost-efficient are to improve connectivity between existing reserves and to improve the resilience of existing reserves against climate change. The key issue for connectivity is that it will require conservation incentives on private land as well as the use of public land. The key issue for conservation incentives is that, to date, legal mechanisms for conservation on private land, such as voluntary conservation agreements, have not been linked to economic incentives, such as various Federal Government programs, and we need mechanisms to link them.

The other thing is that if you are a private landowner you do not really take anything seriously unless it is part of the income tax system, and unless the ongoing costs of conservation management are treated as a tax-deductible expense then people will not move in a large way towards private conservation. Those are the key things I want to say about connectivity.

With regard to resilience, the idea is that if an ecosystem has to be able to adapt to a new impact from climate change, one way to give it that opportunity is to reduce the impact it is suffering from other kinds of effects, such as invasive species, fires and so on. Of course, these are things that parks agencies manage all the time. It comes down to making it easier for the New South Wales parks service to reduce the other impacts on the parks estate.

My particular area of interest is tourism, both the impact of tourism in protected areas and the ways in which tourism can help to fund conservation. The key issue here is that the role for the tourism industry is outside the national parks, not inside. There are very good opportunities and good examples around the world where the private tourism sector has successfully improved conservation on private land outside parks, and on other public lands such as state forests. However, all the examples worldwide where parks agencies have tried to enter into partnerships with commercial tourism providers inside parks have ended up bad for conservation and often also bad for tourism.

I am aware that there is a degree of political interest in New South Wales at the moment in expanding the role of commercial tourism development inside national parks. I simply point out that wherever that has been tried in the rest of the world it has not worked. I do not think that it is a good idea.

Mr GERARD MARTIN: While that is the hot topic of the moment, can you give us some reasons for that?

Professor BUCKLEY: The two parks agencies worldwide that have pursued this course most vigorously are in South Africa and Quebec in Canada. In particular, in South Africa the national parks service gets about two-thirds of its total revenue from tourism, but not from commercial tour operators. It gets it by charging individual visitors when they come to the parks, as happens in New South Wales. They have recently let a variety of upmarket tourism development opportunities within their principal parks, especially Kruger National Park. However, they did not work out.

The operators bid large amounts for the privilege of being able to take up those exclusive opportunities, so the parks service thought it would get lots of money. However, the operators were not able to pay the amounts that they had offered and the operators got together as a syndicate and said, "Well, sorry, you don't get your money." The net result was that less than 6 per cent of the South African national parks budget actually comes from partnerships with commercial tour operators, and the quality of service offered to independent visitors to the parks has reportedly fallen. The parks agency no longer controls the commercial tourism infrastructure, so it is not in a position to improve it. Both conservation and tourism have suffered.

In Quebec, the entire parks service earns more than 80 per cent of its annual income from tourism. However, again it does it by charging people directly. It can do that because it controls all the foreshores. It would be like charging someone to go down to Bondi. Again, it does have commercial tourism concessions, but they bring in about 5 per cent or 6 per cent of total revenue. I can summarise examples from all over the world if you like, but the bottom line is that it always seems to be that there are very good opportunities for commercial tourism in areas of high conservation value outside national parks, but it does not work to put them inside.

Mr GERARD MARTIN: Is the issue the business model rather than a clash between private profit making and conservation?

Professor BUCKLEY: Are you asking why it does not work?

Mr GERARD MARTIN: Is there not a conflict between having private operators in a conservation area, for instance?

Professor BUCKLEY: The issue is that tour operators are there to make a profit. One easy way to make money is to get a public resource provided at the public expense. We cannot blame the operators for this, but obviously they are keen to take advantage of the country's best attractions that are well marketed through the parks service, free infrastructure, free roads, free parking and so on. If they can gain some control over visitors to those parks and the right to charge them, they can obviously make money. Why would they not want to do that?

From the parks service perspective, both the conservation management of the park and the infrastructure are publicly funded, and parks services also have requirements to make those parks available equitably to all citizens in the state. It always seems to have turned out in practice that, no matter how well intentioned people may have been when the partnership started, those two goals have ended up conflicting. On the other hand, when you have a commercial nature tourism development on private land, all the incentives are lined up. It is in the interests of the operator to earn enough money to manage that land, because they have to pay for it themselves as a tourist attraction. They cannot rely on public funding.

CHAIR: At the moment you can take a kayak down the river. I understand that the idea is to enable a private operator to take a group kayaking, not necessarily to set up private resorts and that sort of thing. Are you saying that any ecotourism in national parks is a bad thing?

Professor BUCKLEY: No, not at all. All the parks services in Australia, and indeed worldwide, have systems for licensing private tour operators in the parks. Within Australia there is an informal coordinating body, the Tourism in Australian Protected Areas Forum, which compares the details of those licensing arrangements between the states to try to harmonise them. The heads of agencies of all the parks agencies report

through the ministerial council, and they basically try to make it work fairly uniformly across the country, and it works fine.

The key issue is that those operators do not build permanent infrastructure that is privately owned. They use public infrastructure, and in some cases they pay for the right to do so, and in some cases it is free or they pay the same as public visitors. The key case, which you are probably aware of, is the Seal Rocks development in Victoria, where a large tourism developer gained permission to build a private tourism development inside a park under legal conditions that were not very well written from the parks service's perspective. Without going into the details, that ended up costing the taxpayer \$56 million, and it did not do any good for either the tourism industry or the parks service.

There are many examples around the world where, for historical reasons—for example, in many of the United States parks—there are private developments that were built in order to attract people to those parks long ago, but which do not contribute much to the parks now. In Canada there are examples where particular tour operators have negotiated very good deals from their perspectives, but when it comes back to will this help the parks agency improve the resilience of the parks, to protect biodiversity under climate change, all the evidence is no. If you are looking for policy measures that can be adopted at a state level with this goal in mind, that is not one you would pick. There are so many others that would seem to be much more likely to achieve a positive outcome.

Mr GREG PIPER: I think you have probably covered most of the things I was thinking about but I assume you have taken a great interest in the opportunities for hunting lodges to be developed in New South Wales parks under the possible legislation of the Shooters Party that has been proposed, with conservation hunting going to be a big thing in national parks. Perhaps we have a different model, with hunting lodges in there as well. I do not know whether you want to comment on that but you made a very big statement. I know it was a generalisation but I take it almost to be a firm statement, that this has not worked anywhere in the world, this use of national parks in this way. I am surprised we have not really discussed greatly models in the United States because I would have assumed they were heavily geared that way or there would have been a push for them. I wonder whether you know much about the history of the push for the use of national parks in the United States as opposed to the South African and Canadian models?

Professor BUCKLEY: Certainly. Would you like me to comment on both those issues or only the United States one?

Mr GREG PIPER: What, about hunting?

Professor BUCKLEY: Yes.

Mr GREG PIPER: Absolutely.

Professor BUCKLEY: I am not familiar with the details of the proposal for hunting lodges in New South Wales.

Mr GERARD MARTIN: There is not one.

Mr GREG PIPER: I was being flippant. There is potential for changes to legislation—

Mr GERARD MARTIN: To allow people to hunt.

Mr GREG PIPER: I was being facetious about hunting lodges, I am sorry.

Professor BUCKLEY: There are significant problems with feral animals in many parks throughout Australia, and it has been an ongoing issue whether feral animal control should be carried out by parks staff, which is a cost to the public purse, or whether it should be subcontracted to private hunting groups, which does happen, for example, in some areas in New Zealand. The details of whether or not it is good—it is one of these the devil is in the detail thing. If large-scale private hunting lodges were constructed in New South Wales national parks ostensibly to control feral animals, that would be used as an excuse for tourism infrastructure in the way that I have just been describing which has not tended to work. If the parks agency decided to run a particular program of feral animal control in which it invited appropriately pre-qualified private hunters to join

it, I do not see that that would be a problem. The same issue occurred in the Northern Territory to a large degree, for example.

If we turn to the United States model, they call them concessions, and the idea there is that certain aspects of tourism infrastructure in United States national parks are leased to private operators. There are two different scales historically. There are some of the large western national parks where the parks agency 100 years ago or more was concerned to attract people to the parks and to provide infrastructure, and they granted concessions to some large tour operators to build hotels inside national parks—Glacier National Park, for example. They have not done well out of those because they granted the leases at peppercorn rentals because it was part of their intention at the time. In fact, they renegotiated all those a few years ago and increased those rentals greatly. I am not sure whether they were hearings or lawsuits but there is a famous statement by some lawyer giving evidence to such an inquiry that there was no compulsion on the parks service to operate only the unprofitable parts of its portfolio. In other words, if there was profit to be made, if it was feasible for a parks service to raise part of its revenue through charging tourists, why should it not do it directly? Why should it give away that opportunity to the private sector?

However, those large lodges are not at all common in United States parks. What is common are campgrounds and facilities like that, leased concessionaires. The key thing is that it is the parks service that decides where the campground is going to be, what it will look like and what the rules are as to how it will operate. All they do is grant a private individual the right to operate that campground during the season and keep the money. Since most of the individuals concerned are retired and they see it essentially as a community service and social opportunity, those individuals are very much in line with the overall parks service philosophy. They are not there to construct a huge business out of running parks service concessions. So, there has not proved to be any problem with that kind of model. But that is very different from allowing a large-scale private development inside the park which then has shareholders and people who need to make money out of it and there are consistent commercial pressures.

I carried out a review for what is now TTF Australia, the Tourism and Transport Forum Australia, in 2004, looking at opportunities for the involvement of the private tourism sector in funding infrastructure within parks. We concluded there were three types of circumstances under which it could be a good idea. So, these are the exceptions, if you like, to my general rule but they are quite restricted. One was where a particular kind of infrastructure is needed to be able to view the attraction—infrared cameras or underwater observatory or things like that—which were not going to be built by the parks service but which a private tour operator might choose to build. One was where the parks service was responsible for managing heritage buildings, which was a cost on the parks service budget, and by leasing those buildings to a private operator it could keep the buildings in existence but not have to pay for their upkeep. There are successfully examples of that in Victoria and New South Wales, a number of which you are probably aware of.

The third one is if the parks service for its own management aims would like to distribute visitors more widely than currently occurs—so if all the visitors stay in a small area of a large park and the parks service would like to see some of them go somewhere else—there are examples where it is in the interests of the service to provide opportunities for private development in the more remote areas, but only if those facilities are also available to members of the general public. That approach has been used in the Northern Territory to some degree. There is no blanket statement that tourism investment should never be allowed in national parks. Obviously tourism is a major user of national parks. It is very much a question of how it is done and what kind of development.

Mr RAY WILLIAMS: It almost sounds as though the model and accountability are the things that are wrong, not so much the concept. You are saying it is not so much that it should not ever happen but everything you have raised seems to be around the actual modelling that they come up with. Maybe that has been purely for profit and that has been where it has been let down. Just going back to what Greg was suggesting before, the proposal that will come before us soon in relation to hunting in national parks even proposes to breed and release exotic species into the park for hunting. It is almost like cane toad revisited. It is extraordinary.

Professor BUCKLEY: It is a very remarkable proposal and not one I would support. We have enough trouble with exotic animal species already without having to release any further ones. Let me refer back to a piece of work I did a few years ago where we constructed a database of all nature and adventure tour operators in the entire country, which was between 2,000 and 4,000, depending on how you define them, and we look to see what land they used. This was the entire outdoor Australian tourism industry.

We found, as you might expect, that some use the national parks, some use state forests and some use private land. The interesting thing is that, generally speaking, the larger and more profitable operators operate on private land where they can build things the way they want and they can provide a high level of service that will attract high yield tourists, as they call it in the industry. What they do is they build in areas—they buy or lease the land, which is adjacent to a national park, which has a conservation gain in that it extends the area effectively used for conservation.

It gives them the opportunity to control how they operate very closely and their visitors can also go into the national park. Cradle Mountain Lodge in Tasmania is a good example of that. It is nearby; everyone goes to the park but they stay in the lodge. In South Africa the most successful examples are places like the Sabi Sands area where there is an extra 65,000 hectares of park essentially that is privately owned and operated as a bunch of private tourism lodges. It is adjacent to Kruger National Park and animals move freely between the private and the public area. The private operators can do what they want in their area and they make a lot of money out of it and in the process they effectively extend the area of the park.

The example that I was describing before was where the Kruger parks service itself wanted to provide opportunities for private tour operators to develop inside the park. The reason they did that was they were jealous of Sabi Sands. They thought, “Well, these guys are making so much money out of the same wildlife that we have. Why don't we do that too? Why don't we take some remote areas and invite these guys to come and build operations there?”

But the thing is that it takes a very long time for a new, upmarket tourism operation to become known and profitable. The places in Sabi Sands have been operating for 50 years and they have a very strong international brand recognition. People are prepared to pay premium prices to go there, whereas if you start a whole new operation, it takes a long time for that to happen and, in the meantime, there are impacts; there are costs on the parks service. If the tour operators are not making any money, they will not be happy and nobody wins.

Mr GERARD MARTIN: In relation to biodiversity being important for protecting the environment, it is also important to sustain the attraction of national parks from an ecotourism point of view. Are you conversant with the national parks legislation in New South Wales and whether it is adequate in that area?

Professor BUCKLEY: I do not feel that I can answer a question on the details of the parks legislation.

Mr GERARD MARTIN: Could you speak to the general principle of it? Are we doing enough to protect biodiversity generally and to promote ecotourism, for no other reason?

Professor BUCKLEY: If you would like me to comment on the details of the actual wording of the legislation, I would have to take that question on notice. But in terms of how things operate in practice at the moment—

Mr GERARD MARTIN: Yes.

Professor BUCKLEY: Yes, I would say that there is a good balance at present between conservation and recreation and tourism use in New South Wales; that it is recognised that the primary function of the parks and the parks service is conservation, but that public recreation provides us with a high social value. It helps to maintain the health of our communities. It has been shown in various parts of the world that if people go to parks their medical expenses are reduced. If the medical expenses are met from the public purse, you should encourage people to visit.

This is why the Victorian parks service are all about Healthy Parks, Healthy People. That is their whole slogan. There was a case in Canada a number of years ago where there was a sufficient level of uncertainty as to the relative priority of conservation and recreation in the parks that the national government actually changed its legislation to clarify that the principal purpose of parks was conservation and that that goal should take precedence over any other use and management of the park.

I think that there is considerable concern about proposals that in New South Wales the opposite might occur, where suggestions have been made that legislation for the New South Wales parks service should specifically include tourism. Suggestions have been made that this would not change anything but, of course, that is not true, because if it were not going to change anything, why would you do it? If legislation specifically

says that commercial tourism is one of the approved uses of national parks, then I think we can be very sure that commercial tourism in parks would grow very extensively.

As I say, evidence from around the world has been that that has not been good for conservation; it has not been good to the primary conservation function. If we are looking particularly at conserving biodiversity under climate change, I think we have to give our parks the best shot they can have, and that means reducing the impacts from tourism rather than increasing them. As part of the tourism industry I am strongly in favour of extending the nature tourism industry in Australia and in New South Wales. I estimated in my submission it is worth somewhere around \$6 billion a year to this State. I think there are enormous opportunities to extend the outdoor nature tourism industry. I just do not think that those opportunities should involve private permanent infrastructure development inside national parks.

Mr RAY WILLIAMS: One of the things that is consistently raised with me is from—not so much the greying retirees—but people who predominantly love their outdoors and their camping, the fact that they cannot even drive through many of our national parks any more. That is pretty sad, given that we have some of the most pristine areas that once upon a time you could drive through, albeit by a four-wheel-drive. I suppose, when you conjure up images of four-wheel drives, you have people ripping around tearing the place up. But the fact is, there are also very responsible people who would simply like to have access to drive through these areas but many of them have been closed up.

Professor BUCKLEY: You are absolutely correct, that there are many people who would like to enjoy the outdoors using a car-camping approach. In fact, such opportunities are provided for in the state forests quite extensively. The state forests have benefited in a sense, in that the parks have been allocated for low-impact, generally foot-based recreation only, and that people who want to take pets, light fires, or drive four-wheel-drives generally are not allowed in the parks. The parks are not very big; many of them have quite difficult terrain, they generally do not have very many roads except for fire trails, and I think it is probably not generally a good strategy to try to open the parks to four-wheel-drive use.

In some other parts of the country—for example, in the outback areas—foot access is not feasible and four-wheel-drive access is the only approach. But that is not true in very much of New South Wales, except out around Tibooburra and so on. However, we do not use our state forests for tourism nearly as much as we should. It has been pointed out many times that the economic value of many of our forests is much higher for tourism than it is for timber production. But our forestry commission would say that it is not their responsibility to make tourism opportunities available; it is their responsibility to make timber available. So, in a sense, one of the key opportunities to expand the nature tourism industry in New South Wales and the rest of Australia does not lie in the hands of either the tourism industry or the parks industry; it lies in the hands of the forestry industry and the state forests.

If I were looking at what legislation might be changed to promote nature tourism in New South Wales, that is the component I would be looking at. Again, I would use the United States example where nearly two decades ago now the United States Forest Service realised that it was making—and I forget the exact numbers—orders of magnitude more from tourism than from logging. Essentially, it shifted its entire mindset from being a timber-producing government agency to being a tourism provider. Partly this is because all the big ski resorts in the United States are in Forest Service land, so they make a lot of money out of that. But also it is because large areas of the United States Forest Service land are set aside as United States Forest Service wilderness, which is essentially managed in the same way as the national park.

If you are a visitor, or if you want to go hiking or whatever, it does not make any difference to you really whether you are in Forest Service wilderness land or parks service land. We just have not adopted that approach at all in Australia, but there are enormous opportunities to do so. In Western Australia and in Tasmania, when the conservation and land management departments built tourist attractions they found that they were very heavily patronised, more heavily than they had anticipated. These are these treetop walks and so on. I think there are enormous opportunities for that in New South Wales as well.

Mr GREG PIPER: Are you saying, to the exclusion of logging, for example, or are you suggesting that there is harmony that can still be had within the state forest reserves for logging for timber-getting and tourism?

Professor BUCKLEY: I think we have to recognise that timber is a valuable product, one that can, in theory at least, be sustainably produced, and that if we do not produce it here we will import it from somewhere

else. I think we have to acknowledge that, and state forests are expected to produce timber. What that timber is used for is an important issue. Historically we have tended to use our forests for export wood pulp, which has not been a very value-adding approach. I had a graduate student who looked at the economics of this some years ago and found that it would be possible to increase the value of timber sales enormously if the same timber were used for higher-value uses.

It does not usually work to try to put tourism and logging in the same place physically. There have been suggestions within the timber industry that tourists want to see what they call working forests, which means forests being cut down. But tourists do not want to see that, they really do not; they want to see forests still standing. I think that if the state forests were to adopt tourism as a mainstay of their annual revenue, they would have to think a lot more carefully about what areas they were going to use for tourism and what areas would be used for timber production. But that does happen in other countries—as I say, in the United States particularly, and in some parts of Canada also—and there is really no reason why it should not happen here as well.

Mr RAY WILLIAMS: I wonder if there is an opportunity there for any of the forests that adjoin parks, where there might be some bipartisan arrangement where you might be able to traverse the forest and also obtain the beauty of the park next door.

Professor BUCKLEY: Absolutely. Certainly if we are talking about improving connectivity for conservation and biodiversity under climate change, the most obvious lands to use for corridors are large areas of state forests, which intervene between the existing parks. I would be strongly in favour of reducing the level of logging in those areas and looking towards moving them towards a conservation and tourism recreation land use in future.

There are some examples. In Nightcap National Park, for example, there is an enclave of land owned by New South Wales state forests which is operated entirely for tourism; there is no logging there. Rummery Park, I think, is the name of the camp, and you can book to go and stay there. That is only a small area, but that model could easily be applied across the entire State. Some of the most beautiful landscapes, as our forestry industry will tell you—some of the most beautiful waterfalls, some of the most beautiful camping spots—are inside state forests, and there are certainly very good opportunities for tourism in those areas.

Mr GERARD MARTIN: In relation to renewable energy, would you see it as not being in the best interests of ecotourism to co-locate, say, wind turbines in either state forests or national parks?

Professor BUCKLEY: That is a more difficult question. There are many different environmental issues associated with the siting of wind turbines—which, I guess, we should not go into at any length. But, in general, they are unlikely to be placed inside forested areas, for the obvious reason that you would have to build them much bigger than in an open, grassed area. I think it is probably not very likely that we would see large-scale wind turbine development inside a forested part of the country, do you not think?

Mr GERARD MARTIN: It is an issue in my electorate, the Central Tablelands, which includes Bathurst.

Professor BUCKLEY: But this would be in agricultural areas, more than in—

Mr GERARD MARTIN: There are a lot of state and private forests there, and a lot of those areas are being mapped by the Sustainable Energy Development Authority as being suitable for wind turbines. Given that the new generation wind turbines are 150 metres high or so, the general principle is that that would not be conducive to people wanting to have a look at a pristine area, even though the same people would be the ones who usually would bang on about the use of renewable energy.

Professor BUCKLEY: You are perfectly correct, that large-scale turbine farms generally are not very attractive to tourists, for a variety of reasons. Noise is one, visual impact is another, and what they call flicker—the fact that the blades are rotating and they produce a strange light. All of those things mean that people do not generally want to have their holidays underneath a large collection of wind turbines. The other thing is that to build any very large structure like that, whether it is a gondola tower, a wind turbine, or whatever, you need to get access on the ground generally; it is much more expensive to do it all by helicopter. If you have an area that is of high conservation value, you would not normally want to put in new infrastructure just so that you could build a wind turbine there. It seems to me that we have plenty of areas in the Tablelands which are already

cleared and would be suitable for wind energy generation, and it would not seem to make sense to put them inside—

Mr GERARD MARTIN: Certainly by private people who do not want them there, for whatever reason. That is a different issue.

Professor BUCKLEY: But that is a question of incentive, is it not? If you are an agricultural landowner and you can make a certain amount of money out of farming, and you can be offered a significantly higher amount of money for permitting wind turbines to be built, people will do that.

Mr GERARD MARTIN: It is not the farmers who are the problem; it is the new generation of tree changers. But that is another issue.

CHAIR: With regard to your tax proposal, obviously that is in the domain of the Federal Government.

Professor BUCKLEY: Absolutely.

CHAIR: Obviously, people now invest in forests and they claim it as a tax deduction because they do not see any profit for many, many years, if at all—as happened with the big one that fell over just recently.

Professor BUCKLEY: There have been a number, I understand.

CHAIR: How would that work in conserving an area that in the longer term would not return any profit because you would be leaving it as it is?

Professor BUCKLEY: Yes, these proposals originally came out of some work we did on farm tourism many years ago, where we were looking at the development of tourism operations on private landholdings and we were looking at the degree to which those landowners also engaged in private conservation activities. Some of them, as you say, are tree changers—they have external sources of income—and some of them are long-term farming families and they rely entirely on that land. Those two groups of people need different incentives to put their land into conservation. But the key issue that came up over and over again is that conservation costs money from year to year. That is why the parks service has to have a budget; otherwise, if conservation did not cost anything you would not need to have a service to manage the parks.

The Federal Government's legislation provides for a capital loss to be claimed as a deduction if you put a portion of your land into a voluntary conservation agreement [VCA]. But it is quite difficult to claim that and the tax department might change their mind about it later, and blah, blah, blah. It does not cover the fact that you have still got to spend money on that land, year after year after year. If you keep your land as primary production, then even if you are making a loss from primary production all your ongoing management costs are tax deductible. If you are a tree changer and you can run a primary production property at a loss, you can offset that loss against some other source of income. But if you put that land in conservation and the far as the tax department is concerned it is not a productive use, those identical costs to do identical things on the ground cease to be tax deductible.

I guess what I am saying is that if we are serious about involving private landowners in conservation—which I think certainly is the case in most states and more recently at the Federal level—then you have to recognise conservation as a land use. That is something that could be done at the state level because state governments control land tenure. But once conservation is recognised as a land use—that already occurs in New South Wales through the land tax system, where if you have a recognised VCA you do not have to pay land tax—the next step is that the Federal Government tax system needs to equally recognise conservation as a land use and accept that ongoing conservation management involves a cost.

I originally made these proposals to the previous Federal Government in my former role on the Biological Diversity Advisory Committee, a Federal committee advising the Federal Minister, and received a response from the Treasurer at the time saying that nothing was tax deductible unless there was an income for it to be deductible against, which is the issue raised. However, if we acknowledge that conservation management can generate income either through government incentive schemes, through opportunities for tourism or by increasing the value of land for re-sale, then in the longer-term sense—even if conservation does not generate cash in a particular year—it seems to me that it is not a fundamental breach of tax principles that the management costs of that should become a deductible expense.

The issue is that governments raise taxes for two reasons: they need money, and they design taxes to influence how people behave. Because of the first, they are always reluctant to grant any additional grounds for tax deductibility because it is a reduction in revenue. But if the Federal Government, as has been stated in its recent National Reserve System Strategy 2009-2030—I may have got the title wrong—is keen to involve private landowners in conservation, and there are some quite large targets for that, it will only happen if conservation is treated as a serious land use and ongoing management costs are made tax deductible.

CHAIR: Thank you for the depth of your submission. Will there be another one after 30 June?

Professor BUCKLEY: It says the same thing.

CHAIR: Thank you also for your evidence. The Committee appreciates your input in this Inquiry.

(The witness withdrew)

(Short adjournment)

MEHREEN FARUQI, Manager, Environmental Services, Mosman Council, Mosman Civic Centre, Corner Spit and Military Roads, Mosman,

JOANNE KAREN TULAU, Project Leader, Community Education and Climate Change Mitigation, Pittwater Council, PO Box 882, Mona Vale, and

KIM CASWELL, Biodiversity Officer, Pittwater Council, 1 Boondah Road, Warriewood, 2101, affirmed and examined:

CHAIR: I welcome representatives of the Shore Regional Organisation of Councils. Thank you for appearing today to provide evidence. The Committee also thanks the Organisation for its submission to the Inquiry. I am advised that you have been issued with a copy of the Committee's terms of reference and a copy of the Legislative Assembly's Standing Orders 291, 292 and 293, which relate to the examination of witnesses. In what capacity are you appearing before the Committee?

Dr FARUQI: I am representing the Shore Regional Organisation of Councils.

Ms TULAU: I am here with the Shore Regional Organisation of Councils.

Ms CASWELL: I am the Biodiversity Officer at Pittwater Council.

CHAIR: I draw your attention to the fact that your evidence is given under parliamentary privilege and you are generally protected from legal or administrative action that might otherwise result in relation to the information you provide. I should also point out that any deliberate misleading of the Committee may constitute a contempt of the Parliament and an offence under the Parliamentary Evidence Act 1901. Would you like to make a brief opening statement before we proceed to questions?

Dr FARUQI: Yes, I will do that, Mr Chair. I will quickly set the scene for the submission made by the Shore Regional Organisation of Councils [SHOROC], comprising Mosman, Pittwater, Manly and Warringah Councils. The submission that was put to the Inquiry was prepared in consultation with council officers from all those four councils and approved by the General Managers of the four councils. As you are already aware, climate change is predicted to have many unprecedented impacts and also some impacts which have been studied for a while. In our inquiry we focused on threatening processes other than climate change which we can address to increase the resilience of biodiversity in the flora and fauna in our local communities.

I might take you very quickly through some of those challenges, the first one being pressures applied through urban development. From the perspective of the SHOROC submission, those pressures can be released or addressed through stronger planning controls. By those stronger planning controls, we have particularly spoken about Local Environmental Plans [LEPs] and Development Control Plans [DCPs] which allow councils to protect bushland areas. A recent example in the new LEPs is that some of the bushland area has been classified as open space, which reduces its level of protection. Also, we wanted to focus on protecting biodiversity corridors and establishing new corridors. So with climate change, when species need to migrate to other bioclimatic regions they have that corridor to go through to migrate and be protected.

The other one was weed control and weed management. We have focused particularly on other State organisations and authorities such as the RTA [Roads and Traffic Authority]. With stricter controls in terms of the RTA and action they could take on weed control, it shifts the onus at source to upstream, rather than downstream to our council areas and the SHOROC region. A lot of funding and investment has to be made to continually get rid of those weeds and address those issues. A couple of other points Joanne will talk about later is where we are at with community education about not only the importance of protecting biodiversity and how climate change is going to impact on it but also taking action to protect that biodiversity.

The fourth and key issue is about data collection and monitoring. In a lot of ways councils are strapped for funding in terms of monitoring, vegetation mapping and, I guess, monitoring the key ecological communities. I would like to add there that, while I have mentioned ecologically threatened communities, it is not only the threatened communities that we would like to see protected but also investment put into other bushland areas which might not be threatened now but which can be made stronger to allow for threatened species to be protected through those areas and to move to other bioclimatic regions. I will stop there and let you ask questions.

CHAIR: Your submission mentions that certain policies and activities of State Government bodies threaten the resilience of ecosystems because they do not recognise biodiversity or they have no or little weight compared with other objectives. Could you explain more specifically what areas you mean?

Ms TULAU: Where exactly are you reading from?

CHAIR: It is in the “Matters for attention of the inquiry” under “Unintended consequence of policies and activities”. You talk about the Metropolitan Strategy targets.

Ms TULAU: Can I context this submission by explaining that it was drawn together by a range of different council officers beyond the three of us here? So there has been input from all four councils, and a range of officers have contributed their comments. It is an amalgam of views. We are not necessarily the ones who are expert in the particular issues that are in the submission. I am not so across all the planning issues; I have not worked on that side of things before. But I think the issue there really is that there is so much pressure now from urban development that biodiversity can get left behind, as something that is not necessarily given the same weight as housing the people. And so it becomes a death by a thousand cuts for biodiversity in regions and habitat loss, which is critically important. So I think the thing is simply to ensure that biodiversity conservation and all the issues around it are factored as far as possible into the thinking at the very beginning. I commend this Inquiry for putting biodiversity conservation so clearly on the map and upfront in terms of thinking about the impacts and the adaptation that is going to be needed.

CHAIR: Do councils already have a practice of setting aside wildlife corridors and riparian zones in conservation areas?

Ms TULAU: We do. As to wildlife corridors in Pittwater—it is the same for the other councils but I can speak for Pittwater—the establishment of wildlife conservation and habitat corridors has been a critically important priority from the very beginning of Pittwater Council, which was created in 1992. Mapping the wildlife corridors was conservation strategy number one. It was always there on the map but the funding, I suppose, is always difficult. Council has done what it can conceptually, being clear about the need to design connectivity into the landscape and ensure the wildlife corridors. But then to actually make that happen in the face of pressures from infill development—it is death by a thousand cuts. Many of you would know that trees come down for views and there are endless pressures on vegetation, but wildlife corridors are a very important priority.

Dr FARUQI: Could I just add to that? Councils have these policies but sometimes they are overridden by State policies. That is one of the issues that has been raised in our submission. Sometimes smaller pocket parks might have remnant vegetation, which would be suitable for a corridor if maintained and established further, but those are not environmentally protected zones. So council laws might not hold there if, say, the Metropolitan Strategy for target dwellings in that particular area might need that area to be zoned for development. Those council policies can easily be overridden by State zoning policies.

CHAIR: In my area on the Central Coast—I am in Wyong shire—we have some developments happening, but the conservation requirements are extremely strict and a large percentage of land has to be set aside. The amount of developable land is much reduced. Would you not have the same requirements in your area?

Dr FARUQI: We absolutely do. Some of the areas are set in stone; they are conservation areas and no development can touch them. We have more concern that with climate change the smaller remnant parks will become really important as wildlife corridors and for the migration of those species and that those bushlands, which might not be threatened ecosystems at the moment, need some sort of protection.

Mr GERARD MARTIN: Do I take it from that—pardon me, I am from the Bathurst area—in Mosman you still have land for development? I would have thought you were at saturation point.

Dr FARUQI: We are pretty much at saturation point but there is still room for people to renovate and make houses bigger.

Ms TULAU: In Wyong and many parts of the State that are not already deeply urban as we are there is room for large areas to be set aside as conservation areas while planning a greenfields development. That can be

done upfront. In our particular SHOROC area I suppose Mosman is more urbanised than Warringah or Pittwater; we still have bushland areas but in those areas the parks are small, there is lots of urban-edge effect issues, and, as Mehreen was saying, an area might be critical for very local biodiversity conservation. Things go extinct bit by bit in area after area. A small piece of habitat or a set of connections might be critically important to the species at the local level but it might be so small that the bigger helicopter view instruments cannot necessarily capture their importance for the very, very local level, and without a way to recognise it it becomes more difficult for the people trying to stand up for the values of that bushland because it is seen as quite inconsequential.

CHAIR: Have the councils undertaken a mapping program of remnant bush, et cetera, and identified the conservation values?

Ms CASWELL: Gradually we are getting vegetation mapping done for Pittwater. I think Warringah has had theirs done. I am not sure about Mosman. We just have not had ours completed due to funding, but hopefully next year.

Mr RAY WILLIAMS: You still have access to all the satellite images of DECC [Department of Environment and Climate Change]?

Ms CASWELL: Yes.

Mr RAY WILLIAMS: They do not suffice?

Ms CASWELL: You mean in fragmented bushland and that sort of thing?

Mr RAY WILLIAMS: Yes.

Ms CASWELL: We do have mapping layers, and I am not sure if they have been supplied by DECC or if they were done in-house. I would have to check that.

Mr RAY WILLIAMS: I understand that you are saying that other people have had some involvement in this apart from yourselves. I refer to the comment that development needs to be accommodated in existing development footprints apart from the urban sprawl, as you talked about before. Has the Sydney metropolitan not done that with a plan to put 500,000-plus dwellings in infill development sites? I have to say it is not a plan I support. I would much prefer to see some more of your so-called urban sprawl. I think the biggest problem that we have when people talk about urban footprint is that they fail to come out and have a look at where the urban footprint is happening. The fail to have a look at some of the work of the councils in those areas and in those new-growth areas. I refer to the work that they have done in working in the riparian zones in the sensitive areas, in putting your more sensitive areas into your parkland so that they remain biodiverse areas whilst you have a parkland next to it.

We have some great compromises out there, and I am talking about none other than The Hills shire, which I was involved with for some years. Some of the development out there has been very good. The balance that has to be addressed between development and the interface, in particular, with sensitive areas is addressed through sometimes a higher density and then getting a much better environmental outcome. I would put that council up on a pedestal in the way that it has conducted itself, particularly over the past 15 years, in getting those outcomes.

People talk about this urban footprint and the massive increase. I do not know how long it is since you have been out to the Rouse Hill area. I have lived there all my life. I can tell you that I can measure the urban sprawl in kilometres on one hand that has happened in my lifetime, since I have been out there. I am only halfway from Sydney to the Blue Mountains. There are 40 kilometres to go before you get to the foot of the Blue Mountains and there are rolling hills that have not got a stick or a tree or blade of grass on them—some of the worst farming and grazing land that you would ever find. We have produced it into better biodiverse value through development that has happened in that area. I suggest you get a better outcome through development than perhaps you do sometimes in not developing.

Ms TULAU: The Rouse Hill development is obviously a gold-star case study in doing it well and doing it right, ensuring that better biodiversity conservation outcomes are designed into the development in the beginning. I suppose the sprawl has a connotation of rolling over the landscape without thinking, whereas the

difference you are talking about there is that high-quality thinking and planning and strategy have gone into it from the beginning to design the biodiversity conservation in. To some extent we are speaking here not on behalf of local government or everywhere in the State, because each local context across the State is going to have a different set of circumstances, is going to have different implementations, is going to be different. So we being from SHOROC are speaking from a SHOROC officer point of view only, and the sprawl in our area is what has put our diversity under pressure.

Mr GERARD MARTIN: In relation to monitoring the ecosystem or biodiversity—I know there is some comment in your submission about it—what level do you see is best to effectively monitor progress? At the local level, at the State level or at some independent level?

Dr FARUQI: We think that both at least the local and the State level need to monitor and need to have their indicators of monitoring aligned. I have had a lot of experience in the State Environment Protection Authority at both the State and local level. One of the issues is the misalignment of indicators, and you never get the whole picture because what is monitored at the local level might not match up with what is monitored at State level. But there have been some very successful community monitoring programs as well. As you know, monitoring requires a lot of resources if we want to do it properly and get some good sense out of the data. We think it is a collective exercise; that it needs to be done at local level and State level. It should also involve other consultants in the monitoring of biodiversity because it is a huge issue.

Kim mentioned the issue of what you were just talking about in terms of development. In certain metropolitan areas, yes the State Government has specific targets for dwellings, but given the implications of climate change, especially in the SHOROC area with predicted sea level rises, those number of dwellings that I think are required will need to be increased. That is another pressure that comes along on biodiversity. If those people would still live in those areas, obviously more land will have to be made available for those dwellings.

In terms of monitoring, if we do not know at our local level—I know that Mosman has said there are not too many funds available, or to SHOROC in general, for monitoring—we will not be able to determine which areas to save and which to develop further.

Mr GREG PIPER: In your submission obviously you are raising a lot of issues that perhaps are not global, but they are statewide issues to do with State legislation and State responsibilities, including issues about planning controls, Local Environmental Plans and the impact of some of the major State landholders. I assume the Department of Lands has an involvement there, as do some reserve systems, such as the Roads and Traffic Authority roads network. You were talking about the incursion of invasive exotics. Just in relation to the question Ray asked and your mapping of flora and fauna, am I right to assume that you do not have that ground-proofed, if you like? You are not at that stage? Can I just ask whether you have like a Ramsar environmental management strategy program? What stage are you actually at?

Ms CASWELL: So far we have endangered ecological communities. They are not ground-truthed, but just desktop aerial mapping. It is written into the Pittwater strategy to have it done by the end of next financial year, but I do not know about others.

Dr FARUQI: I think each council is different in that sense. But SHOROC at the moment is developing a regional strategy to look at all aspects of the environment planning and development. I think we are half way through that. We are hoping to put in for some more funding to the State Government. We are hoping to have that completed by the end of the year. That will give us a much better idea of those sorts of issues.

Mr GREG PIPER: You are not under a Catchment Management Authority [CMA] are you—or are you?

Dr FARUQI: We are, actually. Sydney Metro.

Mr GREG PIPER: It is still under Sydney Metro, is it?

Ms TULAU: Sydney Metro is the CMA, but for all the councils except Pittwater, which is in both, Sydney metro CMA is south of Warriewood. So it runs from Warriewood and south. From Warriewood north, there is a ridge line from there up—north up through Mona Vale and Palm Beach—which is the Hawkesbury-Nepean CMA.

Mr GREG PIPER: Just on planning controls, the model Local Environmental Plan is obviously an issue for you. Have you made submissions specifically on the issues of concern as to the inflexibility? Obviously there are questions that you are raising in your submissions particularly about some smaller reserve areas that cannot be provided with the appropriate status, which would obviously be a conservation status rather than a reserve or recreational zone.

Dr FARUQI: Our LEP? I know that Mosman's LEP is going on exhibition soon, so Mosman's planners are having a conversation with the State Government's Department of Planning on various issues, but I would not specifically be able to tell you whether this was part of that. I presume that it is.

Mr RAY WILLIAMS: Dr Faruqi, I agree with your comments regarding the State powers overriding local councils, especially in relation to State environmental planning policies. It makes a bit of a farce out of your Local Environmental Plans and it certainly makes a larger farce out of the standardised LEP that Greg has just spoken about. We have a situation at the moment where one of the most significant floodplains in the north-western areas, which has been flooded by two or three metres of water each decade for the last 50 years, is now subjected to a massive business park that will be filled with anything up to six or seven metres of fill. A business park will go into that particular area. You, I, or anybody else in our area could not put a garden shed in that area or a wheelbarrow full of dirt, but the State can override that and do it. I think it is a disaster and it just smacks of hypocrisy.

Mr GERARD MARTIN: Is that a question?

Mr RAY WILLIAMS: If the Doctor would like to answer it, I would be more than happy for her to answer.

Dr FARUQI: I guess we pretty much stick to that position—that it can override, and it can override a lot of good work that local councils do.

Mr RAY WILLIAMS: A hundred per cent.

Dr FARUQI: I would be in a similar situation. I used to work up in the Hastings area, which also had floodplain issues. Again, it was a similar story there as well.

Mr RAY WILLIAMS: Getting back to the crux of that, when you have sensitive areas there that you have worked hard to protect and achieve outcomes for, you would hate to think that down the track someone could build an apartment block on those particular areas that you have worked so hard to retain. In that sense, if State environmental planning can override those acts, then that is a disaster for the future.

Dr FARUQI: Hence our submission calls for stronger planning controls in those areas because they are aligned with local government.

Mr RAY WILLIAMS: That is true. That is right.

Mr GERARD MARTIN: In relation to the issue of approvals right on the coastline, we are seeing a lot of problems now with the erosion of beaches, et cetera. We had a group that made a submission to us some time ago. I thought it might have been an association that was looking after coastal councils that you are in. Are you involved in that?

Dr FARUQI: The Sydney Coastal Councils, do you mean?

Mr GERARD MARTIN: That is it, yes.

Dr FARUQI: They could have made a submission. I was not working for this council at that time.

Mr GERARD MARTIN: But your councils would have been part of that.

Ms TULAU: Yes, our councils would have been part of that.

Mr GERARD MARTIN: Have there been any outcomes from that? Do you see that as something that should be part of State planning legislation or left to local councils, which in the past has been the case although we might be paying a bit of a price for that now, with the benefit of hindsight?

Dr FARUQI: My position is that it needs to be an integrated effort, so it cannot be left to local councils or to the State Government. It needs to be a joint initiative and linked together. In terms of sea level rises, the work of the Sydney Coastal Councils would be that they have been going around to various councils and talking about it and presenting that work, but I am not aware that it is fully integrated with State policy at the moment.

Ms TULAU: I guess that is a little bit outside of the context of this particular submission, if I understand you rightly. You are talking about shoreline recession and the implications.

Mr GERARD MARTIN: That can have an impact on biodiversity though.

Ms TULAU: Yes.

Mr GERARD MARTIN: Marine biodiversity particularly.

Ms TULAU: Obviously, in relation to biodiversity in the coastal zone, climate change and the projections are going to have serious impacts on marine biodiversity. Rock platforms and the aquatic organisms on rock platforms are an area that Pittwater Council has been involved in for a long time through education and trying to engage the community as stewards around the intertidal rocky shore. Those areas probably will be impacted very seriously. Other areas of the intertidal zone that are of concern are the estuarine side of things, with coastal salt marshes an endangered ecological community in our area.

The issues there are that there is sort of nowhere for those. Under circumstances that did not involve urban development up hard, those communities would be able to retreat, migrate and move somewhere else, or follow other tributaries up, or recolonise in different areas. But now they are going to come up hard against people's seawalls. People will start trying to protect with hard structures. The issues there are questions such as: should shorelines be able to plan to recession, basically—moving of structures and people? These are some of the issues. They are not answers.

Vegetation communities, like coastal salt marshes, will become extinct unless there is somewhere they can move to. In order for them to move, the space will have to be made. In our area, Careel Bay is an important area. The adjacent land uses are recreation zones. It may be that councils will come down to a choice of letting the salt marsh retreat onto the playing fields and trying to find somewhere else for the playing fields. Issues to do with people's homes and other hard structures will be more problematic. But aquatic biodiversity will face big challenges. An important theme cutting across all these areas that is of particular concern to me is community education, understanding and engagement. It goes in every direction. I heard this morning on the radio that a Federal senator has been looking into these matters and is not convinced about the science of climate change. Lots of people in the community—

Mr GERARD MARTIN: That sounds like Barnaby Joyce.

Mr GREG PIPER: No, it is Stephen Fielding.

Ms TULAU: Lots of people in the community have doubts as well. I was speaking to somebody recently who is an expert in bird biodiversity who has been out to the regions of the State talking with farmers who, again, are not necessarily convinced that this climate change thing is real. If this lack of understanding is going to throw up lots of barriers, at a time when it seems that things galloping along fairly quickly in terms of the changes that seem to be appearing in the real world, then people will need to be a bit nimble footed and to be able to move more quickly.

If the lack of commitment or understanding is a problem, it is critical to invest in understanding what those barriers are in people's recognition that this issue is real and to find ways to respond to the concerns of ordinary people who are not climate scientists. It is terribly complicated and people do not necessarily understand the nature of science and the way it works. We must find ways to work with people and to help them to understand the issues and to come to a position where they are able to move forward. That is critical. I do not

think we are there yet. People in my own family are not really convinced. It seems to be so accepted that many people in the community are probably not game to say that they are not really convinced.

Mr GERARD MARTIN: Are you familiar with the draft biodiversity plan and do you have any comments on it?

Ms TULAU: I have seen it, but I have not been deeply immersed in it. Anything that looks at putting biodiversity up front in relation to climate change is a fabulous thing. For example, a Federal inquiry was recently conducted into whether or not Australia should establish a sustainability charter. Biodiversity was not one of the terms of reference. I saw that as a lack. One of the community groups I work with made a submission pointing out that biodiversity was missing. Having biodiversity up front and considered is very important. It is good that the document has been released and that the issue is being thought about. Adaptation is very difficult and no-one has all the answers. People need to have their thinking caps on, to be of good heart and to move forward. We must work it out together. Sustainability is a learning journey and we are on that journey together.

I note it was an interagency document. It is very good that different agencies are working together. I personally consider local government to be a critical player in climate change questions. Agenda 21 chapter 26 pointed out in 1992 the important role of local government, and that has been increasingly recognised. One of the sections of that document dealt with local government capacity building. I thought that was very good. But I would have liked to have seen the Local Government and Shires Associations being included as one of the—

Mr GERARD MARTIN: Would the Shore Regional Organisation of Councils make a submission to a draft document like the biodiversity strategy? Do you take a position on that or do you do it as individual councils?

Ms TULAU: If an invitation to comment to an inquiry came into the executive, as this one did, then we would work as a regional organisation of councils to make a submission. I do not know what happened.

Mr GERARD MARTIN: It is out there now.

Dr FARUQI: In terms of those strategic initiatives that go across councils, we would get together as a regional organisation of councils and make a submission. We will definitely take that back to the SHOROC.

CHAIR: The submission refers to aquatic marine biodiversity. I think I read that there is a need for clear guidelines for determining new marine parks and that it would be of considerable benefit to adopt marine national parks policy number 10. Would you like to comment? There was a submission floating around from an advisory group involved in marine parks up and down the coast.

Ms CASWELL: That marine policy was put forward by the National Parks Association.

CHAIR: That is it.

Ms CASWELL: Do you want to know more about it?

CHAIR: It said that it would be of considerable benefit to adopt the marine national parks policy number 10.

Ms CASWELL: It aims to lock away 20 per cent of each marine habitat up and down the coast. If we back that, we would be conserving at least 20 per cent of each marine habitat.

CHAIR: Would that have significant impact on your area?

Ms CASWELL: I suppose so.

Dr FARUQI: It would because we have marine life worth protecting across the coast. I do not know whether members saw a recent documentary about Chowder Bay and Clifton Gardens at Mosman. The zoo has released 22 seahorses in that area and it is a critical habitat for them. Protecting that 20 per cent would be critical given the implications of climate change, sea level rises and the migration of these species anywhere.

Mr GERARD MARTIN: Twenty per cent seems low. I suppose it has been scientifically worked out.

Dr FARUQI: As you know, sometimes when you come up with these policies the result is often the lowest common denominator; it is what everyone agrees to and you reach a target.

Ms TULAU: The whole issue of marine parks has been contentious in the past with different groups. The evidence is not in that the establishment of conservation zones is beneficial in the long run to some of the other stakeholders, like commercial fishers, for example. This is not my area, but the evidence is now starting to come in that setting aside marine reserves has a long-term beneficial impact that enhances the aquatic stocks that are then able to be used by the fishermen. Therefore, it does not diminish their viability.

Mr GERARD MARTIN: I suppose Mosman Council is one of the councils affected by the commercial ban on fishing in Sydney Harbour that came in a few years ago. Have you any feedback as to what that has done to replenish marine life?

Dr FARUQI: I have not.

CHAIR: Your submission comments on the need for council land to be eligible to participate in BioBanking. What led you to believe that council land is not eligible to participate in the scheme, and have you had any consultation with the Department of Environment and Climate Change on that?

Ms TULAU: Kim, would you like to explain a little bit, to the extent of your knowledge?

Ms CASWELL: I cannot really say any more than we have in our submission about BioBanking.

Ms TULAU: This point came from my manager, Mia Dalby-Ball, who is manager of natural environment and education. Mia is an ecologist and she has recently been to a workshop or conference on BioBanking that went for several days. This is her point. I do not know what is sitting under that but if that is her understanding then—

CHAIR: My understanding is that councils buy up land in wildlife corridors, et cetera. So, they are essentially setting aside for conservation. In my area they do that through section 94 contributions currently. So, when it says they cannot take part in the scheme, I do not understand that. Maybe you could get that person to let us know specifically what the issues are with that?

Ms TULAU: Yes. I guess in areas like Pittwater, there have been some changes to section 94 plans recently. I am just aware of that, I am not so across the exact detail of it. But the section 94 scheme relates to areas where there is new development going in. In Pittwater, the only two areas where that applies are the Warriewood Valley and potentially Ingleside, which will be a new land release area. The rest of the Local Government Area is already developed, but Pittwater is lucky enough to have retained, even in the face of significant urbanisation, good vegetation and fauna populations. So, outside of the Ingleside land release and the Warriewood Valley, section 94 opportunities are very restricted.

If there are very important vegetation areas, to find a way to look after that land and do the maintenance work, often there are funds that come for intensive weeding, but it is managing a threatening process. They come from flowing in and out of the surrounding lands, down stormwater drains and whatever, resulting in lots of weed invasion. Unless that maintenance is ongoing, those areas degrade and decline and become less and less useful as biodiversity habitat. So, I expect that Mia is thinking that if there was some other way that these areas outside section 94 could come in under this BioBanking scheme that would be extremely beneficial. I will ask her to elaborate on that point, if you are inviting that, and I will see that those comments come through.

(The witnesses withdrew)

(Short adjournment)

MICHAEL IAN ANDREW DUNLOP, Research Scientist, CSIRO, Gungahlin Homestead, GPO Box 284 Canberra, affirmed and examined:

CHAIR: We thank you for appearing today to provide evidence. The Committee would also like to thank the CSIRO for its very detailed submission to the Inquiry. I am advised that you have been issued with a copy of the Committee's terms of reference and also a copy of the Legislative Assembly's Standing Orders 291, 292 and 293, which relate to the examination of witnesses.

Dr DUNLOP: Yes.

CHAIR: I draw your attention to the fact that your evidence is given under parliamentary privilege and you are generally protected from legal or administrative action that might otherwise result in relation to the information you provide. I should also point out that any deliberate misleading of the Committee may constitute a contempt of the Parliament and an offence under the Parliamentary Evidence Act 1901. Would you like to make a brief opening statement before we proceed to questions?

Dr DUNLOP: I will, if you would like. I will hand out some slides. I will not go through the whole lot of them, but if I could draw your attention to the summary slide and briefly talk you through that. The first point I would like to make, which was made in our submission, is that there are many different types of ways in which climate change will affect biodiversity, and there is a large amount of uncertainty associated with the particular details of those types of impact. These two features together—the many types of change and the significant uncertainty associated with their detail—in many ways set what I regard as the template for how you need to respond to climate change. If your plan does not cope with many sorts of change and uncertainty, there is a reasonable chance that you will be missing significant sorts of impact.

Taking that into account, we have gone through a process of working out what sorts of strategies or actions might be the highest priorities, and we have come up with three. The first is to reassess the core objectives of biodiversity conservation. Traditionally, biodiversity conservation is essentially about preventing any sort of change happening, or trying to revert to some ideal, maybe pre-European, state. But we are faced with inevitable continuing changes, so we need to come up with some sort of objective for biodiversity conservation that accommodates those changes. This is actually a very hard thing to do, and we have tried doing this with many stakeholders. People agree in principle with the idea, but it is very challenging when you try to articulate what sort of change is okay and what is not, and what magnitude of change is okay and what is not. It forces us to examine a whole lot of concepts about biodiversity that we do not normally need to do.

Following on from that, and given the many types of change and the considerable uncertainty, we have thought about the different sorts of strategies, different ways you may go about trying to protect biodiversity under climate change. Do you want to have a proactive strategy, predicting what is going to happen and to react? Do you want to be reactive—when you see something happen, you respond? Do you design specific strategies that may or may not work, so you risk-spread by having a whole range of different strategies, on the off-chance that some will work in some places? Or do you develop what might be regarded as robust strategies which work against a number of different types of changes and levels of uncertainty? We have put most of our effort into thinking about those robust strategies.

We have listed two here as priorities 2 and 3 on the slide. First protect habitat, using habitat diversity as the focus for protecting habitat. This provides significant opportunity for as many species as possible to survive under climate change, we believe, and it can be applied both to the National Reserve System and also to off-reserve conservation.

The second strategy is around managing changing threats. Climate change will change threats that are important, and also the way threats will affect biodiversity. We have suggested there are four threats in particular, which we sometimes call wicked threats because there is a strong interaction between the societal response and what you might regard as an environmental response. What is good for society might not be good for the environment in these cases, and an adaptation in one sector may be bad for the other sector. They are: changing fire regimes; exotic species and also native species occurring in new regions; land use changes, particularly the intensification of native pastures, where we have identified that there is a particular threat to biodiversity; and changes in hydrology—flows in rivers and wetlands, but also the use and flow of water across the whole landscape. For dealing with these issues we suggest that we need to, first, be attempting to anticipate how they may change as a result of climate change and put in place the beginnings of responses, and second

monitor so that when we do observe them changing we already know how we are going to respond and there are institutional and governance arrangements already in place to deal with it.

I note in closing that in highlighting those three priorities there are a whole range of things in blue down the bottom on the slide there that I have not mentioned which are often listed by people as key adaptation strategies. It is worth noting that we are at a point in this science where we really do not know how to assess the best strategies. The nature of the impacts is unfolding, and what sometimes appeared to be good ideas at first glance do not necessarily stack up upon a more detailed assessment. So we focus on things that I think meet that criteria of dealing with lots of different sorts of change and considerable uncertainty, whereas some of the more aggressive and proactive strategies may work under some situations and not others, or may require accurate information that in reality will not be available.

CHAIR: The submission makes the point that a whole lot of areas are already locked up in the National Reserve System but identifies that there are still some ecosystems that are not adequately protected. Are there any specific ones you would like to bring to the attention of the Committee in terms of recommendations that we make to Government?

Dr DUNLOP: I cannot do that offhand. I guess there are two parts to that response. One is about inclusion in the National Reserve System. Several different analyses have been done at the national level highlighting geographic areas or types of ecosystem that are not well represented, and the National Reserve System section of the Commonwealth Department of the Environment, Water, Heritage and the Arts has its hands on those sorts of things. I imagine the New South Wales Department of Environment and Climate Change or the National Parks and Wildlife Service would also have those things. But the other aspect to that is that it would be very unlikely that it would be possible to incorporate into the National Reserve System examples of all of those underrepresented areas. So people are looking towards using other mechanisms, conservation on private land, to try and provide some sort of protection; not the gold standard that the National Reserve System is but other sorts of protection for those different habitat types.

CHAIR: Your submission identifies a number of impacts on climate change biodiversity, which are either observed or hypothesised. Can you clarify which of these impacts have been observed in Australia and which ones at the moment are only hypothesised if climate change continues as expected?

Dr DUNLOP: Off the top of my head I cannot run through a comprehensive list of such but I will direct you to two things. I am not sure if you have had a chance to look at the report that CSIRO did for the Commonwealth for the National Reserve System a couple of years ago—much of our submission is based on this, and the submission refers to it. It includes a considerable review of different biodiversity impacts.

CHAIR: Are you happy to table that as part of your evidence?

Dr DUNLOP: Yes, it is in the public domain. There is a long version and a short version and they are both available on the web. You could probably get more copies from the Department of Climate Change.

Documents tabled.

I will try to answer your question directly but I draw your attention to the picture with the colourful arrows next to the fire. The boxes and arrows are there to represent the fact that there is a whole range of different sorts of changes in the environment and there are many aspects of that: CO₂, temperature, rainfall, storms, floods and fire, and there is some documentary evidence of these things having changed—quite good predictive evidence. Some of the future changes to those things are much more speculative. For example, changing fire frequencies. We have a good idea that the extreme weather for fire is likely to get worse but fire is determined by three or four different factors and it is uncertain whether, for example, as fire weather gets worse that means litter production will also increase, or it may decrease if conditions are drying. So there are some things where it is very hard to predict exactly which way they will go.

Following from environmental changes there are a range of changes to the biology of individual organisms: changes in the timing of events. Around the world there is considerable evidence for changes in timing of events. There is less evidence in Australia for most of the things that have been observed around the world simply because people have not been watching things as long. In some situations it may be harder to observe these things in Australia because we have a more variable climate. Spring events, for example, are not as clear-cut. One of the absolute classic records of spring events is the flowering of cherry blossoms in Japan.

That has been recorded for a very long time and it is a culturally significant event and if it happens on a different day people know. We do not have anything similar, obviously not as long or as important and easy to observe. But networks have been set up in Australia to begin to monitor these changes.

Other biological changes include changes to the chemical composition of leaves and changes in the ratio of nitrogen to carbon, which changes the nutrient value but also the toxicity. So critters that eat them might need to eat more to get more nutrients but, at the same time, they will be exposing themselves to more toxins. Behaviour may also change as animals forage differently in response to temperature and the like. As biology changes, that goes on to affect how organisms interact with their environment in different ways—again, parts of their behaviour but also birth, death, reproduction, growth and important things like that. There is some evidence for how changes in the environment can affect these things in Australia. I am trying to think of the few good examples there.

Moving on to populations. As lots of individuals in species are affected, then whole populations are affected by changes in abundance, distribution and genetics as populations evolve. The key phenomenon that is best documented around the world, and there is some evidence for it in Australia, is change in distributions. The idea is of distribution moving either uphill or towards the poles—so southward in Australia—typically southward and uphill but it is actually along environmental gradients. So in Australia, because we have such strong gradients from the inland to the coast, these movements could be west to east rather than north to south, depending on the gradients—whether it is rainfall or temperature—that things are responding to.

There have been various catalogues of changes in distributions in Australian species. It is very difficult to attribute them to climate or other changes. In the past 200 years there have been enormous changes to our landscapes for reasons other than climate and these have allowed many native Australian plants and animals to establish in other areas quite independently of climate. Sometimes a change might be consistent with what is expected from climate change but it may be the result of other things.

An example of that is the spread of fruit bats down the east coast. There could well be a warming impact but there have been a lot of orchards and the growing of habitat that is suitable for them. It has been suggested by some people that it may have been a combination of the two that has led to the changes. It is typically very hard to tell what the driver is in individual cases. So what people do around the world, where there is lots of data, is meta-analysis by looking at lots and lots and lots of these records and analysing how consistent is a collection of records about predictions in climate change. It is a bit hard to do it in Australia where we have not got the same volume of information.

CHAIR: Do you want to ask about fruit bats?

Mr RAY WILLIAMS: I think we have touched on fruit bats a lot. It is not my favourite native species.

Dr DUNLOP: It is actually a really good example of one of the points we make about the moving around of native species. People often think that it does not really matter if native species move around, but fruit bats actually highlight that sometimes when native species move around the place they can be as much of a problem as an invasive species. There are a few examples, such as fruit bats, and kangaroos in Canberra, that highlight how contentious it can be yet none of our conservation rules of thumb, heuristics or guidelines help us deal with this at all and we should expect these things to happen much, much more. It is going to be our agencies and managers who have to work out how to deal with it.

Mr RAY WILLIAMS: The thing that is contentious with me is the numbers. We used to count them religiously and we got to 2005 and found out there has been this massive population explosion and they are still listed as threatened species, so now nobody wants to count them any more. I have a bit of an issue with that for our poor old farmers and the fact that attempts are being made to stop them culling them to maintain the viability of their farms. That is my issue with fruit bats. In your comments on carbon plantings, in the last paragraph of your submission, you say:

.... extensive unplanned applications may lead to adverse outcomes for the environment and potentially negative impacts for rural livelihoods.

I would have thought that carbon plantings would have been good for rural areas?

Dr DUNLOP: I did not draft that particular part of text, although I work on this sort of stuff, biodiversity and climate change policy, half of my time; the other half of my time I work on biofuels, which does relate to the carbon planting issue. I think the issue there is the nature of the revenue that comes from it. Carbon plantings will provide a one-off payment, whereas the previous land use presumably provided an annual payment. Also, in the case of any cropping or grazing enterprise, there is often considerable value-adding within the region. For example, in dairy areas most of the value-adding to the region comes from processing rather than from the actual milk production from the cows themselves. If you go for an industry that gives you a one-off payment but has no value-adding downstream then you completely change the temporal and sectoral dynamics of that income.

Mr GERARD MARTIN: In your submission you talk about the whole-of-system method of attacking threats to biodiversity ecosystems and the like, rather than looking at an individual threatened species or something like that. Is that the difference between what you were talking about before, of being reactive, and being proactive?

Dr DUNLOP: No. There is a temptation both with the reactive and the proactive approaches that you could just be picking up on one particular phenomenon or species or type of change or threat to one value. So it could be just the incursion of weeds you are worried about or it could be just the changes in distribution to species that you are responding to. If you just manage that one issue in the one location you might not be dealing with the issue on a broader regional scale, which might be appropriate, or you might not be dealing with providing opportunity for the biodiversity as a whole to cope with that issue. For example, you may go in and wish to control a particular weed or pest but across the whole landscape it may be that by providing sufficient habitat in various places the biodiversity, plants and animals, can survive some level of that pest or weed themselves. By simply attacking one aspect of it, you might not be looking at the broader opportunities or opportunities in other regions. I think looking at the issues, looking at biodiversity conservation on a broader scale, so a broader regional scale rather than just a catchment scale is probably likely to be much more effective under climate change because we are talking about broadscale change processes.

Mr GERARD MARTIN: You also made reference to the impact of fire regimes. I am not sure whether it is part of the royal commission, but what happened in Victoria on 7 February would have had some massive impacts on the ecosystems there. Is there any early evidence of that?

Dr DUNLOP: I saw something I was reading last night that did quote an area burnt, a site, as an area destroyed, which I take exception to because it is a natural part of the system—things burn and recover. Someone has counted apparently the number of animals that were killed, or estimated the number of that. The CSIRO has recently completed a submission to the royal commission following the Victorian fires and we are doing a number of other studies that will further aid the royal commission looking at how the fire actually spread, so reconstructing the spread of fire in relation to fuel loads and management that was previously undertaken. The other bit of work of relevance that the CSIRO has recently completed was a study by Dick Williams and Ross Bradstock, who may be known to you, that has looked at fire nationally. Has Ross presented to the Committee?

CHAIR: Yes.

Dr DUNLOP: I will not go over his material other than to suggest again the work of Ross that intense fires are often a natural and important part of Australia's ecosystems. You often get higher biodiversity, a healthier biodiversity, after intense fires than you do after repeated low-level fires. This is one of those trade-offs between what is good for the bush is not necessarily good for the people who live near the bush.

Mr GERARD MARTIN: We all grew up with the CSIRO as the iconic organisation to solve all our national problems or with the vision. We heard from other parties that research in this area is all a bit fragmented and depends on who has the bucket of money. How proactive can you be as an organisation? Do you have to react to the pools of money out there that you can grab to get into the research, or can you set the pace and standards for research into biodiversity?

Dr DUNLOP: There are probably lots of ways to answer that. From the point of view of climate change, we have recently formed what is called the Climate Adaptation Flagship, which involves some partnerships but it is mainly the CSIRO. It is a bringing together of a whole lot of research that is done on climate change. There is a significant amount of money under that. We seek to use that money in partnership with various stakeholders. The idea is to link closely to agencies, organisations that are really interested in the

issue. The work we do, which we are funded to do and we seek external funding as well, is well matched to their needs rather than us being completely disconnected from needs. With regard to biodiversity research, there recently has been a bit of an internal reorganisation in the way we organise our biodiversity research. It is very early days, so I cannot talk at all about that. Again, it is attempting to be strategic in terms of the impact. So we are focusing on the needs of management agencies and other people in terms of that.

CHAIR: We have received a number of submissions in relation to connectivity, in particular, the Alps to Atherton project. Are you aware of that project?

Dr DUNLOP: I am.

CHAIR: Your submission notes that connectivity conservation is both important and there are threats involved. Can you give us more information about that in terms of whether that is a good strategy to pursue or not?

Dr DUNLOP: I will try to keep my comments broad rather than say whether I think that the Alps to Atherton is a good issue or not, because it is not really my business to do that. Quite separate, there is a broad movement for connectivity conservation in Australia and there are number of such initiatives around Australia and around the world, often driven by slightly different needs. Sometimes climate change is an important component. It is unclear, however, the extent to which connectivity is the limiting factor or likely to be the limiting factor in the future determining whether or not lots of species go extinct or not, for example. If you just refer to this picture with the little green blobs, the little green circles. "An evolving biogeography of climate change" is the title of the slide. The green blobs on the left are supposed to illustrate the idea that the way biodiversity may respond could be by species changing in their abundance and distribution pretty much in situ. One thing that was dominant may become sparse and the sparse becomes dominant. Things may move slightly around a hill, under a rock, up and down onto different soils nearby. Species could find themselves responding to climate change without having to move very large distances at all through their natural variability. As I flew from Canberra to Sydney today, if you look out over the extensive areas of bush it is phenomenal the variability there is in any one small stretch. Species may be able to exploit that variability as they respond to climate change.

The other pattern that people suggest will happen is species moving large distances, from one region to the next, in order to track the macro trends in climate change. If that is the way that species need to respond in order to survive, then you can ask the questions: Can they get from one place to the next? What can we do to increase the chance of them getting there? Connectivity is one way that you may be able to increase the chance of things doing that sort of movement.

I would suggest that we do not actually know that that type of response is the limiting factor, if that type of response were to occur, if connectivity were the limiting element. So it is probably more important that they have somewhere to move to. It is currently a different type of environment that may be suitable to them in the future spread over the landscape. That is probably more important than actually having steppingstones for those that are limited by dispersal to get there. The rates at which things will need to move in order to keep up with the macro trends in climate are very rapid, far more rapid than any species that needs to move through small-scale continuous bits of habitat. So nothing is going to keep up with climate change if it has to basically walk through the bush the whole way. Large steps are the only way that things are going to keep up. It is a very contentious issue scientifically. We do not know how to measure these things properly yet. When people do the modelling they typically have very coarse-scale representations of environment and so the representations they have from satellite images and mapping and all sorts of things are not at the scale at which organisms experience the environment. So we do not know exactly if our models represent the way that organisms experience the changes that are going to happen.

Connectivity will be important in some places because the illustration on the left assumes that things can move locally. So connectivity is probably very important locally to make patches of habitat effectively bigger so things can have larger home ranges but also move from one bit of habitat to the next bit. It is easy for me to say that you can just move up the hill or over the ridge, but if there is a barrier they cannot. But the connectivity required to do that is quite different from the connectivity that might be required for things to move in the order of hundreds or thousands of kilometres. I would suggest that we do not know that the connectivity designed to improve the ability of things to move around the place on the scale of hundreds of kilometres is needed or likely to be effective. At a smaller scale it almost certainly is an advantage.

There will be some circumstances where connectivity has negative consequences for biodiversity. One of those is if a new species arrives early in a region it may have all sorts of consequences for the biodiversity that is currently there. So what we can learn from the study of exotic species coming from elsewhere is that most of them, when they get to somewhere, they do not actually establish, they cannot survive. Some do survive and most of those that do do not tend to have much impact, they are relatively benign. But some have a really big impact. Sometimes they are called transformer species: they can completely transform the ecosystem. Lantana might be an example of that in some places—completely choking out the understorey and changing the fire dynamics. That leads to significant changes. However, a whole lot of species might have got there before and had very little impact.

Native species might do the same thing. Some might have no impact when they get there; others could completely change the ecosystem when they get there. If there were threatened species there—rare, sparse species; species that had not moved on or survived in some other way—then the arrival of the native species transforming the ecosystem could lead to their demise. If our efforts to increase connectivity favour those more aggressive species, the species that were going to survive anyway, the species that move across the landscape easily, then that is not looking after the species that are not going to be able to move around very well. Some people suggest—and I am not putting this forward as my own idea—that we need to be putting barriers across the landscape to reduce the movement of species rather than corridors to enhance the movement of species. We really do not know which species are going to benefit from the connectivity and if they are the species we want to benefit or if they are not.

The other issue I will just add in relation to your question is that we do not know which regions are the ones that you might want to focus your effort on from the point of view of climate change. Again, it is a new area; we do not know the best way to assess impacts and vulnerability. The traditional way people have done it is list those places where there is lots of documentary evidence of individual species that are likely to be vulnerable. For example, if you look at IPCC reports and most reviews, south-western Australia gets listed, as do the alpine areas, the tropical mountains in Queensland, Kakadu and the Great Barrier Reef because there are a whole lot of species there that we believe—or work has been done to suggest—are vulnerable.

I draw your attention to the map of Australia. The report I gave you did a pretty quick analysis looking across the whole of Australia, focusing on patterns of ecosystem growth. We used these zones that were developed by the Australian National University and a couple of other people as well. These zones break Australia up into, I think, 10 regions. They differ by the main season of growth and the climatic limits to growth, whether it is temperature or moisture that is limiting growth in different seasons. It is a fantastic sort of template for examining the impacts of climate change. If you can think about it getting drier, hotter, colder or wetter then you can relate that to those different zones. You can then ask, “Is this zone going to switch to be like a different zone or is it just going to be a more extreme version of itself?”

By doing that analysis, it is really an ecosystem-process type analysis, we identified the light green and mauve areas with a dotted line around them as two zones that are possibly more likely to experience the greatest number of ecosystem-related changes. I hesitate to say that is vulnerability or threat, because there is no guarantee that that will lead to more extinctions because there are more changes. Species may be able to cope but there is more likely, I think, in those regions for there to be changes in land use or changes in fire regimes, new species turning up, than possibly elsewhere in the country. So depending on how you look at the issues and the changes, you might identify different regions as those that are most important.

Your first question asked about areas that are underrepresented in the reserve system. Again, you can use that as a bit of a template. On the back there is a small map of Australia—which is not one of my maps; it is one from the National Reserve System section. The red areas are areas that are bioregions that have an underrepresentation of particular ecosystems in them. So that is one view of the priorities for protecting habitat. What that does not take into account is the likelihood that the habitat that is there is going to change. It could be underrepresented in the reserve system but not threatened, so it is hard to know, particularly with the introduction of broadscale habitat clearing legislation, how threatened various ecosystems actually are just because they are not in the reserve system.

So there are issues about which locations. Is it the steep country or is it the flat country? One suggestion is that you might want to go for something like the Darling River, with it providing significant source populations or refuges, if you like, along the river for biodiversity in the neighbouring areas that can come in. That could be a really important refuge-type area, worthy of conservation effort. I refer also to the steep country

that is the focus of the Great Eastern Ranges Initiative. It has a whole lot of refugal properties as well that could be good.

Mr GERARD MARTIN: Are you an optimist in terms of coming to grips with these problems?

Dr DUNLOP: I have three modes. First, on some days I am an optimist and I think that biodiversity has coped with changes in the past, so it can probably cope with the changes better than societies can. Second, some days I am a pessimist and I think all species and ecosystems are going to change in some way or other—CO₂ is going to change all the plants, and you either eat plants or eat animals that eat plants; everything is going to be affected and we could be facing lots of extinctions. Third, on other days I just put my pure-scientist hat on and say it is a big experiment and we will learn a lot about biodiversity as we watch it happen. That is the best I can do for you.

Mr GERARD MARTIN: It covers all bases.

CHAIR: My last question is to do with looking after weeds and pests. Do you think the current management processes in place are adequate or do you think that we need to do a lot better in that area?

Dr DUNLOP: Maybe I am going to evade your question again. I do not know that we necessarily have the ability to answer that question. Some people may offer you an answer to it. I do not know that we know enough about what is likely to happen in order to be able to answer that question. I suspect, however, that it may be prudent to explore other approaches. For example, we know a lot less about where introduced species may spread into Australia than we used to.

In a static climate we have a bit of an idea about where things will establish. As the climate changes in unpredictable ways there will be more places that things can go, but we will not know where. Exotic species present a greater threat under climate change because there is more uncertainty about where they will be able to establish. Native species and ecosystems are more likely to be under stress, so there will be more opportunities for the exotic species to spread. Overall, exotic pests and weeds present a greater threat. A natural response to that might be to try to limit them at the source; that is, let fewer things into the country. It is a concomitant sort of thing. If the risk goes up, presumably it is reasonable to impose a greater barrier to people wishing to bring stuff in, particularly if there is any chance that it may pose a threat.

In terms of dealing with things that are already here, it suddenly becomes a lot more difficult. There are many weeds and pests that are in very low density in places that we do not worry about because they have little impact. They are often called “sleeper populations”. Under climate change they may suddenly find the opportunities to establish. It could happen in one year that has good establishment conditions—the native biodiversity is down and the exotics respond to a particular event associated with that and they spread. Once they have a foothold it is the beginning of a ratchet effect. There are many low-density populations that may not be on the concern list because they are currently not a concern. However, under new conditions they may suddenly become a concern.

We can try to assess them using models, but there is huge uncertainty about that. I would strongly advise that any modelling should not be taken as a guarantee of what is going to happen. It will give some indication, but deciding to do something or not to do something on the basis of modelling alone is likely to be a highly risky strategy. It should be done looking at how weeds and pests may respond, but not as the main response mechanism.

CHAIR: Two situations have been raised recently. One is the rat population on Lord Howe Island. I think the proposed solution is to use aerial baits. However, concern has been expressed about a species of bird that is attracted to the bait. That is problematic. The other situation is that apparently the oxygen content in the ocean is dropping. Jellyfish do very well in that environment and they are on the increase. Apparently the aquatic population is moving towards the poles. South east Queensland and northern New South Wales might have to contend with box jellyfish, which I assume would become a pest if they moved further south.

Dr DUNLOP: Yes. Programs like the Great Eastern Ranges Initiative—which was called the Alps to Atherton Initiative—were set up to facilitate the movement of things across the landscape. It may well be that that creates the biggest headache for us. It could be also that that is the only way things will survive. We are not sure. In addition, things at the top of mountains are most vulnerable. Connecting habitat to those mountains will

do nothing to protect the things at the top. It will help the lowland things as they move up, but they may not be particularly threatened because they have lots of opportunities, whereas the things at the top do not.

CHAIR: Like the picture of the kangaroo and the statement “Kangaroos threaten alpine plants—Yum, yum.”

Dr DUNLOP: Indeed. At the moment the odd wombat and grasshoppers graze the alpine meadows. If wallabies and the exotic herbivores start colonising, they will have a big impact on those meadows. We know this because in Tasmania, where there are wallabies, the alpine meadows are structured completely differently because of the impact of the grazers. The wallabies going up there could completely change the meadows rather than their responding to changes in the climate.

Mr GERARD MARTIN: Is that necessarily bad for the biodiversity?

Dr DUNLOP: It will lead to the constriction of certain species and whole ecosystems. Some will be directly affected by changes in snow cover. There are some things that go through their life under snow. Therefore, if the snow cover disappears that will have big impacts. The changes in water availability are huge in the alpine regions, so changes in temperature and snowmelt will also affect those things. Some things will be directly affected by temperature changes. However, for others, it could well be the grazers that drive them out. For example, the cattle in the high country had a huge impact on certain grasses that dominated. If you take them away, changes happen. Similarly, if the wallabies come back it could be the other way around.

CHAIR: We heard before—and I think it is a general feeling in the community—that it is fruitless to try to save everything, so we should nominate what we can save and concentrate on that. What are your thoughts on that?

Dr DUNLOP: In answering that I draw members' attention to the slide on the first page called “Four targets for conservation: Managing the change to minimise the loss.” There are four rows and I have identified four different values. There are four reasons that we may value biodiversity: First, for the individual species or genes; secondly, the functioning of ecosystems—every point on the ground, be it a backyard, pasture, cropland or bit of bush; thirdly, the whole landscape, consisting of native biodiversity and human activity; and, fourthly, the biological diversity—that is, the patterns of species and ecosystems across the landscape. There are values and changes associated with each of them. In black is a list of things that will almost certainly change associated with each of those values.

The things on the right-hand side in red are the properties of those values that we could aspire to maintain while the things in black change. If you have to choose what things to protect, you can do that to some extent between those rows. Most of the conservation legislation and programs focus on that first line—that is, individual species or communities. There are pragmatic reasons for that. With tree clearing there is a little bit of focus on the third line—that is, whole landscapes. We are attempting to protect areas of habitat against loss. We have very little that is targeted at the health of ecosystems at any one point. There is no policy or program that aims to increase the health of every bit of ecosystem around the place. Yet that could be argued to be just as important as some individual species.

The fourth point—biological diversity—is often said to be very important in many documents. However, the diversity of species and the role that diversity plays is not dealt with very well at all in policies and programs. We will need to choose to some extent between them. I suggest that it is worth reassessing the relative weight put on those things but also, within those, which species—which I think is the nature of your question. I would suggest that it is worth moving away from focusing on the most threatened species towards focusing on how we stop species from becoming threatened. In doing that, if there is a finite pot of money, we might need to put less effort into dealing with those threatened species and more towards stopping things becoming threatened.

It is what things like connectivity conservation try to do, but we do not really know if it is the best way of doing it, and it is what our suggestion of protecting habitat diversity and reducing threats tries to do as well; provide as much opportunity as there is for the species to survive, reduce the chance of them becoming threatened, rather than chasing threatened species. There are scientific and societal issues and I would suggest we do not currently have the mechanisms for getting feedback from society about how to make those decisions other than through you guys.

(The witness withdrew)

MICHAEL HEDLEY MUSTON, Deputy Chair, Southern Rivers Catchment Management Authority, P.O. Box 113 Fairy Meadow, 2519, and

NOEL ANTHONY KESBY, General Manager, Southern Rivers Catchment Management Authority, P.O. Box 3095 Wollongong 2520, affirmed and examined:

CHAIR: I welcome Mr Noel Kesby and Mr Michael Muston from the Southern Rivers Catchment Management Authority. Thank you for appearing today to provide evidence. The Committee also thanks the Catchment Management Authority for its submission to the Inquiry. I am advised you have been issued with a copy of the Committee's terms of reference and also the Legislative Assembly's Standing Orders 291, 292 and 293?

Mr KESBY: That is correct, yes.

Mr MUSTON: I am appearing on behalf of Pam Green, our Chair, who is not able to be here today for personal reasons. She wrote the submission.

CHAIR: I draw your attention to the fact that your evidence is given under parliamentary privilege and you are generally protected from legal or administrative action that might otherwise result in relation to the information you provide. I should also point out that any deliberate misleading of the Committee may constitute a contempt of Parliament and an offence under the Parliamentary Evidence Act 1901. Would you like to make a brief opening statement before we proceed to questions?

Mr MUSTON: Perhaps if I could do that and then I will hand over to Noel Kesby, our General Manager, who will give you a bit more detail. We would like to say we are happy and would be pleased if our evidence today is part of the evidence before the Committee. We have a brief but I think fairly concise submission we have made, and Noel will talk to it in a bit more detail. I think one of the key issues from our point of view is that while we do a lot of work on—in fact, imbedded in everything we do—is the concept of climate change and managing for that, and particularly the adaptability issues around that. Most of our programs are not specifically called that but they imbed climate change into our thinking, if you like, and into the design of the projects.

We have also done a number of other projects. We have a report from the University of Wollongong that was commissioned by us, by, amongst others, Dr Colin Woodroffe, who was one of the IPCC authors, so it is fairly credible, and it is on the scoping of climate change vulnerability and adaptation options for the Southern Rivers region, on natural, built, coastal and marine systems. It is particularly focusing on the coastal systems although our area includes areas like the Monaro and the upper Shoalhaven because of the catchments. I should perhaps say for the record what our area is. We go from just south of Sydney, north of Wollongong, which is where I come from, to the Victorian border and all of the catchments there, which includes the Snowy River and the Shoalhaven, obviously, and three nautical miles offshore. So, we have a marine focus as well. We are one of 13 in the State, as you would be aware, but I state that for the record.

The other point I would like to make before I hand over to Noel is one of the things I think we see as quite fundamental, and it is in our summary, is the need for the development of climate change strategy in New South Wales that would guide all the elements in the State, the Catchment Management Authorities—this morning I chaired a meeting of our local councils and Landcare groups and others in the subregion of the northern Illawarra. The thing that is missing, I think, is this very strong and focussed policy that will give some factual guidance to things like the preparation of Local Environmental Plans and the planning of projects.

There was a project, people were talking about having done a risk assessment but it was a qualitative risk assessment and I said is there any quantitative risk assessment to make decisions and the answer is no, there is just no data that will allow them to do that at this stage. So, a lot of planning decisions, a lot of infrastructure decisions and, in our case, a lot of the decisions about things like biodiversity, linkages and all the planning pressures that get put on some of those linkages. I think the absence of that framework is a thing that we would most see as an important outcome.

CHAIR: Would the climate change action plan fulfil that role or does it need to be more detailed than that?

Mr MUSTON: I will let Noel answer in more detail, but I think the answer is that it needs to be quantitative in terms of some specific guidance; taking a punt—and I know there are figures around in sea level rise now are that point nine of a metre is an almost universally accepted figure, but I am not sure that that is policy, if you understand the difference. It is a talked-about number and I just use one figure but there are lots of models and lots of information out there. At the end of the day someone has to say, “This is what we think is the most likely scenario and we are going to plan to that, and the risks associated with that can be quantified and so on.”

Basically that strategy should be incorporated into climate change management plans that could be developed at a subregional level. We have a Catchment Action Plan that is catchment-wide or area-wide. It is very generic because of the vast area that it is covering. We are also developing—and they are at various stages—subregional plans, which are much more specific but, again, to try to get climate change impact into them is difficult. We do it intuitively. I do not think councils can adopt them as part of their Local Environmental Plans [LEPs]. We know there are other pressures on councils. I think that is probably all I need to say and I will hand over to Noel for more detail.

Mr KESBY: We are one Catchment Management Authority [CMA] of 13, as Michael said. A lot of the things that we do and the evidence that we will give today are probably applicable right across all CMAs across the State. Whatever we do can be duplicated right across the State and you will get similar ends. We have been implementing on-ground activity for four and a half years, coming up to five years now. All the work that we put out on the ground, virtually every part of it, can be part of mitigating climate change impacts. The two main areas we concentrate on are improved water regimes within the whole landscape, so within stream and also within the soil profile right across the landscape. Moisture regime protection is a key factor in mitigating climate change into the future.

The second part is increasing and maintaining ground cover right across the landscape. They are the two main areas that all CMAs really put a lot of money into on behalf of government—both the New South Wales Government and the Australian Government—and also including third party investors. Within maintaining ground cover, we work on all different fronts: we work on the native vegetation side but we also work on private land and work very harmoniously with landowners on maintaining ground cover. Part of that maintaining ground cover, which is another part of making landscape resilient to the impacts of climate change, is soil health.

Ground cover is the first key to soil health, plus the moisture regime. Then, when you are doing those things well, you are actually building up soil health and you actually storing carbon within the soil profile. A main area of really storing carbon is in the soil profile. It can store 10 times the carbon than you can in storing it vegetation wise. They are that two key areas that we invest in. Within those areas we have lots of divisions—threatened species habitat, biodiversity, native vegetation, pasture production and grasslands, river and riparian management programs, soil and sustainable land use programs, coast and marine programs. We have a planning program where we link up with local government and State Government agencies. These are issues that Michael has presented where we need to really integrate all this through to the planning side so that if we come up with a strategy for mitigating climate change, the statutory planning documents actually give you the teeth to roll it out.

At the moment most of our work is via voluntary agreements with all of our various landowners. The last program we invest in is the community capacity side of landscape management where we increase the capacity of the various communities to actually deliver on ground natural resource management, which includes climate change remediation. In motivating and mobilising the community, from the landowner's perspective to voluntary groups to industry—we have extensive industry partnerships with the dairy industry, the oyster industry, the grazing industry, the horticultural industry, and right across the State there are a lot more industry partnerships.

Mr MUSTON: Indigenous communities.

Mr KESBY: Indigenous communities is another flagship within our community side of the program. That is where we like to invest and we have been doing that for five years now. We would like to ratchet that up a bit and start saying, “We want it really to be recognised, what we are doing, and maybe even some fine tuning to say that we could actually do more in mitigating climate change.” My Board wants our CMA to go further with soil carbon, to go further with biodiversity vegetation carbon, to start doing a lot more direct mitigation that is actually recognised as climate change mitigation rather than being tacked on. Where the new climate change strategy is coming from, there have only been rough drafts talked about to date. I would like to be able to see

that detail in there, but sitting underneath a robust framework that locks all these various streams into place. Whether it is going to be there, I do not know yet because we are really not privy to what is going to come out of the agencies' programs. I could give you some more detail if you like, otherwise I will leave it for you to ask questions.

Mr GERARD MARTIN: You said towards the end that your Board was keen to do some soil carbon work. Did you mean on the ground or in terms of research, because the jury is still out on the best way to go about that?

Mr KESBY: Both.

Mr MUSTON: We would probably do both, I think.

Mr KESBY: We are investing in soil carbon research but we are doing work on the ground to improve soil carbon. One of the biggest issues with soil carbon is that there is not a lot of monitoring going on about what the base level in soil carbon is. Then when we invest, does that increase? As we know, soil carbon can be a little bit volatile, depending on the land use practices. Can we wait for all the research to be finalised? I do not think we can because we are going to be investing tomorrow and the next day. We think we are on the right track with this research that is done, but there needs to be a lot more. Storing the carbon lower down in the soil profile is obviously much better, so we want to work on techniques to do that. We have been talking to researchers about that.

To answer your question, we are actually going to be doing both. At the moment, say with our dairy industry program, which is quite extensive on the South Coast—it virtually covers the whole South Coast—we are actually investing in soil health monitoring. One of the indicators we are looking at under soil health is soil carbon and we are measuring soil carbon at various depths. We are already starting to do that; we have already got two or three years worth of data now and we want to build on that, so that as we improve investing in ground works, with our landowner partners, we can actually monitor that soil carbon, either increase or decrease.

Mr MUSTON: Can I just add to that? We have been talking to Dr Christine Jones, whom you may be aware of, from Armidale. We are keen to pursue some of her ideas and have an open mind about them of course. The key thing is that it is about managing farming practices—certainly not adding carbon to the soil. That is not what we are about; we are actually about making farming practices to enhance the carbon in the long term, as Noel said, in the deeper horizons of the soil. I refer to some of the other things we are doing in that same area. For example, in Monaro, where the drought has been quite severe, we have funded a number of farms, to help tide them over the drought. We have funded drought feeding lots which, of course, means there is a much better protection for the ground cover. While it is an indirect form of soil carbon, essentially they are not overgrazing because of the pressures of drought. While our core business is not drought relief, it has a double-edged benefit. In essence, we are not a conservation body; we are about sustainable production as well as natural resource management. We are about helping farmers to be sustainable as well as protecting the jewels, if you like, of the natural environment.

CHAIR: Did you have representatives at the soil carbon conference held in Orange last year?

Mr KESBY: Yes.

Mr MUSTON: In fact, a submission has gone into the Caring for our Country bids, which is not part of our main submission but across Catchment Management Authorities and a number of other organisations.

Mr KESBY: Richard Stone, one of our staff from Braidwood, was the main author, and the Central West Catchment Management Authority. We are a partner with a multi-agency bid for soil carbon implementation across New South Wales.

Mr MUSTON: But, of course, it is with the other 1,300 applications.

Mr RAY WILLIAMS: I would like to explore some of the opportunities you have created with your private landholders in relation to conservative biodiversity and what mechanisms or incentives you have in place at the moment or that you hope to explore in the future, or that we should be looking at to further enhance those partnerships with private landholders.

Mr KESBY: We have quite an extensive list of incentive products. Right across our landowner regime we have sustainable land incentives, which predominantly look at ground cover issues, and again biodiversity is the main part of that. The other strong part of the program is weed management. We now know—and the scientists are telling us—that under global warming acceleration in weeds could become a more dominant factor in the future than in the past. Part of our sustainable management incentives program looks at weeds. Just throwing chemical at weeds is not going to be the answer. It is not the answer now, and it will not be the answer under our climate change regime, but maintaining ground cover, soil moisture and soil health is. So we are now doing a package where we are saying: We want to maintain soil health and ground cover, and particularly the harmonisation of native grasses with production species. Actually, that is the best way to be resilient against weeds.

We have quite an extensive number of programs for sustainable agriculture and sustainable land management under those incentives. We also have biodiversity incentives, where we invest on-farm on private land for native vegetation conservation, or native vegetation management, which again includes native grasses. We have a suite of products around conservation of native vegetation on-farm. Our third area of extensive incentive programs is a riparian area. We are managing riparian areas to a more sustainable level, which includes buffering and fencing, and providing alternative water supplies and enhancing vegetation. Linked with that is enhancing better water management so there is less pumping of the river but that farmers are getting more out of the water when they do pump, and they are pumping less. By improving vegetative cover, soil health and moisture-holding properties of the soil you can pump less water and have better productivity.

Mr RAY WILLIAMS: Has that type of cell grazing technology been widely embraced by your farmers?

Mr KESBY: It has. One of our hardest areas to roll out an incentive program is the Monaro region. They are very wiry landowners out there; otherwise they would not have survived those harsh conditions for 150 years. We now have extensive partnerships with Monaro farmers. We use that as our litmus test, if you like. They are the hardest and toughest landowners around. For someone who is pseudo-government, pseudo-community to roll up on a farm and say, “Can we invest in partnerships on your property?”—that has been quite successful. We have a very strong partnership with Bega Cheese, which has 130 contracted farmers. We have expressions of interest with 130, so we have a 100 per cent take-up with Bega Cheese. That is an extensive program. We are working on-farm with them on all kinds of environmental outcomes, which makes it much more resilient management for climate change impacts.

Mr MUSTON: The Northern Illawarra dairy group—at a meeting I attended this morning the officer gave a presentation on that. The take-up there was about 60 to 70 per cent, but a lot of those that are not taking up are likely to leave the industry within the next year or two because of their age profile and because of the pressures of urban expansion on the land and so on in areas like Jamberoo. That program has expanded outside our area, to Camden and into a number of other areas up in the Hawkesbury-Nepean Catchment Management Authority area.

Mr RAY WILLIAMS: In terms of some of the farmers in Monaro and the tougher areas, has the cell grazing technology been in place for longer than a year now? Can you look at the results of it and assess them yet?

Mr KESBY: That is a good question. We have been doing some trials up there for longer than a year. That trial data, which we have done in partnership with the Department of Primary Industries, is starting to be valuable for use, but our roll-out across a wider section of the community has been for less than a year now. We are building pace pretty quickly and we are starting to sign up farmers in Monaro fairly quickly. I think we now have 25 per cent signed up in Monaro. I am jumping over the moon with that sort of percentage.

Mr RAY WILLIAMS: It should be a wonderful litmus test.

Mr KESBY: We also run a Carbon Cocky Program, and we have had two winners in the New South Wales Carbon Cocky Program in our patch. One of those landowners just got a Landcare award last week. He has been doing this for seven years, and we have been supporting him for five of those years. When he received the award he said his neighbour leaned over the fence a week ago and said, “What are you doing?” The neighbour was a pretty hard-core, old-time grazier. He said, “What inputs are you putting into your property?” Tim Reynolds said, “Nothing. I am not putting any inputs in.” So it is starting to catch on.

There is a lot of negativity about climate change impacts. A lot of farmers are saying, "It's rubbish. It is not happening. Why should we manage?" What we do as a Catchment Management Authority is to say: Whether climate change is real or not, there is wide-ranging variability in climate happening anyway. I have been in the southeast doing this sort of natural resource management work for 33 years now, and I have seen a change in the water regime across the landscape. We are saying: If it is not climate change, if we can make you more resilient to more frequent droughts, longer droughts; if it is a cycle and not climate change, the cycle is 50 or 100 years. You can go out of business really fast, even if it is a short-term cycle. We would be negligent if we did not start looking at managing that. I happen to believe that climate change is a factor. But whether you believe this or that, we still need to put these same practices in place.

Mr RAY WILLIAMS: I believe that is 100 per cent right. I think climate change in terms of farmers, especially those farmers, is just irrelevant. Good, common sense farming techniques should be embraced. We have seen that in practice. Indeed, I ask through the Committee that we visit the Monaro region in 12 months time and have a look at the fruits of their labour.

Mr KESBY: We would love to host you down there. We can show you some pretty good data.

Mr RAY WILLIAMS: I think the Monaro region would be a wonderful litmus test.

Mr MUSTON: A number of farms have for some years now been managing the native grasslands, and there is a lot of good data to demonstrate that they are getting better productivity out of those grasses than the farms that are basically much more impact-type farming. Noel mentioned the Landcare awards last week. A farmer from the Monaro region was also one of the winners. I know that the material he put up was that he had had—I am not sure of the number of years, but certainly long enough to demonstrate some benefit. So there are farmers there that are doing it but, as Noel said, the Monaro region is a tough gig. The Braidwood area has also been tough, but I think we have a lot more success there. We have some very good staff who work in that area. We have a program called Farming for the Long Haul, and a number of farmers have been signed up to that. As the name implies, it is about sustainable farming practices, and there are some very good demonstrations there as well. In terms of soil—that is where Noel comes from—the soils there are very erodible and obviously the climate is in a rain shadow as well.

Mr GERARD MARTIN: For the incentives for grazing you are giving them capital for extra fencing and water storage and those sorts of issues?

Mr KESBY: Fencing is what we invest in for grazing, so they can rotate their stock and keep the ground cover—it is all about ground cover maintenance. We are also looking at disc seeding into established grass cover. We do not have to go and dig it all up and fallow it; we can actually disc straight in—as long as we are doing it with the right sequences.

Mr GERARD MARTIN: Very effective weed control too.

Mr KESBY: Absolutely, ground cover.

Mr MUSTON: The other thing, in terms of our capacity building we will not invest unless the farmer has done a recognised farm management course. They need to have the training and the capacity and demonstrate that they have actually got the capacity before we will invest so that we are not throwing good money after bad.

Mr KESBY: We have got some interesting results. I went through the 1980-1983 drought on the highlands and on the Monaro. That was a devastating drought where we had a Sahara Desert landscape: everything blew away and the sand just built up to the top of fences and the stock could just walk straight across—we have a photographic library of that. The farmers tell me that this drought is worse—up until this year the drought was worse than the 1983 drought, yet we have got ground cover everywhere and the country is nowhere near blowing like it was.

Farmers out there are latching on to tangible incentives that actually help on ground. What I would like to see is more focus on funding those incentives from a climate change impact point of view, as well as the biodiversity and soil health, and link it so what we are doing is recognised. There is some fine-tuning to be done as we get the research in. With the Department of Primary Industries research we have on the Monaro, we are

now fine-tuning those incentives to match those research results. So if we can step that up a bit as a result of the findings that this Committee comes up with that would be excellent, and maybe even some targeted funding for climate change impact implementation.

Mr MUSTON: I think also while the discussion is about sustainable farming practices, embedded in that are things like shelter belts that involve tree planting and so on, often done by Landcare groups, and again often supported by our funding. But they also provide linkages for some of the remnant biodiversity and so you are starting to get a little bit more resilience in the natural landscape as well as part of that process. In fact, we very much work on the model of at least 20 per cent of the property is dedicated towards the ongoing biodiversity.

CHAIR: Is that part of your Property Vegetation Plans [PVPs]?

Mr MUSTON: They can come in to it as well. That is a separate part of our business—and Noel can answer this in more detail—but certainly in terms of developing those connectivity is one of the offsets. We have done a number of conservation PVPs as well. I am assuming you are referring to plans under the Native Vegetation Act, which are essentially associated with permits or requests for clearing and where the area does not get red lighted because of the endangered ecological communities, or whatever other things that might stop it, we obviously get offsets that will enhance the connectivity of the resource. You might like to add more to that, Noel?

Mr KESBY: We do. With PVPs we lock up a lot of those corridor issues. With PVPs unless you are voluntary and unless you are looking to clear—if you are looking to clear you need a PVP and the PVP then offsets that clearing so there is no net loss of vegetation across the State. I think the PVPs have worked extremely well. The relationship that Catchment Management Authorities have with landowners in that sense has been quite positive. That is part of the package but because they are voluntary only some of our work can be locked up in PVPs, but I think it is growing. On the Monaro, again, we have just signed up 14 PVPs for the incentives for the grasslands. That has never been heard of before.

Mr GERARD MARTIN: They were like a red flag to a bull when the native vegetation legislation first came in, were they not?

Mr KESBY: Yes.

Mr GERARD MARTIN: So there is a softening or more of an acceptance that they are the way to go?

Mr KESBY: Yes, there is but it has taken a while. We are decentralised, so we have an office on the Monaro with good staff, we have board members that live on the Monaro and there are farmers there. It is working really well when you get these guys signing up for PVPs.

Mr MUSTON: We should also say that with a lot of our incentives we have a program for biodiversity protection called Bush Tenders, where we basically put out an opportunity for us to invest in people's property, mostly focused along the coastal belt in the northern Illawarra through to the Shoalhaven and up into the Braidwood area. But we have now said if you get funding for fencing, or whatever other works they propose to protect part of their property, they must sign up for a property veg plan as part of that. We basically lock the benefits in perpetuity or for a reasonable period of time at least. That seems to have been quite accepted.

Mr RAY WILLIAMS: I guess it would have been so hard years ago, as Gerard said, for farmers to look at their land and lock up some of the sensitive area. I am a farmer and I farm the land and I need as much as I can get. But in terms of this technology less is more. There is less land farmed, there is less impact on the land, less impact on the soil, less livestock, less time for the farmer to be at work and at the end of the day there is more money.

Mr MUSTON: And more resilient. More resilient to drought and that therefore means more resilient to climate change. But the focus being on drought resilience in the first instance, but clearly with climate change issues in mind as well.

Mr KESBY: I know exactly what Mr Martin is talking about because I was way back out there and I was run out of town a couple of times. We are now getting through the farm gate and it is very exciting to be a part of it. There is a groundswell of a lot of genuine farmers that would grasp climate change remediation work

if it were packaged up and funded and if it was taken on farm and shown how it is applied on ground. It actually can help them make money as well as have conservation value.

Mr RAY WILLIAMS: And improve their lifestyle?

Mr KESBY: Exactly.

Mr GERARD MARTIN: In your submission you talk about the need to have management plans at a subregional level. What do you mean by subregional?

Mr KESBY: We are a region—

Mr MUSTON: We have six subregional plans within our catchment authority area. There is a northern Illawarra one which includes essentially three local government areas, although they are not based on local government boundaries, of Wollongong, Shellharbour and Kiama. It is that northern area.

Mr GERARD MARTIN: Does that make the monitoring easier or harder?

Mr KESBY: That is a good question. It makes it harder because it needs more resources but it makes it more applicable. If we are collecting data and doing research at a subregional level it makes it much more relevant, much more applicable, and the credibility of the science behind it is more applicable. One of our subregions is the Monaro—it is a subregion on its own. When you focus your subregional plan on Monaro it is not then joined up with Bega or the coastal areas, it is not joined up with the Illawarra, which has completely different landscape, completely different moisture regime and different soils. At a subregional level this is more work but it is much more credible. Our adaptive management program actually devises incentives that work on the Monaro but we would never be able to sell one of them on the Illawarra; we have to have a different set of incentives for the Illawarra, which we are doing. At a subregion we are gathering spatial data: our subregional plans are spatially founded and we can pinpoint where we want to go, and we can then apply what science is telling us about climate change to that subregional level.

Mr MUSTON: And continue to adapt it. One of the other advantages of the subregional plans is that they are not a statutory plan as our caps are. Our caps are actually signed off by Cabinet and are binding on other agencies, although sometimes loosely so but in theory that is the way they are supposed to be. There is a negative side to that in that basically they can only be reviewed in a formal structured process and time frame. Whereas the sub-regional plans, even in the draft form that they are in, are useful documents. We have not finished them because we have been diverted with a whole lot of other things, like Caring for Our Country bids and the like. They are still useful working documents.

Mr KESBY: We have six started and we will have two finished in a week's time. We will have Eurobodalla finished and Illawarra finished. Monaro is well and truly down the path. So we will have most of them finished by the end of this year. We want to use those as capturing a lot of the climate change remediation work. On the coast where we have to develop different products, Michael was talking about in the Illawarra where we have got partnerships with the dairy industry group there. We also have a harmonised partnership with the oyster industry. We have actually tied two industries together because the dairy industry was impacting the oyster industry and the oyster industry was taken off production for so many weeks. Just one small industry in the Crookhaven lost half a million dollars, just one farmer in one outing, from pollution events. It was caused from the dairy run-off hitting his oysters. We formed a partnership with both those industries. Now they are both working in harmony together.

Mr MUSTON: The tangible things they have done is essentially fence off the salt marsh, the wetlands and the intertidal areas where the cattle used to graze and, therefore, pollute the creek through both the faecal material and stirring up the mud. That no longer happens. If the farmers really get stressed they can use that. We have not said, "You can't use it." But it is a managed process, short-term grazing, so the impacts will be much less and it can be done in a way to have minimal effect on the oyster farmers. The other thing is that the salt marshes are now recovering as well. So there is a biodiversity benefit as well.

Mr KESBY: A resilience to impacts from climate change.

Mr MUSTON: Could I add one more thing that I think is important? The natural resource management delivery model, the regional model, which in New South Wales is the Catchment Management

Authorities—nationally we are one of 56—I think is of fundamental importance. A lot of our achievements are because of that model because we are very much locally focused and able to work with places like the Monaro. I do not think that is achievable with a much more centralised type of organisation. I think it is important that we reinforce that model. It is safe in the short term but we do not have any long-term crystal ball.

Mr GERARD MARTIN: Are you suggesting an implied threat?

Mr MUSTON: Over time there have been at various stages. We need to be resilient across all the political spectrums as well. We need bipartisan support. We have had a change of government nationally and I think in the early stages there was some doubt there, but we are now quite confident that the regional model is supported there. We went through the worrying period when the new Government came in as to whether they would still support it. We would just like to make that point every time we can because we think it is an important model and it works well, not just in New South Wales.

Mr GERARD MARTIN: It is a matter we can address in our final report and recommendations.

Mr MUSTON: There have been numerous reports, most recently a report to Cabinet, which is still Cabinet-in-Confidence. Most of them have supported the regional model. A report by the previous Federal Government was fairly strongly supportive, even though it started out with a cynical approach. Every time it gets looked at we get a reasonably positive bill of health. It is important. It is the bottom line of our submission that the regional delivery model is an important one to hopefully work closely with local communities.

Mr KESBY: It is a State asset. If the Government decides to roll out some programs under climate change, the Catchment Management Authorities are ready. We have all the partnerships and all our networks established. We can roll it out on farm, on private industry, on public land. Thirty five per cent of the time it is on public land. We can roll out any on-ground initiative that the Government decides they want to do in a blink of an eye because we are already out there doing it. We have got established partnerships where there is confidence and trust. It is an asset.

Mr MUSTON: We're part of the glue that keeps the State agencies and the various local governments together and singing from the same hymn book with their independence obviously, but we basically help the communication process. It sometimes does not work all that well at senior level. I would like to make that as a key point.

CHAIR: It is duly noted. Thank you for your attendance at the Inquiry.

Mr MUSTON: Thank you for the opportunity.

CHAIR: Thank you for your submission and your presentation today.

Mr KESBY: We can table a copy of the scoping study by the university.

Mr MUSTON: And we can get you an electronic copy of that.

CHAIR: Yes. I place on record my thanks to both the Committee secretariat and Hansard for their hard work today.

(The witnesses withdrew)

(The Committee concluded at 4.15 p.m.)