REPORT OF PROCEEDINGS BEFORE

STANDING COMMITTEE ON NATURAL RESOURCE MANAGEMENT (CLIMATE CHANGE)

INQUIRY INTO MANAGING CLIMATE CHANGE IMPACTS ON BIODIVERSITY

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At Sydney on Monday 4 May 2009

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The Committee met at 10.00 a.m.

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PRESENT

Mr D. R. Harris (Chair)

Mr T. George
Mrs K. L. Paluzzano
Mr R. C. Williams

TIMOTHY JAMES ROGERS, Acting Deputy Director-General for Climate Change Policy and Programs, Department of Environment and Climate Change, 59 Goulburn Street, Sydney,

THOMAS ANDREW GROSSKOPF, Director of Landscape and Ecosystems Conservation, Department of Environment and Climate Change, 59 Goulburn Street, Sydney, and

PETER LAWRENCE SMITH, Manager Climate Change Science, Department of Environment and Climate Change, 10 Valentine Avenue, Parramatta, affirmed and examined:

CHAIR: Thank you for coming this morning. I apologise in advance for having to go to a meeting of the Independent Commission Against Corruption Committee at 10.30 a.m. I am Deputy Chair and I have to vote on some motions in that committee. Mrs Paluzzano will chair this Committee in my absence. Also, Mr George has an appointment at 11 o'clock and we apologise in advance for that. Before we start I ask everyone to turn off their mobile phones as even mobile phones operating in silent mode can interfere with Hansard's recording equipment. I welcome representatives of the Department of Environment and Climate Change. Thank you for attending today to provide evidence. The Committee also thanks the Department for its submission. I am advised you have been issued with a copy of the Committee's terms of reference and a copy of the Legislative Assembly's Standing Orders Nos 291, 292 and 293, which relate to the examination of witnesses. Is that correct?

The witnesses: 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 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?

Mr ROGERS: Thank you, Mr Chairman, I would. Climate change is one of the greatest challenges we face today. The significance of climate change and the considerable threat posed to our natural and human systems is recognised by all levels of government. Climate change is listed as a key threatening process under the Threatened Species Conservation Act 1995 and the Environment Protection and Biodiversity Conservation Act 1999. That covers both State and Federal legislation. Climate change is predicted to eventually affect virtually all species and ecosystems. Climate change will also affect the ability of our environment to provide the ecosystem services and natural resources that many of our industries rely on.

New South Wales's most vulnerable ecosystems include coastal ecosystems, inland rivers and floodplains, wetlands, alpine areas, rainforests, fragmented and highly restricted terrestrial ecosystems and areas vulnerable to moisture, stress and high fire frequency. Even some New South Wales ecosystems that are well represented in national parks and reserves, such as sandstone heaths, woodland and dry forests might be at high risk as most species have a poor capacity to disperse into new areas if the climate changes.

Relatively small changes in climate over recent decades may have already had an impact upon species distribution, life cycles, genetic make-up and ecosystem processes. Examples of observed changes to species as a result of climate change include native and feral animals from lower elevations colonising alpine ecosystems, reductions in the area of salt marsh in response to sea level rise, and the widespread reduction in the populations of freshwater invertebrates in rivers and streams that prefer cooler and fast-flowing water bodies. The strengthening of the East Australia Current pushing warmer water south has resulted in the southern extension of a number of marine species normally found in warmer waters and a southwards retreat in a range of marine macro algae species.

A better understanding of future climate change and the likely responses of plants and animal species to those changes is essential to the development of future policies. The New South Wales Government is committed to using the best available information on climate change and we have established a specialist climate change science section within the Department of Environment and Climate Change [DECC] to coordinate research that will improve our understanding of the likely impacts and potential adaptive responses. For instance, the Government is systematically accessing and applying leading expertise from Australia and around the world to develop better information on climate change on a regional scale in New South Wales rather than just a statewide scale. We have established the Climate Change Science Research Network to provide

independent technical advice on climate change and help shape that advice. The network comprises leading academic researchers from a range of disciplines and the partnership is allowing New South Wales to develop a collaborative research program to address gaps in the regional information in New South Wales.

In partnership with the Climate Change Research Centre at the University of New South Wales, the New South Wales Government has also developed information on projected changes to temperature, rainfall and evaporation for New South Wales. Those projections are being used to assess impacts on physical processes such as fire, flooding and coastal hazards, and the subsequent effects on New South Wales ecosystems. The preliminary results of that work were released in 13 regional assessments and at public and community forums around the State from September to November last year. We anticipate that the full report will be finalised and issued later this year. That work will provide an important baseline for information for biodiversity managers around New South Wales. It will signal the changes likely to occur in species and habitats at a regional scale and it will highlight species and ecosystems that may be particularly at risk.

The Department is also implementing a range of other climate change research programs that will improve our knowledge and understanding of the relative capacity of the species to adapt to a change in climate. New South Wales participated in the development of the National Biodiversity and Climate Change Action Plan 2004-2007, which was the first national natural resource management and climate change adaptation strategy in Australia. The National Action Plan provided a direction for natural resource and conservation agencies across the country in their initial planning and research actions for the early and unavoidable impacts of climate change. The New South Wales Government's response to the National Action Plan is outlined in the New South Wales Biodiversity and Climate Change Adaptation Framework, which was produced in 2007-08, and the Department of Environment and Climate Change's Adaptation Strategy for Climate Change Impacts on Biodiversity.

In our written submission to the inquiry we have set out the range of Government programs and initiatives that are helping to build biodiversity in ecosystems, but some of the key ones include protecting more habitat through the National Parks Establishment Plan, supporting the establishment of aquatic reserves and a representative system of marine parks along the coast, supporting private land conservation initiatives to identify ecologically significant links for the restoration of conservation management, and particularly continuing those core programs that will be an important part of the overall strategy to reduce the impacts of climate change on both plant and animal species.

We will need innovative approaches if we are going to deal with climate change into the future. We are building on those initial planning actions and drawing on new research to set the future direction and priorities. Action is proceeding on a number of fronts. The new Climate Change Action Plan, which is anticipated to be released later this year, will set out priorities for Government action across New South Wales aimed at reducing greenhouse gases, helping New South Wales communities and businesses to adapt to those unavoidable impacts, and ensuring the prosperity of New South Wales in a low carbon economy.

A statement of intent in response to the listing of climate change as a key threatening process under the Threatened Species Conservation Act is being prepared. That will be a summary of specific actions that DECC will undertake to improve the resilience of biodiversity over the next five years. The Government is also preparing a new biodiversity strategy for New South Wales, which will cover both terrestrial and freshwater aquatic and marine biodiversity. That will give us a framework for improved decision making and investment in biodiversity conservation in the future.

A discussion paper on the development of biodiversity strategy was circulated for public comment and closed in February this year. We got 59 submissions in relation to that and the intent is to release the draft strategy as the next step. We are also working on improving biodiversity conservation beyond the individual property scale and across a range of both public and private land tenures. Some of those mechanisms have already been put in place. That includes working with 1,200 private and public landholders to develop 250 in perpetuity conservation agreements over 23,000 hectares. A total of 647 wildlife refuges over 1.9 million hectares have already been established. There are 1,100 landholders who have entered into voluntary property vegetation plans since the Native Vegetation Act commenced in 2005. Around 800 of the property vegetation plans have already been developed and $13 million has been provided to voluntarily purchase selected high conservation value leases under the perpetual lease conversion program, and the Government supports the Nature Conservation Trust of New South Wales.

Catchment management authorities across the State are working with rural landholders to improve environmental and natural resource management and in the current year the New South Wales Government has committed $27.2 million to catchment management authorities, of which $23 million will be spent directly by the catchment management authorities in their particular regions. There will be further announcements of funding for future years in the budget when it comes down. We are also continuing to participate in a national process in relation to biodiversity management. Clearly, the national process is one that also has an awful lot of work going on, so it is not just New South Wales programs. I am happy to talk about that later.

CHAIR: Thank you for your comprehensive opening comments. I will commence with questions and then let other members of the Committee ask questions. The Committee understands that climate change is one of a number of threats to biodiversity. Could you explain further what you consider to be the most significant threats to biodiversity in New South Wales? Are the impacts of climate change different from other threats, or are they exacerbating existing threats?

Mr ROGERS: The quickest way to describe it is to say that there are a number of threats. However, I would not like to speculate on which one is the key threat. Increases in population and the like obviously are also key threats. A number of threats that will be heightened by climate change already exist in the area, for example, weeds, pests and things like that. We have been suffering periods of drought for many years, in particular, in the south-east, and climate change is likely to exacerbate those outcomes. I do not think it is the only threat but it will certainly exacerbate a lot of other things and make it harder to adapt.

Mr GROSSKOPF: There is not much more that I can add. Loss of habitat, compromising water quality, changes to the environment—those that are of a shorter temporal scale, as Tim has said, such as the drought conditions that have been experienced in the south—all have an impact. In the short term the impact of climate change is accelerating and it is adding further stress. However, as Tim mentioned in the opening address, in the long term it will have an impact on the ability of species to move and to adapt. The speed of change is probably the key critical factor.

CHAIR: You mentioned in your opening address the work that is going on at the Federal level. How closely does the Federal Government consult with the New South Wales Government on the work that it is doing? Is the work that New South Wales is doing reflective of what is happening at the Federal level?

Mr ROGERS: Most of the natural resource management work is handled through the Natural Resource Ministerial Council. All States and Territories are represented on that council and are involved in a highly collaborative program of work. We support what is going on in the national program and we contribute to it at a State level. The work that is done at the national level is then used to inform the work that is done at the State level. It is an area of genuine consultation and working together. Ministerial councils tend to have large work programs, but that program is integrated and has been focusing strongly on climate change in recent years.

CHAIR: Your submission refers to a number of programs to encourage conservation of biodiversity, in particular, on private land such as the Great Eastern Ranges initiative, the Biodiversity Banking and Offsets Scheme, and the Conservation Partnerships Program. Can you provide the Committee with more details relating to these programs? Are these programs ongoing and funded?

Mr GROSSKOPF: The Biodiversity Banking and Offsets Scheme, which is a market-based scheme, provides a mechanism to allow funding for conservation actions that are being funded by development actions. The scheme, which is self-funding, can continue in perpetuity. Because the impacts on biodiversity are in perpetuity the agreements for the ongoing management are also in perpetuity. The scheme is self-funding and it is also ongoing. The Conservation Partners Program was initiated under the National Parks and Wildlife Act 1974, which provides for wildlife refuges and voluntary conservation agreements. The program has been in place since then and the Department is continuing it.

Tim made mention earlier of the 23,000 hectares or more in the voluntary conservation agreement [VCA] and the one million hectares or more under wildlife refuges. That ongoing program is being funded into the future. The Great Eastern Ranges initiative is a three-year $7 million program. Currently, we are in the second year of that program. The program focuses on engendering community support for the idea of a linked corridor. It is about voluntary involvement and ongoing participation in the scheme.

We are interested in building a strong economic base for this initiative and an interconnected corridor through the involvement of the tourism industry and conservation partners. It will be seen as a rallying banner

under which these programs can continue. The program is funded for three years and the legacy of the program will fall to my area in the Department to maintain. We are attempting to establish whether a body of people would like to take that initiative further and we will provide them with the resources, the brand, the websites and that kind of infrastructure to adapt the program for the future.

CHAIR: When a development is approved and there are conservation offsets or wildlife corridors are established, on whom does the burden of payment fall?

Mr GROSSKOPF: The biobanking scheme requires a trade between the developer who is seeking to have the impact and the private landholder who is willing or who volunteers to undertake that action. The developer will pay the landholder a sum of money in one of two forms. The developer will deposit funds into the Biobanking Trust Fund, a managed fund that pays an annual payment to the landholder based on a projected program of management actions. The funds will vary depending on the management actions proposed to be undertaken.

In the early years of the scheme those payments are likely to be larger because that is when the major piece of capital works may be undertaken, for example, fencing, significant weed removal, or whatever. That is when that occurs. Large payments are made upfront and there is ongoing maintenance in the out-years. That component is paid into a trust fund. A premium might be paid for the type of credit that is being sought, which is a pure profit component or an offset opportunity cost that the landholder would build into the price that he or she asks for those credits. That is paid directly to the landholder.

CHAIR: Is there a set criterion to establish whether the land qualifies under the scheme?

Mr GROSSKOPF: Absolutely. An assessment methodology is published which is available on our website. The way the schemes works is as follows. We put the entire program into the private sector and we run it through a registered training provider—the North Sydney Institute of TAFE. We run accreditation training and accreditation programs for private sector providers—basically, ecological consultants who go out and undertake a survey. The results of that survey are then sent to the Department to establish whether we think it is the same thing. The agreement, that is, the conservation action, or the statement, that is, the inventory of impact, can be agreed upon and the scheme then moves forward.

Mrs KARYN PALUZZANO: I refer to the Great Eastern Ranges initiative. Would you define the area that that initiative covers?

Mr GROSSKOPF: On a national scale the Great Eastern Ranges runs from the Victorian Alps through to the Atherton Tablelands. The part of the program that we support runs from the Victorian border, from the alpine areas, right up to the Queensland border in the Border Ranges National Park The area of the Great Eastern Ranges runs from the escarpment, that is, the sharp-changing landform from the coastal plain, through to the Divide, which is the change in the watershed. At some points in New South Wales they are somewhat physically separated. In the Illawarra the escarpment is just behind the plain but the watershed is out in the Blue Mountains. At that point it is quite wide but at other points the escarpments are in the same place.

Mrs KARYN PALUZZANO: What are you asking private landholders to do?

Mr GROSSKOPF: The initiative enables people to identify their role in the landscape. A lot of people who are interested in undertaking conservation actions might say, "I am doing something on my place and I feel that I am making a difference." This initiative is about joining them up to see how they link into this larger conservation story. In everything that we are doing it is important to identify this as a voluntary program. It is about people taking the initiative but also about seeing how they fit into that larger scenario. The kinds of things we are asking them to become involved in range from entry level activities to improve their understanding and knowledge of their natural resource assets and their position in the landscape, right through to the Rolls-Royce model of a voluntary conservation agreement under the National Parks and Wildlife Act. So it could be any of those things in between.

Mrs KARYN PALUZZANO: Would the key stakeholders who are involved in this three-year $7 million project include councils and catchment management authorities?

Mr GROSSKOPF: Yes. We are working closely with catchment management authorities, local government, conservation groups, the Nature Conservation Trust and farmers. New South Wales farmers sit on

our advisory subcommittee. We are trying to work across all boundaries. We have identified five key hotspots in which we are trying to work.

Mrs KARYN PALUZZANO: Where are they?

Mr GROSSKOPF: They are in the slopes to summits, that is, the area running west out of Kosciuszko Park down towards Albury; the Kosciuszko to coast, which goes in an easterly direction across the same sort of latitude; the Southern Highlands between Morton National Park and Kosciuszko National Park; the Hunter Valley; and the Border Ranges National Park, which is an internationally recognised biodiversity hot spot and a place of great biodiversity.

Mrs KARYN PALUZZANO: Why were they chosen?

Mr GROSSKOPF: They were chosen for two reasons. The first relates to the biodiversity richness in the border ranges area. The second relates to those areas where there is the lowest level of representation of the established reserve network and the greatest opportunity to create stronger linkages.

Mrs KARYN PALUZZANO: I have a question about the climate change action plan. Recently I attended one of the 13 regional assessments that are involved in preparing analyses. How large are the mapping areas?

Dr SMITH: You need to qualify that question. Are you talking about the regional areas? They were dictated by the State Plan.

Mrs KARYN PALUZZANO: Yes, but within the regional areas, there were grids within those regional areas.

Dr SMITH: That was the subset of what was called the lineal interpolation of the global climate models, which are at a 300-kilometre grid square. We did a lineal interpolation of those grid squares down to 50 kilometres. They were not mapping; they were just an interpolation.

Mrs KARYN PALUZZANO: Okay. Within that, how is that presenting? Obviously having 13 regional assessment presentations—I went to the one for the mountains and the plains, so from Parramatta probably up to Mount Victoria—within that area you have high urbanisation. You have a World Heritage listed national park and you have State conservation zones. As you mentioned, you also have sandstone heath, so you have very significant fragile landscapes. With the climate change action plan, how are areas like that to be accommodated when you have urbanisation, World Heritage areas, areas of significance? How will that manifest itself within an action plan?

Mr ROGERS: The action plan itself will have a number of different issues in it, so there will be things to be done in national parks, things that will be done in urban areas, and things that will be done in rural areas. It will not be a one size fits all. Something like that particular area, which, as you say, is quite diversified, different parts of the climate action plan will relate to different bits of it. It is not like you will treat the whole area as one thing. There will be different parts to deal with different actions.

Mrs KARYN PALUZZANO: I notice in one part and looking at the development of the action plan—having to reduce greenhouse effects, adapt impact and ensure prosperity in a low carbon economy—what I see in my community is also those different urbanisation, national park and conservation areas. What kind of communication will this action plan require? Will there be any part of the action plan that relates to connecting those different groups? If you are dealing with a township that is right next to a World Heritage park, what kind of cooperation will there be within those different agencies?

Mr ROGERS: It will be a coordinated plan because in terms of different agencies it will be a government-endorsed plan, not a plan for one department. The Department of Environment and Climate Change [DECC] is merely the lead agency on putting it together. It will cover such things as what the home owners in that community can do to make their own impact on climate change. It will also be about how the parks estate around it is managed. It will also be looking for both economic and environmental opportunities for job creation in the region, and what industries are there that could perhaps improve some of their performance using things like sustainability advantage.

We would be looking to make changes in, if you like, the residential economy, changes in the work economy, and changes in the national parks estate which are around it. Clearly, how we blend those is specific to particular regions. The intent is that we will be coming in at the community engagement level and working with industries and parks managers.

Mrs KARYN PALUZZANO: We will all be anticipating the final plan. Thank you.

Mr RAY WILLIAMS: Just in terms of biobanking and exploring the parameters of biobanking, is that just a monetary offset, or does the actual amount of funding from the developer in relation to the environmentally sensitive area that they may be developing have to relate to a like-for-like sensitive area? Does that funding that you will be achieving from that offset go into an area that is like for like? How is that defined?

Mr GROSSKOPF: Okay. The scheme has a very clear set of rules about what offsets are available and how you would offset, and the scheme is based on a like-for-like or better principle. The short answer is, yes; it is like for like. The scheme has two types of credits available: one is an ecosystems credit and the other one is a species credit. Ecosystem credits are where we can predict a species presence by the habitat, and koalas are a very good example of that. If you do not have the right kind of habitat trees, you do not have koalas. That is just a fairly simple example.

But then there are some species that are not well predicted by habitat, and they are unique to find a species credit to match. The trading rules are based on a like-for-like principle. There is some flexibility because we use ecosystems as the way that we identify the presence of all of the species. That can then be traded across boundaries. In some of our ecosystem types, the ability to trade is quite large and involves large geographic distances, but in other cases they are very specific and they may only be found in a specific locality.

Mr RAY WILLIAMS: I will knock that into layman's terms so that I can understand it, first and foremost. If I pick a hectare of sensitive land in the Sydney Basin that a developer might be interested in developing, and he is working with you, for that hectare of sensitive area does he pay a monetary contribution in relation to that hectare, based on its biodiverse value?

Mr GROSSKOPF: What he would do is this: the developer would say, "Right, I need to get X number of credits for this environment type or this ecosystem type." He would then go into the market to see if anybody is willing to offer the conservation of that same type. If they are both present—if there is a willing buyer and a willing seller, the two get together and they negotiate a price. The price is negotiated on the value of the management actions that need to be undertaken to protect the site, plus any profit motive that the seller has. The market determines the price.

Mr RAY WILLIAMS: All right. When somebody goes out to the market—I am sorry to keep banging on about this; there is quite a lot of ambiguity in relation to biobanking so I would like to explore it now, if I could—who are the market drivers in relation to that? Who are the people? Are they the private property owners? Is it National Parks? Is it government departments? Who are the drivers in relation to that who can on-sell those credits?

Mr GROSSKOPF: The scheme is designed to be primarily for the private land market, so they are the chief suppliers of credits. National Parks, for example, is not part of the scheme at all. It is about the private sector.

Mr RAY WILLIAMS: There would be no credits available from any Crown land whatsoever?

Mr GROSSKOPF: I will need to take that question on notice. There may be some classes of Crown land that are available, but I just do not have that level of detail. If you like, I can follow that up and provide that information.

Mr RAY WILLIAMS: My only concern is that I would like to know where and how those areas are defined, and whether they are locked in perpetuity. It is all well and good to be able to raise some biodiverse values somewhere else, but once we get there in 50 years time we find out that there is just another six-storey apartment block sitting on that area, and we get no outcome whatsoever.

Mr GROSSKOPF: Just to address that issue, in establishing a biobanking site, they are in perpetuity. When establishing that site, before the Minister makes an agreement to accept that as a site, we do a reference

check with the Department of Primary Industries to check for any minerals or profit à prendre forestry values, et cetera, attached to the site to ensure that we are not alienating land to which there is a desire for development in the future. We also check with the Department of Planning in relation to any significant future public infrastructure or zoning proposals for the development of that site. We do try to put those safeguards into place.

The other thing is that, with a site, if there is a capacity to conclude a biobanking agreement under agreement between both parties, that would be under exceptional circumstances. But, importantly, if a landholder decided or wished to terminate the agreement, there is the possibility that, on termination of the agreement, you would offset the original offset as well as then offset the loss of that site. There is a way of moving forward with these things.

Mr RAY WILLIAMS: I have to say I have a real concern, especially in relation to the Sydney Basin where we have such a problem with the urban heat island effect, and there is an area of significant value. I question whether you would try to retain the benefits in perpetuity. Once it is retained, it is locked up, irrespective of whether it is a recreational area, a park or whether it adjoins a recreational area or a park. It is there in perpetuity. It is unlikely that that area would come under threat from development. The local community really does get the benefit of that natural environment that has been left, whereas once you start to give credits and it goes on it is a matter of how long is a piece of string. You trade in the values, and on and on it goes until you end up finding that the country is engrossed in development and it will be a case of, sorry, we did not really save anything, but we have a value from another country.

Mr GROSSKOPF: Given the like-for-like rules, if you take western Sydney as the example, we are talking Cumberland Plain Woodland as the key thing.

Mrs KARYN PALUZZANO: Cut to the chase, Ray.

Mr GROSSKOPF: When it comes to Cumberland Plain Woodland, Cumberland Plain Woodland can only be traded within a very limited area, and that is Cumberland Plain. If somebody undertakes a biobanking agreement dealing with Cumberland Plain Woodland, the likely scenario is that they have an area on the margins on the fringe of western Sydney, such as the Camden and Picton parts of the world.

Mrs KARYN PALUZZANO: And the Orchard Hills Defence establishment.

Mr GROSSKOPF: They will be saying, "This is where we wish to undertake or we wish to do this and we wish to see this country locked up or conserved in perpetuity." That is the likely scenario of Cumberland Plain. It cannot be traded west of the mountains and it cannot be traded north and south out of the Cumberland Plain.

Mrs KARYN PALUZZANO: May I ask a question about research? Within the climate change action plan there was development of undertaking research into the impacts of climate change. Can you explain what type of research there has been into climate change and biodiversity?

Dr SMITH: Sure.

Mrs KARYN PALUZZANO: And some of the projects?

Dr SMITH: Yes. I will answer in terms of DECC alone at the moment because it is a bit hard to get a handle on all of the climate change research. In terms of climate change research and DECC, there are about 50 projects that currently are underway. They cover ecosystems from the alpine zone, the north-east rainforest, the desert regions, freshwater systems, estuarine systems and marine systems. They range in detail from field-based studies—long-term historical analysis of how ecosystems respond to climate variability and therefore predicting how they may respond in the future; palaeoecological studies where we are trying to look at how our ecosystems have responded in the past to climate change so that we can get a much better handle on how resilient they are to climate change in the future; laboratory-based studies that examine, for example, the effect of rising CO_2 on freshwater algal species—and field-based studies looking at the effect of temperature and water flow on freshwater ecosystems, in particular freshwater macro invertebrates.

There are also laboratory-based studies examining genetic resilience. They are actually looking at the genetic composition of various isolates of communities up and down, especially in rainforests, and looking at how they have responded to past climate as an indication of what sort of resilience they have. In terms of

adaptation of research related to biodiversity, there is a significant amount of work looking at how we do the modelling if species are to move. If they are to move in response to climate change, where is the best place to put that, where are the best places to put reserves, and where are the best places to re-establish vegetation or conserve vegetation? There is a whole bunch of modelling related to that.

There is also work looking at how we would look at fire regimes because fire regimes will be one of the big things of change. We cannot do anything about the temperature, we cannot do anything about rainfall, but we can look at how we distribute habitat across the landscape and we can look at how we manage that in situ. The other large area of research is the investigation of the effect of weeds and pest animals—how would they respond? Which species will increase? Which will decrease? Which ecosystems that currently are not under threat may become under threat? Things change; as you change the temperature and the rainfall, the whole ecosystem dynamics will change. We have a lot of studies looking at that. Most of those 50 projects I have mentioned also are being done in collaboration with just about every university in New South Wales at the moment.

Mrs KARYN PALUZZANO: Has there been any early indication or any published documents?

Dr SMITH: There are a number of published documents. A lot of those studies are still in train. One of my staff published a paper in *Global Change Biology*, which looks at the effect of increasing temperature and reduction of water flows on invertebrates. It showed a direct trend in the reduction of those invertebrates. As mentioned in that speech before, that is actually a published study showing that certain aquatic invertebrate families have been declining—they like cool and fast-flowing waters—while those that have tended to be in stagnant and warmer ponds have tended to increase. A lot of the work we are doing is still just about ready to be published. If you look at it, there is some work that has been done in the past, but our own research has been ramped up over the last few years. Research does not get done in six months, one year, two years or three years. Of those 50 projects, there are about three or four, maybe five—I could not give you an exact figure and it may be better not to say a figure—there are a number of those that would be ready and published, but most of them are still in train.

Mr THOMAS GEORGE: There has been some concern raised in a submission about the potential loss of biodiversity with the possible sale and clearing of stock routes. Have you got any further comment in relation to that?

Mr ROGERS: I am deferring to Mr Grosskopf, whose area that is directly.

Mr GROSSKOPF: With the changes that have occurred in the administration of travelling stock reserves, the reserves and the routes, it is my understanding that the new regional organisations, whose name escapes me, animal health and livestock something—

Mr THOMAS GEORGE: The Livestock Health and Pest Authority.

Mr GROSSKOPF: Thank you. The new organisations are looking at the lands which are beyond their capacity to manage. It is my understanding that from there those lands are then returned to the Crown, the Department of Lands, for management and there is an assessment of their values at that point in time. The Department of Environment and Climate Change is working closely with the Department of Lands on the establishment of a methodology to undertake that assessment and to consider the environmental values of those sites both in terms of the values that are present at the site and also their role in providing connectivity between reserves. In a lot of our western areas, through the drift way, the sheep-wheat belt, the reserves often represent some of the best examples of native vegetation, good seed banks and stores which a lot of farmers use as local provenance for rehabilitation and revegetation projects. So that is basically the position as I understand it. Regardless of the tenure and who holds the lands, there are still laws and regulations relating to land clearing that would still apply in any circumstance.

Mr THOMAS GEORGE: Further to that, have they been considered or are they being considered to be included in the national reserve system at all?

Mr GROSSKOPF: Under our assessment methodology, we are looking at what types of travelling stock reserves would be suitable to join the reserve system, yes.

Mr THOMAS GEORGE: On another country issue, your submission refers to establishment and a representative system of the marine parks. Are there any other areas being considered for further establishment of marine parks or additional ones?

Mr ROGERS: Not to my knowledge. The recent suggestions did not come from the Department of Environment and Climate Change. I do not think there are any more currently on the agenda. I will take it on notice and double check for you but I am pretty sure that is the case.

Mr THOMAS GEORGE: Do you believe the existing ones that we have are adequate or representative of marine parks for environmental purposes?

Mr ROGERS: They represent a good cross-section of what is there. With the two recent ones that have been gazetted in the past couple of years, I think they are regarded as having an extremely wide representation along the coast. It is not my specific area so I would prefer to take it on notice rather than be nailed to the wall on that.

Mrs KARYN PALUZZANO: Getting to the climate change action plan, is there any component that will be looking at the research that you are doing and further decision making? Just looking at "reduce greenhouse gas adaptation and ensuring prosperity", is there any part of the action plan that is looking at harnessing the local research? For example, out our way we are looking at mussels in the Penrith lakes, in a built environment, taken from the Nepean. We are looking at how they can adapt and whether they will keep the lake system nice and clean and so forth. Is there any component of the action plan linking the research to further activities outcomes in the local area?

Mr ROGERS: I will perhaps try to put it in context. The action plan will cover a range of things where we have things we do now based on what we know now. There will be further research going on as part of the action plan so that it will not be, "Here's the action plan, that's the end of it". It will be, "Here's the action plan, that's the start of it", and we will keep doing research on other things. There will be other research that takes place at a local level which will feed into local decision making about those sorts of things. I do not know the piece of research you are specifically referring to. Dr Smith may or may not know the piece of research—

Dr SMITH: No. Mussels at a site of the Tillegra but not mussels in the Nepean river.

Mrs KARYN PALUZZANO: It was the University of Western Sydney, whether it is attached to DECC or not. It is probably outside the domain of DECC but it is part of what the universities out in the local communities are doing, looking at the impact of not necessarily climate change but of urbanisation on biodiversity and adaptation.

Mr ROGERS: Certainly part of the climate change action plan is to look at the effect of urbanisation and the effect that has on everything from water run-off and those sorts of things through to encroachment in other areas.

Dr SMITH: The climate action plan refers to development of a climate change strategic research plan or whatever it will be finally nominated, and in that there is the process—we are attempting to look at the process of how we integrate the science as we learn it, the information that we get, into policy formulation of adaptation strategies.

Mrs KARYN PALUZZANO: I think that was very well articulated at those regional forums because the first phase was looking at what the research has had impacts on around New South Wales and where the rainfall has changed.

Dr SMITH: Yes, those forums were a joint process in DECC where the science section, my section, and the policy group worked together to develop the information for those forums so we would be working closely and we intend to continue that process.

Mrs KARYN PALUZZANO: It is a mixed up model. That is why I keep asking, within the plan itself, whether there is that scope within the local plans with the research that is happening.

Mr GROSSKOPF: I was simply going to add I think the point that was made at the end there. My world is the policies and programs part of the world, and we certainly keep a very keen ear and are involved in

what happens with the results. So, moving away from the specifics of the climate change action plan, but more broadly when we get information about prioritisation, risk, threat and those sorts of things, that is when we respond in terms of our priorities in terms of the actions that we promote and the programs that we attempt to deliver. If we can just go back to the Great Eastern Ranges as an example, a few years ago—

Mrs KARYN PALUZZANO: I was happy but the Blue Mountains is not included—

Mr GROSSKOPF: No. The Blue Mountains are very much part of that network.

Mrs KARYN PALUZZANO: The Southern Highlands?

Mr GROSSKOPF: It is about joining them up. There is a lot of talk at the moment; there is a lot of debate in the scientific community at the moment about connectivity and the role of connectivity in a climate changing world. The Great Eastern Ranges initiative is a direct response to those kinds of findings out of the research world and that kind of discussion in the science community.

Mr ROGERS: If I can add: A lot of the Great Eastern Ranges, parts of the Great Eastern Ranges have large areas of national park in them, and this is in fact about providing some corridors between those so that if you get a change in climate, flora and fauna can actually move between areas so that we can protect them for the future.

Mr GROSSKOPF: Simply it is a matter of range. Most of our reserves, no matter how large we make them, will never effectively provide for the whole range and for the genetic diversity which is required for healthy populations. So being able to extend beyond the boundaries of the reserves becomes a critical part of biodiversity conservation. Our large bird species, the predatory bird species, are probably Australia's best example of where reserves often do not provide suitable range for those kinds of species.

CHAIR: The Committee understands that anthropogenic climate change has been listed as a key threatening process under the Threatened Species Conservation Act. What prompted that listing and what are the legal and management implications of the listing? You can take that on notice.

Mr ROGERS: I am not sure what prompted it. I know what the response is.

Mr GROSSKOPF: I am stuck on the prompt as well. The simplest answer would be a nomination to the Scientific Committee. I do not know the details of who made that nomination but a nomination to the Scientific Committee would be the process which started that investigation by the committee, then the public consultation by the committee followed by the publication of a preliminary determination and then a final determination.

Mr ROGERS: I mentioned the statement of intent in the opening but Mr Grosskopf would probably have more detail on that.

Mr GROSSKOPF: The statement of intent is DECC's primary response to the listing, and the statement of intent is about identifying what DECC's priority actions are in terms of anthropogenic climate change. You will find a lot of congruence between that statement of intent and of course the climate change action plan. There is nothing specific to my knowledge that results in a regulatory change as a result of the listing. So as a result there is now not a new heading under which a development must be assessed or anything like that. There is no new control that is put in place. But it is very much about raising awareness in the community. It is about seeking action from Government to respond and identifying it as a priority for action, and it is about us then developing programs to deal with those issues, of which the statement of intent and the actions within that are a key part.

CHAIR: So if an application for a development of a piece of land came across your desk and DECC was doing its assessment, would the implications of that be broadly read into what DECC's report back would be on that application?

Mr ROGERS: I am not sure that any assessment we did would feed in from that perspective.

CHAIR: Only that when you were saying that you need to make sure there are the connections between the different reserves and all those sorts of things, would you be looking slightly more broadly than you would have before, looking at the long-term implications from climate change?

Mr ROGERS: No. We are seeking to make the connections by voluntary agreement via the people. If the land were inhabited by a threatened species or something like that, the existing legislative provisions would apply. So it is not adding anything that is not there in that sense.

Mr GROSSKOPF: The schemes that we build, the assessment methodologies that we build, whether it is for biobanking or whether it is under the Native Vegetation Act, the PVP framework or whether it is to do with the code of practice for private native forestry, et cetera, we take into account a range of considerations. The position of vegetation or habitat in the landscape context is a matter for consideration in all of those schemes. So from that point of view, yes, it is a consideration. Climate change as a specific head of consideration is not something that we assess at a site scale. We look at it in terms of what are the issues around connectivity and those sorts of things, rather than on this site this has this kind of climate impact. It is too fine a scale for us to work out.

CHAIR: So if you are looking at, say, coastal development, and we know that there will be a rise in the sea level, what would that come under when you are looking at something like that.

Mr ROGERS: That would not come under the assessment of a project. That is part of the work that we are doing with the Department of Planning about providing guidance to what sorts of considerations should be taken into account to deal with a long-term potential sea level rise and other changes. We would not be commenting on a specific development in that sense but we would be working on the assessment methodology which people who would be doing the approvals would be working for the long term.

Mr RAY WILLIAMS: Does future urban development in terms of biobanking and environmentally sensitive areas apply under State environmental planning policies? Do they have to meet the same criteria as any other development in terms of protected species or native vegetation?

Mr GROSSKOPF: Under the biobanking assessment framework?

Mr RAY WILLIAMS: Yes. Do they all have to meet exactly the same criteria, even though it is under a SEPP?

Mr GROSSKOPF: I am sorry, I do not quite understand.

Mr RAY WILLIAMS: If it is under a State environment planning policy, like for a growth centre, do developers and landholders in those areas still have to meet the same criteria in terms of protected species?

Mr GROSSKOPF: It depends. There are many pathways through the planning system and I will not profess to be knowledgeable of them all.

Mr RAY WILLIAMS: I guess the follow-up question would be why.

Mr GROSSKOPF: A part 3A development, for example, which is called in by the Minister, does not, to my knowledge, go through to the same level—or there are other discretions available to the Minister under that scheme, rather than those that would be found elsewhere. That is a balance between the socioeconomic and environmental considerations. So that is probably the best answer I can give you.

CHAIR: Would the project have to be biocertified?

Mr GROSSKOPF: An area like the growth centre has biodiversity certification, which is the same standard as you would find under biobanking.

Mr RAY WILLIAMS: In terms of changing weather patterns and a reduction in rainfall that has been mentioned before, does the Department of Environment and Climate Change [DECC] see the significance of land now as being any less significant than it has been in the past and therefore would it see potential for low-lying lands to be perhaps developed in the future more so than they have been in the past?

Dr SMITH: Not all the State is looking at having a decrease in rainfall. Already New South Wales is quite complex climatologically: in fact, it is one of the most variable climatologically complex areas on the planet. So the north of the State is wet; the north-east of the State is quite wet. We are expecting the north-east of the State to at least get maybe a slight increase in rainfall, probably within historical variation. The area of the State that our projections give us that has a decline is the south and south-west. Depending on where you are in the State there will be less or more flooding. It is a bit hard to do. The global climate models do temperature very well, they then do rainfall less well and then evaporation comes. As you get more and more complex phenomenon they get those less reliably.

If you are looking at flooding, it is a really complex issue of the storm intensity, the amount of rainfall, the pre-catchment conditions—is the catchment wet prior to or after—the seasonality of the rainfall affected, and then if you are right in the coastal areas, sea level rise. Sea level rise will exacerbate flooding. Even if rainfall were to decline, you would have an increased flooding risk because if you have got, say, one metre sea level rise—we will not go to a particular—you have a king spring tide, you do have a storm event: your entire infrastructure in the low-land areas is already full of water. So you could have increased flooding for the same amount of rainfall. You could have increased flooding for even a lesser amount of rainfall. So the flooding issue is something that we have still a lot of research that we have got to do.

We are doing research into extreme weather events at the moment with the Bureau of Meteorology. We are beginning those projects. We have to get a much better handle on how the rain is going to come. At the moment the global climate models can give us a rough idea of what will happen to seasonality. Storm intensity is still an area in which we have a significant amount of work to do. Most of the storms that cause most of the flooding on the east coast of New South Wales are east coast lows, which are smaller than the global climate model cells; they are not able to be really picked up so we are still trying to understand about whether east coast lows will increase, decrease or stay the same. What happens to them and how that interacts with sea level on the coastal plain is going to drive the amount of risk for flooding that we have. So the big picture, the sort of, broad scale things of whether the rainfall is declining or increasing, does not give you the right answer in terms of understanding flood risk. Inland it might be slightly different but on the coast it is a very complex issue. Inland it is related to the storm intensities as well and the preceding catchment conditions.

Mr RAY WILLIAMS: In summary, DECC would consider that low-lying and flood sensitive land may be more vulnerable in the future than what it is currently?

Mr ROGERS: In some areas that may well be right.

Mr RAY WILLIAMS: Therefore, I guess, you would not be looking to wind back any of the local environmental plans that councils have in place in relation to their flood sensitive land?

Mr ROGERS: We are looking at trying to provide some enhanced guidance for councils on what might happen but as Dr Smith has indicated it is difficult to predict. We are predicting sea level rise and we can take account of that, but to actually try to predict what would happen—we certainly would not be looking to wind back anyone's planning arrangements. We do not have enough data on that depth of material. We are looking to try to develop guidance that will help people, if you like, take account of things like sea level rise but not down to the level of telling them where to go. We do provide guidance on flood manuals and we do provide assistance to councils to develop them. But I cannot predict at this stage what we might do.

CHAIR: I thank you for appearing before the committee. We may extend another invitation for you to return at the end of the hearing in order to clarify matters that may be raised in other submissions, if that is okay?

Mr ROGERS: I am happy to do so.

CHAIR: We thank you for the depth of your presentation and submission. Clearly you are doing a huge amount of quite complex work. The Committee is certainly keeping watch on what is happening.

(The witnesses withdrew)

GRAEME LEONARD WORBOYS, 3 Rischbieth Crescent, Gilmore, Australian Capital Territory, 2905, sworn and examined:

CHAIR: The committee understands you have not made a submission but you have provided some relevant background papers. Are you happy if that is published as part of the proceedings?

Dr WORBOYS: Yes.

CHAIR: I am advised that you have been issued with a copy of the Committee's terms of reference and also a copy of Standing Orders 291, 292 and 293 of the Legislative Assembly, which relate to the examination of witnesses. Is that correct?

Dr WORBOYS: Yes.

CHAIR: In what capacity do you appear before the Committee?

Dr WORBOYS: I am representing the International Union for the Conservation of Nature [IUCN] and within that larger organisation, one of its commissions, the World Commission on Protected Areas [WCPA], and within that I lead up internationally the Mountains Biome and Connectivity Conservation.

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 information you provide. I 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. Do you want to make a brief opening statement before we proceed to questions?

Dr WORBOYS: Yes. That is the purpose of the document I have just given you. Really they are points that can track what I present, just to make it easier. So I am actually on your page two—the witness introduction. I guess a little bit about background that will help this Committee is that I worked with the New South Wales National Parks and Wildlife Service for something like 27 years so I got my hands dirty helping to fight bushfires, treat pest animals and weeds, and later on as I went through the ranks, actually dealing with full incidents as incident controller and later on as a member of the executive of the parks service dealing with policy. Since then I have my own company working as a consultant. I lecture park managers, post graduates at the University of Tasmania and I have been a co-author and joint editor for international texts on how to manage parks, how to manage connectivity management. The latest one is just being published this year. So that is a background about myself.

In terms of the International Union for the Conservation of Nature WCPA—that is the World Commission on Protected Areas—I have given you in appendix one some background. So my intent is just to give you a snapshot rather than go into detail. The snapshot is that it is a non-government organisation; it is apolitical. Its principal purpose is to really lead up the conservation of nature worldwide. Within that subset the principal role of the World Commission on Protected Areas is to really ensure that there are global standards and best practice for protected area management all around the world and encouraging nations to facilitate the establishment of parks. So that is the IUCN. It has been going since 1947, and in the World Commission there are about 1,200 professionals involved, and it is by invitation only, so it is a very important organisation that helps a lot of countries.

This is an endorsement. I believe this inquiry is just a wonderful thing, that it is happening and these questions are being asked. In the new book that we are just publishing with IUCN I have done a summary which responds to the question you asked previous witnesses, that is, what global change factors really are impacting the planet? How serious are they? If you go to attachment two of these notes. You are privileged in the fact that this has not been published yet so you are getting it not hot off the press but pre-press! Page 11 deals with global issues. Really the advantage for you of that is that it is really tight. They are really crisp summaries.

So it is not just climate change, it is a whole range of issues which are really forcing our generation and the next generation to deal with some pretty hard decisions. So that is item three: What are the global change impacts and trends? Again my choice is not to dwell on that because I want to get to the latter part of this presentation. What I will quote is one of the summary statements in the Intergovernmental Panel on Climate Change that basically states:

> The resilience of many eco-systems is likely to be exceeded this century by an unprecedented combination of climate change, associated disturbances (e.g., flooding, drought …), and other global change drivers …

That is really a depressing statement that is recognising in 2050 there will be 9.2 billion people on the planet. When I started work there were 3 billion people on the planet. I am still working. There are 6.7 billion just in 30 years, so huge changes. These are from conservative scientists writing something like this so I think it is an important statement. Item four on page three refers to where I want to spend most of the time—how are we actually dealing with this. I guess I am not covering dealing with the root cause of climate change and the greenhouses gases. My assumption is that governments are going to be dealing with that, and dealing with that effectively, and actually lowering the amount of greenhouse gases in the overall atmosphere given that the atmosphere is finite. It really can only cope with so much.

Merging onto matters that fall within the ambit of this inquiry, that is things that help prevent further problems in the atmosphere, the retention of green carbon—if you have heard that language—preventing habitat destruction and fragmentation, will be really hard with so many people around. I guess that is one of the core points I wish to raise. The timing and the urgency of action is really critical as the population increases. The establishment and management of protected areas is one mechanism for doing that. You have already heard of the Great Eastern Ranges being talked about in terms of connectivity conservation, and that is another. Protected areas may be private, they may be government, they may be run by non-government organisations depending on where you are in the world. But usually connectivity conservation is a potpourri of different tenures and people committed to trying to do something; they may be private landowners, governments, whoever. A very famous ecologist working out of the United States said:

> [W]e applaud the growing community of scientists, environmental activists, planners, land managers and politicians who are working on behalf of the world's citizenry to prevent further fragmentation, to restore connectivity at all scales, and in the end to make the world healthier for all of its inhabitants.

That is why I said I like the idea of this inquiry, and the fact that it is happening. Stepping down from item 4, the global position, to item 5, Australian responses, and before I plunge into New South Wales, I note that the National Reserve System is good progress, but there really is an urgency to finish that nationally. I have given the inquiry an electronic copy of the International Union for the Conservation of Nature [IUCN] document about a climate change and protected areas conference held in Canberra in 2007. It was run by WWF and IUCN and it made a large number of important points. Basically, its summary statement stated that there is a need to protect refugia—if this language needs clarifying, please point that out. Further recommendations are to conserve large-scale migration corridors, maintain viable populations, reduce threatening processes, manage fire and invasive species, conserve connectivity, and really build effective climate change policies into protected area management, and meet the NRS targets.

That came out of that workshop and that is transferring it to you here, but basically it follows a consensus approach about minimising fragmentation and protecting habitats. I refer now to connectivity conservation on page 4. Just last week the G8 Ministers for the Environment endorsed both the establishment of protected areas and connectivity as key international strategies for looking after the last lands, if you like, on the planet. Have you heard of the program of work for protected areas? Have you heard of the Biodiversity Convention and the secretariat that runs that? Australia is a signatory to the Biodiversity Convention, the secretariat that administers that is based at Montréal in Canada, but it is global.

The Biodiversity Convention has 188 countries as signatories. Basically, it recognises looking after conservation and biodiversity in the best interests of the planet, humans and wildlife but also protected areas, which are really a critical instrument of how they actually do that. They have a program of work on protected areas and a target for the year 2010. Australia has signed off on that. Basically, it is a target that says "Let's have a representative and adequate reserve system by 2010 for terrestrial areas." I do not think Australia will make that, but it will come close and will certainly exceed it in some areas. Still, the path is being taken to do that. It also says, "Let's try to keep these large natural areas that are still left on the planet extant." Because when you are dealing with climate change effects that cross over many degrees of latitude, and if it is east-west, the longitude will change, and that can often be drying. If you are sweeping across the Himalayas, it will be wet at one end and dry at the other, but those changes will happen.

Latitudinally, there is a pole-ward creep in terms of the way species are responding. Altitudinally they are going up the mountains as well. There are shifts. The program of work on protected areas is saying, "Keep the connectivity together so it maximises the chances of species being able to actually do that." There is a large number that will not make it and a large number of extensions are already forecast. Some may make it. If you

create islands out of the remaining habitat, it will be harder for them. So the program of work on protected areas recognises that. The organisation that I am involved in has a strategic target of basically saying, "Okay, let us encourage nations to really keep these large natural areas intact", recognising that a lot of it will be voluntary with a lot of different landowners and so on.

Australia has just released Australia's Biodiversity Conservation Strategy 2010-2020, which recognises that. The Caring for Our Country initiative recognises that connectivity and protected areas are very important. Again, in that context about connectivity conservation, I have again cut a little bit out of the book, which I will not go into, about what we are talking about with connectivity conservation. It gives four basic one-liners, if you like, about what it actually means, what we are talking about. The bottom line is that it is mainly a biological conservation concept, although there are social and other aspects of that.

The last point is about effective management. Really, these lands need to be managed. If you have more pest animals and the fires are tougher and harsher, they need to be managed to accommodate that. New South Wales has done very well. However, there are patterns in the environment that are shaping the world, which is very different from our previous experience. I hate to say it, but scientists are now saying that the Victorian fires basically had been influenced by changed circumstances, thanks to climate change; that link has been made.

The first bullet point is an improved science-management partnership, more than ever before. But this is not science and research, doing research that just sits and collects dust; it is managers working with scientists. It is not done well enough in any area in this country to improve the agenda of how these are managed on the ground. The second bullet point is capacity building to actually deal with catastrophic events; they are forecast, and they have already happened in some instances. But really dealing with that and having the staff equipped to deal with it as managers is important, not just protected areas staff. Leadership in how they are actually driving around the countryside in their own vehicles—is it a gas-guzzler, is it something that is friendly to the atmosphere?—I assume the departments are doing that. But I have slipped into your package something we put on the website in 2005. Basically it is a checklist about your conscience; are you doing the right thing?

Leadership in a sense of business, economics and the new carbon economy and how you get smart about linking that back to biodiversity conservation is another point. We heard a little about that earlier with biobanking. So on page 6, it is about slipping into New South Wales. Internationally, New South Wales should be proud of is protected area system. It is really a leading system throughout the world, but my main point is that it is unfinished business. New South Wales states that itself. In 2008 it produced a report stating "These are the things we need to do." The urgency is my point. This is not something like, "Let us do another 20 years and get it finished." When I say "finished" I mean the 95 percentile level; there will always be bits and pieces linked to the reserve system that you will add.

There is urgency while the lands are still natural. All this combination of pressures allows that opportunity to happen. Item 6.2 refers to the Great Eastern Ranges Connectivity Corridor, Alps to Atherton. This country is one of the 17 mega-biologically diverse countries in the world. It really has a special responsibility. It is one of the few developed nations that have that. The area we are talking about is that span on the east coast on the document I am holding. I will leave this with you. On the other side is Commonwealth data about where the concentration of the species is. The red area on the map, on the east coast, hovering all around New South Wales, is where most of Australia's biodiversity is. It is not by chance. The Great Eastern Ranges have a very special role, among the total number of our vertebrate species—mammals, birds and so on—and the relationship between the forested environments of Australia. Most of them are in the forested environments.

Are you familiar with the word "endemicity", endemic species that are not found anywhere else in the world. These are species that are found only in a gully, or a ridge, or a river, or a patch, in New South Wales. Our country has the greatest number of endemic species on the planet; it is the number one world ranking for animals. They are not found anywhere else. Basically, we have a special responsibility to look after them. My point is that the Great Eastern Ranges [GER] have a special role, because that concentration of species is located where the GER is. That connectivity will help keep those species extant.

The other special point about the GER is that most of the water catchments for every town on the east coast is within the GER—the vision of an urban stream with its black water, or brown water, versus a crystal-clear mountain stream that you are willing to drink the water out of. They are two extremes. It is the healthy ecosystems that keep those streams extant and we are blessed in this country that we have got a lot of those traps

of country. The GER on private lands, on various tenures, helps keep those ecosystems healthy, and helps keep that water suitable for drinking in our catchments and for the majority of our Australian population.

Given that background, I go to page 7. For all the reasons that the planet is in a bit of trouble, there really is an urgency. The New South Wales Parliament and the New South Wales people will be very pleased in the long run to have a pretty comprehensive and representative reserve system. New South Wales has a really special role with the Great Eastern Ranges; it is the longest and largest opportunity for connectivity conservation in the country, it has the greatest number of species, and it has been there for 80 million years. Dinosaurs were in Queensland when the Great Eastern Ranges first established. Some of the plant species found in Queensland have been there, or are there, or their descendants have been there, since the time of the dinosaurs.

There is no other country in the world that can match that; 2,800 kilometres of interconnected natural lands that have been there forever. It would be so easy, broadly, to keep it that way; from Walhalla, from the Australian Alps, all the way through to Atherton in Queensland. It is a simple vision, and New South Wales has played a leadership role through Bob Debus when he was Minister for the Environment, and the Attorney General, for New South Wales, the Environmental Trust with its $7 million investment and the Department of Environment and Climate Change, which helped support this in the past two years.

My point is that in 2010 that investment finishes. It is too important at an international responsibility level, let alone a national responsibility level, let alone a New South Wales responsibility level, to let that go. The enthusiasm and support for this by local landowners, local government and mining companies in the Hunter, is quite remarkable. We have generated a 14-minute film, which was launched in Barcelona at a major international conference last year. I have provided a copy for each of you. It summarises the Great Eastern Ranges.

The next bullet point is about upgrading management. That is not to say management now is not good enough. I think New South Wales can be proud of the quality of its management on the ground for protected areas, but new management is needed for connectivity, which is across many Government departments, different landowners, catchment management authorities and councils. There is a whole new environment associated with a thing called connectivity conservation, which this State has not yet pushed the button on. Secondly, the work on protected areas needs to go up to a new logarithmic order, another layer of dealing with the complexity. It is really critical that that happens quickly, particularly with science in management. Change is going to happen so quickly that it will be important to understand that change. If you do not have scientists working on that, it will be harder.

In the last bullet point I suggest that New South Wales needs to take on a national leadership role in these issues. The inertia is deafening when leadership is needed and there is no reason that New South Wales cannot do that. I have left with you an extract from the new book—a best seller! It is not formatted. That is the way the publishers wanted it. It has the text of why the Alps to Atherton [A2A], or GER, is important. I will leave that with you.

CHAIR: Thank you very much for the depth of your opening statement. In your presentation you have answered a lot of our questions. The Committee has heard from DECC that supporting conservation on private land is an important initiative. Do you believe the current mechanisms for doing so in New South Wales are adequate? What incentives or mechanisms do you believe would be effective in encouraging conservation of biodiversity on private land?

Dr WORBOYS: That is a good question. I believe that what is happening is good. I believe you could go to the new logarithmic order I was talking about. The GER is a strategic response. Instead of dispersed activity and investment in properties it enables us to say we have a focus here and we would like to play our role in a national response to keeping the Alps to Atherton intact. We would like to see a strategic response to how carbon sequestration is invested so that a banking occurs. There are different initiatives in different countries. For example, non-government organisations are purchasing land with philanthropic money, changing the titles so the natural lands are kept intact and then reselling it. Are there are initiatives like that that could be introduced here to encourage NGOs to take that role on private lands? There is a scan of what is happening around the world to achieve every mechanism possible to keep the habitat and the interconnection of that habitat so that it will help biodiversity conservation, species and the response to climate change. There is a list of different mechanisms in this new book, but I am not really pushing a button on that unless you want me to go further.

CHAIR: No, that is fine. At the local level, people have an expectation of what their land is worth and there is a perception in the community that if it is zoned as, or indicated to become, conservation land, that actually pushes down the value of their land. How do we sell to the public that it actually makes their land more valuable in many different ways in terms of conserving biodiversity?

Dr WORBOYS: There are two answers to that, but I also stress that with the GER and in most other places where these things are happening it is voluntary. If people choose to covenant, there is no superimposition of a larger planning layer. It is a voluntary arrangement. But "What's in it for me?" is a good question. There are two courses of action. One, for example, is in Ecuador where there is a scheme that The Nature Conservancy kick-started with the Quito water supply authority. The high altitude grasslands are critical to the water supplies for Quito, the capital. How do you keep that intact when all the locals want to grow potatoes there and they are clearing the grasslands, which means the demise of the catchment? To keep the lands intact they are getting a resource rental, a revenue return, from the supply of the water. There is an incentive. That exists, it has been published and it is working.

Another course of action is green carbon, and we have not opened that door properly yet. Professor Brendan Mackey at the Australian National University has just published a paper on green carbon. Green carbon is called that because it refers to the forests that are holding carbon now. If you clear them—and they are on private lands—it drops more carbon into the atmosphere that you want to keep clean. It is not really smart, so what are the incentives to keep the green carbon there? That is one aspect. Not too many people want to lift that lid but it solves many problems: it keeps the water supply intact, keeps animals extant and keeps farmers happy.

Another aspect is carbon sequestration; for example, the Blowering foreshores of Kosciusko National Park are old farmlands. Why should not that area, which is part of Alps to Atherton and part of the GER, have preferential investment in new plantings, which will help restore Kosciusko National Park, bring down the amount of carbon in the air and is also a targeted investment? I do not think that is happening enough. It is not a case of what is in it for the landowner, but you could have targeted landowners who would benefit from the re-plantings.

Mrs KARYN PALUZZANO: In your submission you referred to a case study for Alps to Atherton.

Dr WORBOYS: Yes. It should be among the documents provided to you. That is the one I apologised for and said it did not have all the figures and diagrams. It is just the text but it gives you the meat about Alps to Atherton. It recognises New South Wales language for this part of the Great Eastern Ranges.

Mrs KARYN PALUZZANO: Are there any on-the-ground examples of what is happening in the GER?

Dr WORBOYS: Those are the five locations Tom Grosskopf referred to earlier—the Southern Highlands, the Hunter—

Mrs KARYN PALUZZANO: Let us drill down. What are they doing?

Dr WORBOYS: Keep in mind my role here. I am on the subcommittee on this for the Environmental Trust so that is why I have some knowledge but I am not the expert. They are doing a range of things. They are working in partnership with Greening Australia; they are working in partnership with the Kosciusko to Coast and Slopes to Summit initiatives. That partnership is looking at the treatment of threats—pests, animals and weeds—but also restoration in some places. It is educating by having field days and workshops to pass on this information. Some of that is in the film I have given you copies of. That document you have is one of DECC's brochures. It shows the map and the location of the five areas.

Mrs KARYN PALUZZANO: So each of those five areas that have been identified in New South Wales would have local projects happening?

Dr WORBOYS: Yes.

Mrs KARYN PALUZZANO: And they were chosen because of their sensitivity?

Dr WORBOYS: They were chosen for a number of reasons. Certainly they were chosen because they are important environments within the overall GER in New South Wales. Secondly, there is a greater need for

restoration. In other words they were gaps in the linkages and there needed to be interconnections. I think those were the primary reasons but they were chosen for good environmental reasons.

Mrs KARYN PALUZZANO: The main thrust of this, and what is so good about it, is the connectivity. You have a national park over here and a conservation area, and those bodies and local landowners and a catchment management group are all now sitting around a table. Is that correct?

Dr WORBOYS: The community and people side of this is absolutely huge and really important. It will succeed or fail depending on how that works. In terms of the connectivity and what is in it for biodiversity and for the catchments, I guess an example is the possum being kicked out of the nest when it gets too big for mum and dad. That is dispersal, just moving into the next catchment. If the next catchment is a cleared paddock that has been fenced, the possum cannot move on. There is movement of animals but it is different from the movement of the grizzly bear wandering along from Yellowstone to Yukon and throwing its weight around over a distance of hundreds of kilometres, which is its home range. For us, with a 13-year drought, birds have nowhere to go. It is baking hot in the Riverina and there is no water, so the birds that would normally be there go back into the home range of the GER. If that were not there, then the birds would have nowhere to go. Connectivity is important for that dispersal and migration. Every now and again when there are major emergencies in the natural environment like these humungous droughts and very large fires—which regrettably are normal for our country but that is the way it works—there are still larger areas that are unburnt from where species can recolonise the burnt areas over time. That is certainly what is happening in the Australian Alps right now.

Mrs KARYN PALUZZANO: You also noted that the funding ceases in 2010. Obviously it is spread between three States. Is there communication?

Dr WORBOYS: There is work between the three States and the Australian Capital Territory, but in New South Wales the Environmental Trust is so important it must not stop. It is important in the long term for this country. Some of the silence about progress in the other States is deafening. They are committed to a lot of things. I guess there could be a little more urgency to some of this work. I believe New South Wales can have a leadership role. It is already doing it in part but it could be louder.

CHAIR: The DECC submission stated that alpine areas are one of the ecosystems most vulnerable to climate change impacts. Could you explain that further and are there any management strategies that could be specifically adopted in alpine ecosystems?

Dr WORBOYS: Yes. I am working on that question and answer. The response is really tight. I will pass these documents to you. There is a trendline for the Australian Alps for the last 50 years and a graph on the other side of the document that shows the average snow levels. That is real-time information. There has been a decline in snow levels, which is why the ski industry should be worried, if it is not already. The graph hits the bottom line, zero snow in 2070. That is real-time data, and on the flipside of one of those sheets is the forecast of the amount of snow remaining based on old intergovernmental panel data. To answer the question about the impact on species, the mountain pygmy possum is one of the few Australian species that hibernates during winter. It relies on the snow cover above it to do that because it insulates. The snow compacts the vegetation and the possum sleeps in the little air zone below the compacted vegetation. That always stays around zero degrees. If there is no snow, it will not be zero; it will be minus 12 or whatever. The temperatures will be below freezing. That is an endangered animal. The scientists are saying that that animal will lose through climate change. It is one of a number of species.

That is one of the policy decisions that government organisations such as the Department of the Environment will have to make. How much money do we put into making decisions about whether or not we keep that species alive artificially? Is it warm and cuddly? What about all the unique mountain grasshoppers and other things? Do we also keep them alive? This will occur not only in relation to mountain species; it will also occur in relation to a pattern of species all over New South Wales. In future we will have a changing managerial environment when making community and social decisions about whether or not to keep a certain species alive.

Fire is a major issue in our catchments. At present I am working on an understanding of the condition of our catchments. We are obtaining forecasts of the condition of catchments and how they might change, and we are aiming at forecasting water yields. We want to understand the nature and trends of those yields relative to the whole of the Murray-Darling River, as that is where most of the water ends up. Some of the environmental flow goes into the Snowy River but most of it ends up in the Murray-Darling River. What

managerial conditions need to be put in place to maximise water yield and to help the maximum number of people downstream of the Murray-Darling River?

Answering those questions means dealing with resilience, which is a technical term. How can we keep pest animals, weeds, and other matters from threatening the integrity of the catchment? How can we ensure that the alpine humus soils maximise the retention of water, which is what they do now? We will lose that if the catchments are disturbed. Deep and sharp creeks will be cut into that humus soil and when we have big mountain storms the water will immediately zap down into the Hume Weir and we will not have the steady, long-term flow that is really needed.

The Australian Alps are particularly vulnerable and their role in the country in supplying that water yield is great. We have to get that management right. That is why I said in my submission that the management of our protected area systems and the linkage between science and management must go up in logarithmic order from where it is now. However, I am not saying that it is not good now. I hope that I have answered your question.

CHAIR: Currently the Government is putting in place conservation policies for different areas across New South Wales. Will that identify those areas in the long term? Will people know what areas have been set aside and what areas are available for development?

Dr WORBOYS: I apologise, as I do not think I can answer your question. I do not have enough knowledge about what the Government is doing.

CHAIR: Thank you for the depth of your submission and for your obvious passion in this area.

Dr WORBOYS: Good luck with your work; it is a great inquiry.

CHAIR: I am sure you will monitor our proceedings and read the final paper that is put out.

Dr WORBOYS: Thank you.

(**The witness withdrew**.)

PHILIP JOHN GIBBS, Principal Fisheries Scientist, Department of Primary Industries, Cronulla Fisheries Institute, 202 Nicholson Parade, Cronulla, sworn and examined:

CHAIR: I welcome Dr Gibbs, the representative from the Department of Primary Industries. I understand that you have not made a submission but that you have contributed to the submission of the Department of Environment and Climate Change?

Dr GIBBS: That is correct.

CHAIR: I am advised that you have been issued with a copy of the Committee's terms of reference and also with a copy of Legislative Assembly Standing Orders 291, 292 and 293, which relate to the examination of witnesses. Is that correct?

Dr GIBBS: That is correct.

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

Dr GIBBS: As the Principal Fisheries Scientist.

CHAIR: I draw your attention to the fact that your evidence is given under parliamentary privilege and generally you are protected from legal or administrative action that might otherwise result in relation to the information that you provide. I also point out that any deliberate misleading of the Committee might 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?

Dr GIBBS: I apologise on behalf of Mr Austin Whitehead, Director, Water and Resource Policy, within the Department. He was to give the general overview of the submission of the Department of Primary Industries. We found out only this morning that he has been taken ill and that he is unable to attend. We have submitted—and it has been distributed—a copy of the overview document to which Austin would have spoken, and undoubtedly about which you would have asked questions. I am happy to go through that at a brief level but obviously I do not have a lot of detail about it. My main area of expertise relates to fisheries and marine resource matters.

CHAIR: Are you happy for this document to be tabled as part of the proceedings today?

Dr GIBBS: Yes.

CHAIR: If there are any questions that you cannot answer are you able to take them on notice?

Dr GIBBS: Yes, I am able to take those questions on notice and come back to the Committee with written responses.

CHAIR: Thank you.

Mrs KARYN PALUZZANO: You said earlier that you were a principal fisheries scientist.

Dr GIBBS: Yes.

Mrs KARYN PALUZZANO: Within the parameters of your research do you examine what is in our saltwater and freshwater systems?

Dr GIBBS: If I could make a presentation, which I suspect will take about five minutes, it will give you a general overview of the principles of the work done by fisheries. I think you have been distributed with a copy of this PowerPoint presentation, about which I am happy to talk. I will refer, first, to the fisheries sector so you get some idea of the scope that is covered by the fisheries group within the Department of Primary Industries. The fisheries sector is responsible for natural aquatic ecosystems; wild harvest fisheries, whether they are recreational or commercial; aquaculture; and aquatic pests and diseases.

The next slide is a brightly coloured satellite thermograph. I will speak briefly to this slide as it leads to the key impacts of climate change on natural resources. In a marine environment, as against the terrestrial environment, the east coast eddy system along our coast relates to fisheries recruitment, fish distribution, local biodiversity and where we site marine parks in the marine environment—and I am concentrating on marine. It is also worth noting that the current systems off our coast are heavily linked to terrestrial issues, for example, the east coast lows program, which I assume someone from the Bureau of Meteorology has spoken to you about, et cetera.

A lot of the heat that is associated with causing those lows comes from the ocean currents, the red area depicted on the slide. In simple oceanographic terms, New South Wales has a cold current that comes up from the south and it has a warm current that comes down from the north. Just off New South Wales they all eddy off and transition, so it is an area where there is a high degree of change. It also means that many species in our marine environment are on the northern limit of their range and others are on the southern limit of their range. Variation under climate will cause significant shifts in our marine resources, which will have implications for fisheries management as well as for the siting of our conservation zones.

On the next slide I listed the major impacts that are likely to occur under variations in climate as they affect our marine biodiversity, for example, the East Australian Current which is moving south and bringing heat to the south; the increasing severity and frequency of storm surges which connect with the east coast lows—that is also the major supplier of water into our agricultural systems—and the shift in the seasonality of that. Freshwater flows in our estuaries impact on estuarine fauna. One issue that is well documented under water quality is the increasing acidity of the ocean and what impact that will have on a lot of our marine fauna that have calcium carbonate shells. Oysters are a good example of that in our aquaculture industry. We have been doing some research in that area. There are issues relating also to rises in sea levels.

I refer, next, to the slide that depicts a great deal of colour. The New South Wales marine environment is extremely variable, but added to that is climate change. Reflected on that slide are two CSIRO [Commonwealth Scientific and Industrial Research Organisation] sea surface temperatures, which are a day apart over a period of 12 months, that is, December 2006 to December 2007. Without going into detail that slide shows us how far up a cold current could have pushed—the blue colours on the left verses the warm red waters on the right. Pick a spot such as Sydney, which has a latitude of 34 degrees, or pick an area near the top of Smoky Cape and you see the extreme variation that we get anyway. Climate variability or climate change is likely to increase that variation and that increase will lead to significant fauna changes.

I have outlined in the next few slides what is happening as a result of climate change in the fisheries and aquaculture areas. I refer to the Commonwealth Government document, which at the time was released in August 2008, which lists the implications of climate change for Australian fisheries and aquaculture. I presented the four main areas in which the Department of Primary Industries is involved in the national climate change adaptation research facility—the Fisheries Research Development Corporation—which is one of the research development corporations [RDCs]. Of course, there are other agricultural RDCs but I am concentrating on the fisheries area.

The adaptation of fisheries and fisheries management to climate change in south-east Australia is a large program of work which is a collaboration between Tasmania, Victoria, New South Wales and Queensland. I have mentioned at the end there the Eastern Seaboard Climate Change Initiative, which I am sure Peter Smith mentioned. I notice that Peter was on the list and I am sure he mentioned that: I cannot imagine that he did not. Fisheries is involved in that.

If I then just flick over the next two, which is all I will speak to, these list some of the currently active projects. The first page lists three projects which are large-scale, big picture projects. There are lots of components that come together with them. They are elements of our core activities as a fisheries division within the Department of Primary Industries, and clearly there are major elements within those that relate to climate variability or climate change. The third or next page, which lists three specific projects, refers to projects at another level down. They are smaller in size and they have specific implications for climate issues.

I thank you for indulging me and letting me go through that in answering your questions on what my experience covers and what our research covers. These six programs are what we cover and I have given you the background to what we are trying to address.

Mrs KARYN PALUZZANO: Okay. The Committee made an inspection visit down the Hawkesbury from Windsor to Wisemans Ferry. We were there with the Hawkesbury-Nepean Catchment Management Authority.

Dr GIBBS: Yes.

Mrs KARYN PALUZZANO: They raised the issue of the climate change research they are doing on salinity and the movement of the salt.

Dr GIBBS: The salt wedge?

Mrs KARYN PALUZZANO: Yes.

Dr GIBBS: Up and down.

Mrs KARYN PALUZZANO: Yes. Obviously there would be an impact of increased salt intrusion into freshwater rivers. Is there any rollout of that second dot point, what you are doing with the provision of regional maps and the work you are doing with the CMAs in relation to that salt wedge?

Dr GIBBS: Indirectly, yes; directly, no, because it is dependent upon modelling of the freshwater flow. I mentioned the east coast lows, which are outside my area of expertise, but that is a knowledge base we take the output of. With the change in freshwater flow systems and if we take the models, there has been within the Department of Primary Industries—not in the marine area, but in the agricultural area—an examination of regionalising and downscaling some of those models. That is mentioned in the documentation that Austin would have spoken to. We can therefore take the outputs of those models and the models DECC has produced—I am sorry, I am thinking of what information you might have. I assume that Peter Smith and others spoke about the regional modelling and CMA modelling they have done.

Mrs KARYN PALUZZANO: Yes.

Dr GIBBS: Okay. We can take the outputs of those models which will then tell us where they predict, based on less flow into the river or more flow into the river at different times, where the salt wedge will be. That then has implications for the vegetation habitats, such as the salt marsh mangroves and your fringing reed beds. The mapping that is going on now provides current and hind-cast historical mapping of where habitats have been. It has not been done, but with that baseline you can then overlay the predictions from other departments and predict where you think, or forecast where you think, the habitats may move to.

Remember that it is a highly variable environment, and the rate of change will be slow. That is why I showed those eastern Australian currents and our estuaries. The Hawkesbury is also exceptionally variable, but it is possible, and of course it is the ultimate aim of a lot of the modelling and the mapping.

Mrs KARYN PALUZZANO: What role do you believe fishing and aquaculture industries could play in the impacts on biodiversity—for example, changing the catch limits for particular species or gathering data about populations?

Dr GIBBS: If you go back to the programs on that other page there—

Mrs KARYN PALUZZANO: The big picture one?

Dr GIBBS: Yes. There are three big pictures ones, and the second dot point there is about implementation of adaptive fisheries management strategies and share management plans. That is a large program of work—effectively, it is the management of our fisheries. In doing that, we collect information for that purpose, which is obviously one of the objectives of the Fisheries Management Act.

We must manage those fisheries sustainably from a commercial or recreational harvest viewpoint, and maintain biodiversity. Under the objectives of the Act, maintaining biodiversity is above sustainable management for harvest. Therefore we collect information that is provided by the fishers. We also do fisheries independent sampling. We also do research sampling of an ecological basis, so that we have within the Department a significant amount of information on the existing situation in many areas.

Under some of our modelling, if we go up to one above that project, we are trying to take some of that information. Using forecasting models that we are working with the CSIRO on—it is a model called Atlantis—we can actually look at what possible changes could occur. We are also able to do analyses to show that there are different fish communities in the north of the State compared with the south of the State, and some of that work has been published. That is well known in general terms and documented by many people. Obviously, using forecasting from the models, one of the predictions is, for example, that abalone is on its northern limit around Broughton Island. Abalone will contract south, we believe. Lobsters will probably do the same—contract south—because they are a cold water species.

As part of the third program, which is the monitoring, evaluation and reporting program [MER]—a whole-of-government program—both lobsters and abalone are included in that program specifically for that purpose. So one of the big tasks is to separate climate change and climate variability from human-induced anthropogenic changes. We can do exactly the same in estuaries, and one of the big things that will affect estuaries is freshwater flow to the estuaries—which is why I had that up front there, wherever it was—where more than likely you have, on a yearly basis, a decrease predicted, though there will be bigger storm events. So you will have a general decrease, but with these bigger flows.

Mrs KARYN PALUZZANO: A flush.

Dr GIBBS: A general decrease but with bigger flushes. Some animals will cope with that, and some will not.

Mrs KARYN PALUZZANO: Obviously that is where you collaborate with the Department of Environment and Climate Change [DECC] in relation to the freshwater flow issue.

Dr GIBBS: Yes.

Mrs KARYN PALUZZANO: Because if you are looking at the Hawkesbury-Nepean system, the changes to do with urbanisation and water reuse schemes will have an impact on the freshwater flows. The data that you are putting into the estuarine and coastal habitats program will obviously have a pattern. All the predictions would have to be calculated with that so they know that the recycling project for St Marys, Penrith and Quakers Hill will come on line, and that on X date there will be so many litres into the system, or from a certain date onwards.

Dr GIBBS: Yes. As I said, we do not actually do that component of modelling. We take the output of information from our colleagues who are working in that area. That is not our mandate as the Department of Primary Industries, to do reuse planning of water, et cetera.

Mrs KARYN PALUZZANO: Okay.

Dr GIBBS: We would take information from DECC and information from the Department of Planning, or the output of their models, more than actual movement information. I know that Sydney Water, and as you probably know better than I, works rather strongly in this area.

Mrs KARYN PALUZZANO: Yes, it does.

Mr RAY WILLIAMS: Just in relation to the estuaries and the waterways and in particular the Hawkesbury River, one issue raised by the prawn fisheries in that particular area is the shallowing depth due to siltation. Is that something that you take on board when you are studying that? They tend to believe that the shallowing depths are not conducive to strong prawn farming in those areas, and believe that that will diminish significantly unless something is undertaken. Of course, what they are suggesting should be undertaken is also controversial, and that is the dredging of the navigable channel to improve the depths for the prawns.

Dr GIBBS: Yes, that is interesting. Just for the record, I am a little out of my direct area of knowledge, so I am referring to work of my colleagues. I just have to think to make sure I have all the right points there. There has been quite a bit of work done through a program of work looking at prawn fisheries and looking at the relationship between prawn fisheries and flow of water down the rivers. Some recent modelling was done by Dr Matt Ives on the Clarence fishery. He has quite a comprehensive model that looks at how you can predict prawn catches, et cetera.

Over the past three or four decades, there has been a significant amount of work done by various academic institutions—universities—and by the Department on the relationship of prawns to different habitats, et cetera. The lifecycle of the prawn is such that they spend quite a bit of time up in the shallow areas of the estuaries. The shifts that have been seen in prawn catches out of places such as the Hawkesbury to my knowledge are not correlated with changes in water depth which might be due to siltation. That is my knowledge.

CHAIR: Do you know what work is being done on the potential economic impact of these climate changes? Obviously you talked about abalone and lobster, but there will be other opportunities as other species move south from Queensland into New South Wales, I assume. Are there any retraining programs to redirect some people who are currently engaged in particular activity to take opportunities?

Dr GIBBS: I will have to take that question on notice, I am afraid. It is a little bit outside my area. The only thing I would do is refer you to the program of work that I mentioned the Fisheries Research and Development Corporation is working on and note that it is now an RD&E program, so it is more than research and development. It also includes the economic issues, and the inclusion of economic and social aspects into the work we do is increasing. I am a biologist by training. I have become more involved in the social and economic sciences, but even our funding bodies are at a Commonwealth level.

Fisheries, being relatively small, applies for funding at the Commonwealth level because there is not a lot of State funding. The economic aspects are becoming far more important. In order to put projects forward, there needs to be an economic component to them. While I have not answered your question directly—and I can take that on notice—I note that across the fisheries research area the economic and social implications are becoming far more documented and important.

CHAIR: In terms of adaptation, do you know whether there are any projects for the construction of weirs or anything to define areas between the salt and fresh water, where the crossover happens, to protect the integrity of the fresh water further upstream?

Dr GIBBS: Again, I will take that on notice, if I may, other than saying that historically there was a program of work within the fisheries branch of the Department of Primary Industries that mapped the blockages to fish passage for the coast. There are some two reports, I believe. I think Robyn Pethebridge and John Harris were the authors of one, but I would need to take that on notice and check. That mapped for maybe 10 years ago where these barriers were which provide the protection that you are looking at. In many instances we were looking at that from a different purpose because they are barriers to fish movement and many of our estuarine fish move between salt and fresh water. So the aim was to put fish ways, fish locks, remove them, whatever provided passage. So, yes, there is a listing of them at a point in time, which undoubtedly could or may have been updated but I do not have the information.

CHAIR: Thank you for attending the hearing today and for your presentation. We will send back with you some questions on notice because they are outside your area of expertise.

(The witness withdrew)

(Luncheon adjournment)

JEFF SMITH, Environmental Defender's Office, Level 1, 89 York Street, Sydney 2000, and

TOM HOLDEN, Environmental Defender's Office, Level 1, 89 York Street, Sydney 2000, affirmed and examined:

CHAIR: The Committee understands that you have made a submission in the form of a draft discussion paper but at this stage have asked the Committee to treat that as confidential. Is that correct?

Mr SMITH: Yes.

CHAIR: I am advised that you have been issued with a copy of the Committee's terms of reference and a copy of the Legislation Assembly Standing Orders 291, 292 and 293, which relate to the examination of witnesses. Is that correct?

Mr SMITH: Yes.

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

Mr SMITH: I am a solicitor and also the Director of the Environmental Defender's Office [EDO].

Mr HOLDEN: I am the Scientific Director at the EDO.

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?

Mr HOLDEN: The Environmental Defender's Office welcomes the opportunity to address the Legislation Assembly's Standing Committee on Natural Resource Management regarding the inquiry into management strategies to address the impacts of climate change on biodiversity. The EDO is a community legal centre specialising in public interest environmental law. We provide legal advice and assistance to individuals and community groups who are working to protect the natural environment. As stated in our introductory letter, which was attached to our submission to the inquiry, the EDO has recently prepared a draft discussion paper on the topic of this inquiry and the draft paper comprised our submission to the inquiry.

The draft paper reviews the current legal framework in New South Wales for the protection of biodiversity and begins the process of evaluating the adequacy of the management tools provided for under this framework to protect biodiversity under climate change. We have sought feedback on the draft paper from various legal and scientific experts, including holding a roundtable which went through the draft paper and the issues raised in it. We are currently in the process of finalising the draft paper in accordance with this feedback. The focus of the draft paper is on the broad legal framework for the protection of biodiversity, not on ground management strategies, and I guess this is what we would like to constrain our discussion to today.

The draft paper and the feedback we received on it raised a large number of issues, many of which we have as yet no concrete conclusions about. However, it seems to us that climate change raises three issues in particular that have broad implications for the way we manage biodiversity in New South Wales and we would like to discuss these further today. The issues are, first, the current conservation objectives generally aim to maintain the status quo, to prevent change and to keep things where and as they are, which we think will be impossible to achieve under climate change. We feel climate change will require us to rethink our conservation objectives. Second, and related to the first issue, climate change will require us to think further about the concept of prioritisation, both in terms of determining what species should be listed for protection and in terms of determining what species should be the focus of recovery and threat abatement efforts once listed. Third, climate change will create a greater need to shift our focus in terms of planning and development assessment from the site scale to the landscape scale.

CHAIR: The draft discussion paper is an extremely comprehensive summary of the relevant scientific and legislative frameworks. When do you think the paper will be finalised and what do you think is likely to happen as a result of it?

Mr SMITH: Good questions both, I guess. I should say that is the only reason that we have presented it on a confidential basis. Obviously it is in a draft and we want to put before the Committee and before various organisations the best information and best thinking available. So that is the only reason that we have put it on that basis. We are probably hoping, I would think, to have it publicly available in, say, two weeks time. Would that be realistic—two or three weeks time?

Mr HOLDEN: Yes. We will be finalising it over the next two or three weeks and hope to have it done by then, yes.

Mr SMITH: To answer the second part of your question, the issue arose for us because some time ago I was asked to do a conference paper on this very topic and spent a lot of time and thinking doing that formative thinking around it, and it turned into an area where we thought that it would be useful to feed in some of our thinking to the Government about different ways you can do that. So we would intend to do that at the earliest available opportunity but in any event we note that there is a review of the Threatened Species Conservation Act coming up shortly, so I mean we would hope to get it in shortly so that it can be considered, I guess, as part of that whole process. So that is why we are doing that.

CHAIR: Your paper raises a lot of key issues about the conservation framework but it does not make clear recommendations about how they should be improved. Are you able to tell the Committee what the EDO thinks should be done to improve the framework?

Mr SMITH: I think the paper is unusual in that respect. Normally the EDO would be more prescriptive, if you like, because that is our role as an expert-based body to make those kind of recommendations. The starting point for this work here is that the issues are so fundamental that we want to recognise the importance and the profoundness of the changes that are needed. I think we risk overstating our case if we go, "So on the basis of all this uncertainty we need to do A, B and C". So that is why the paper is more open and raises more issues than specific ideas about how you do that. Having said that, some of the very specific things that we would say are we need to engage in these issues. The Government needs to take up these issues and take climate change seriously and begin to talk about the logic of what we are trying to do with that fully in mind.

One of the analogies would be, we were talking the other day about the changes to water laws in New South Wales which happened in 2005, from memory, and onwards. If those kinds of changes had taken place 10 or 15 years beforehand, they may have had quite fundamental effects on the regime but we lost those 10 to 15 years. I am not saying there was any deliberate reason behind that, but if we can get ahead on these issues, now that we are beginning to know in broad terms what climate change challenges will be thrown up, then we should be doing so as early as possible. So that is one observation.

There are a number of other specific recommendations which I think would fall out of a later version of this paper. We talk about, for example, key threatening processes, and you could identify that is already part of the framework of the legislation in New South Wales. We have, from memory, 31 key threatening processes identified. We have made, as part of the commentary and the narrative, suggestions about four more but that has not quite flipped into a recommendation yet. There are all sorts of things that we would hope to be able to specifically put to the Government in various hues based on our own legal and scientific analysis, but also a recognition that this is new for all of us and needs to be a bit of an intuitive process. That is why we have put it forward in the spirit in which we have put it forward. We do not want to pretend that we have all the answers.

CHAIR: Are the impacts of climate change fundamentally different to other threats to biodiversity or is it just exacerbating existing threats?

Mr SMITH: It is probably more a scientific question. I am happy to have a go.

Mr HOLDEN: I think the issue for us in this discussion paper was whether climate change requires us to do things differently to how we have been doing things already or how we have been trying to do things already or whether it requires us to fundamentally change the legal framework. I guess my thinking is still not concrete on this but it seems that in many ways climate change is about doing what we have been trying to do

for sometime in relation to biodiversity conservation but doing it better and perhaps at a more urgent pace. I do not think that is true for everything. I think climate change perhaps requires us to refocus, take some of the things that we have already been doing and give more weight to them, give more importance to them. For example, at the moment we largely do impact assessment work at the site scale in New South Wales. The impacts of development are assessed at the site scale in most cases. Governments have already moved to expand that and assess impacts at a landscape scale, which would better address cumulative impacts, and also just generally better protect biodiversity, or at least provides a mechanism to do that. It is something governments have been starting to do anyway. Climate change I think just makes it even more important that that is done. So I think it is about perhaps refocussing some of our efforts.

CHAIR: When you talk planning at the landscape level are you referring to the regional conservation strategies that are being developed?

Mr HOLDEN: In the paper I am more referring to the biocertification process. In the paper we did not really look at regional conservation strategies although probably will for the final version. So we have not thought through that issue. Yes, I mainly mean in terms of biocertification, which essentially means impacts are assessed at a landscape scale as opposed to the current process, which assesses things at a site, or project by project level.

CHAIR: Do you have any specific comments on the current biocertification process?

Mr SMITH: We do. Our position on biocertification has been tempered by what has happened recently. The Government passed new laws giving recognition to biocertification and we were very supportive of that regime and the idea of maintaining or improving biodiversity values and also a more strategic outlook to take it away from the site-by-site approach, which really has not helped anyone—it has not helped the environment, it has not helped development or it has not helped the Government. So we were supportive of those things. However, we had concerns with the operationalisation of that idea in the growth centres State environmental planning policy, which gave rise to some clients who came to us and sought our assistance to take a legal challenge, and the Government passed special legislation to overturn that legal challenge.

At least out of that the whole process has given us the opportunity to think more about what kind of regime you would want in place. Really our thinking is that maintain or improve is a good way to go. It has become a concept with some certainty around it. There are about five or six different legislative contexts where that term now rises in New South Wales. Our suggestions would be to simply ratchet up the level of protection around that so that the maintain-or-improve test would be a more objective test, for example, and that the Minister would need to be satisfied of certain things before he or she was able to certify that that test had been met. We have done quite a lot of thinking around that as well, but that seems to be pretty much the direction I think that we should be heading.

I would have to say most people from the roundtable, and other observations, are of the same view that those types of mechanisms are really the kinds of things that we want because they give you the certainty that we all crave, and as long as everyone knows what the rules are, and they are set out up-front, and everyone abides by the rules of course along the way, as long as it is a legitimate process, then that is a good way to approach these questions.

CHAIR: Finally, where does New South Wales sit compared with the rest of Australia in relation to biocertification? Have we kept up with the pack or are we ahead of the pack?

Mr SMITH: The idea of biocertification, I think, would place us quite well in terms of the approach. As I have said, we would like to see some more rules and regulations around what that means but I would have thought there are only a couple of other approaches in other jurisdictions in Australia that I am aware of which applies that level of rigour, so I think we are quite well up there in terms of Australia. That would be my assessment.

Mrs KARYN PALUZZANO: Your discussion paper is fairly comprehensive. It summarises the relevant scientific and legislative frameworks. Apart from the roundtable forum, what process did you go through to develop the paper?

Mr SMITH: Correct me if I am wrong, Tom. As I said it started in-house when opportunistically I was asked to do a paper at a conference. I did that with the usual kind of peer review process that you would do for

that process. Then when we saw the opportunity arising to take it further we added in the scientific work within the office, in-house again, and prepared our own discussion paper. Then we took that piece of work and we went out to peer review and that is the process we are currently going through. So as well as the roundtable, participants of which were people such as David Farrier, Michael Dunlop, Simon Ferrier, Tony Auld from the Department of the Environment and Climate Change, Jan McDonald from Griffith University, Terry Bates, and Martin Faulding, we had three lawyers and four or five scientists I think. There were probably half a dozen other people, if not more—six to 10 people—who could not make it or did not want to be involved formally that we sent it to as well. As I said, we are now in the process of capturing all of that information and trying to work out where we go.

The important aspects of that process for us, as the title suggests, is the legal and scientific issues. We have not engaged with industry and conservation groups, for example, because we think that is the Government's role if it wants to do that. If it thinks there is anything in it, it can do that. We are trying to confine it to an expert-base piece of work that the Government may or may not be interested in. So that is pretty much it I think. Also, I guess, with the roundtable we are not trying to get any kind of consensus. If expert A says A, and expert B says B, then we will just reflect that in the paper. It will be our paper at the end of the day, informed by those people, but we are not after their sign off or any of that kind of stuff.

Mr RAY WILLIAMS: In line with that and who are the specific stakeholders in relation to the environment—I notice some of your work involved private property owners to whom you made quite a lot of reference and to private properties being important in retaining biodiversity of the environment—I would have thought they were farmers and landowners themselves. When we talk about the environment and biodiversity do you take into account the fact that if we do not produce our own food and fruit, it will have to be imported, and therefore more greenhouse emissions will be produced, et cetera? Is there a balance taken into that equation?

Mr SMITH: I could not agree more; those stakeholders are important, but with this paper we did not talk to stakeholders. You could argue that lawyers and scientists in their own right are stakeholders, but we did not talk to them as stakeholders; we spoke to them as experts. There is the full spectrum of conservationists, obviously the Government will have a view, as will industry, landholders, indigenous groups, and so on. We do not have the resources to do that. We did not want to do it in a way where we trade off and say, "Okay, the landholders think this is a good idea, but on the other side the conservationists think that", and so on. We do not want to play that role.

We want to say that this is our expert-based opinion on some ideas and say that if the Government is interested in that, it should go out and talk to everyone. Landholders are absolutely key, where one of the themes of this paper is that private conservation has a key role to play now and under climate change will have an increasing role to play. I do not disagree with anything you have said.

CHAIR: The paper makes the point that obviously not all species can be saved in the face of climate change. The paper talks about the lifeboat dilemma of working out who should be saved and why. How do you think such prioritisation would happen in practice? Is that a scientific decision or a political decision?

Mr SMITH: I can start off answering that question, but ultimately it will become useful to hear from Tom Holden as well. The reality is that we cannot save everything, even if we did not have climate change on the horizon. We need to hold to that aspiration and clearly that is what the international law, right down, recognises that we try to do. The dilemma which we have, and which is accelerated by climate change as the scientists tell us, is that it will be increasingly difficult, and tougher decisions will have to be made. Our interest is in the aspirational, we want to try to save everything. So, we avoid playing God, but how do you go about that? What is the next step? The objective is to try to save everything, but your goals are what we need to focus on; how to actually go about trying to do that.

I guess that is where the issues about prioritisation come in. The prioritisation is really in two parts. The first is how to prioritise what gets on the list, which is an issue in itself, but more importantly, what you are getting at is how to prioritise when something is on the list. That is what we have been giving quite a lot of thought to. Again, we are not at the point of being able to say definitively, but some of the points would be that at the moment we focus all of our attention on the threatened species. Once you are doing that, you are too late; it is not very strategic. You are watching while something moves from abundance to scarcity. And only at the point of scarcity do you start doing something about it.

So, our thinking is about trying to turn that around, trying to focus on what is called "functional species"—and Tom will talk more about that—and species that are important for other species regardless of whether they are rare or abundant at any time; they are important as part of the system. Also, there is the resilience of species and ecosystems, and so on. That is what we are trying to talk about, the science around prioritisation.

Mr HOLDEN: Yes. There are two things there; the point Jeff Smith just made is the idea about listing things that are not threatened. Some scientists have talked about the need for focusing our conservation efforts on species that are not necessarily threatened but that play an important role in ecosystem resilience so that they maintain the ecosystems of which they are a part. At the moment we focus on and give protection to threatened species and we do not give protection to these species. One of the ideas that came out of the discussion paper process was whether the Threatened Species Conservation Act could provide for the listing of these species, particularly because climate change will require ecosystems to be resilient if we are protecting them. By giving added protection to those species that provide for that resilience we are probably doing a good thing.

The initial part of the discussion related to prioritisation. As Jeff said, you can think about prioritisation at two levels. The first is prioritising species before they are listed. So deciding what gets listed in the first place and then prioritising species once they are listed, and that relates to recovery efforts and threat abatement efforts. A point to make is that prioritisation does occur at the moment on an informal basis. I think the Threatened Species Conservation Act says that the Scientific Committee must prioritise what species are listed in the first place, but we are not sure how that happens. If there are criteria, they are not clear or transparent, and not made publicly available, not that we have seen anyway. Secondly, once species are listed, prioritisation certainly occurs on an informal basis, because some species get recovery plans and some do not. Some species get a lot of money for their recovery and others do not.

CHAIR: If they are cute and cuddly?

Mr HOLDEN: That is right. The point we make is that prioritising based on iconic, or cute and cuddly species may not be the best available use of resources. A fair bit of work has been done by some scientists at the University of Queensland, and they have done some work for the New Zealand environment department and come up with a method for prioritising. The Queensland Environmental Protection Agency also has its own method. New South Wales has the Priorities Action Statement, but the problem with that is that it does not prioritise between species—it lists [brief interruption].

All species get recovery actions listed against them and we may have 1,000 species listed, and there are 3,000 high-priority recovery actions that need to be implemented, which is impossible to do obviously. In our view, there are problems with the current priority action statements in New South Wales as well. The other thing is that, yes, prioritisation is definitely a scientific thing, but also society needs to get involved in determining what we should protect and why.

Mr SMITH: And again, that is another example of where we need to think about this as a community; think about the values. You would not want to do it blind to science, but you do not want to do it blind to what people are beholden to, or to cultural values, or to the efficacy of what you are doing as well. All those things are part of the mix. At the moment we do not talk about that at all, we just have this general idea that we will save everything and then it all goes into an administrative bin, if you like, where decisions are made. We need to be more transparent, honest and upfront about exactly what we are trying to do and how we go about doing it, and bring the community along in that process.

CHAIR: To clarify that in terms of any recommendation that the Committee could make, are you saying that we should create a list of species that should be absolutely preserved? Even before they are endangered, we should list those that are important to each of the ecosystems, and we should do everything to protect them upfront?

Mr HOLDEN: When we talk about prioritisation we have applied it mainly to the threatened species process. It is almost separate from that, to have the idea to list species that are not necessarily threatened and that play a key role in ecosystem functions. It can feed into the prioritisation process, but it is almost a separate idea in itself. It is something that we thought might be useful. I am not sure, we have not thought fully through all the difficulties in doing that—identifying species that play key functional roles is not always easy. That is one of the difficulties. We did throw it up as an idea for discussion at the roundtable. Again, there were no concrete answers, but it certainly was an idea that people seemed to think would be good.

Mr SMITH: Worth trying.

Mr HOLDEN: Or worth thinking about more.

Mrs KARYN PALUZZANO: Did that look at key functional groups within ecosystems? Can you elaborate on that?

Mr HOLDEN: We mean that a key functional group is essentially a group of species in which all the members play the same role. Say five species belong to a group and they all play the same role in maintaining the ecosystem. If there are a lot of species in the same group, that is called redundancy. In theory, it means you can lose nine of them; as long as you have one left the ecosystem is still being maintained, but you would not want to do that. If you have only one left out of a group of 10, and you lose it, the role it plays is obviously gone and the ecosystem may degrade. So, some scientists have said that where you have a group of species all playing the same role and there is only one left, or only a few left, that is where we need to target our conservation efforts.

Mrs KARYN PALUZZANO: You would have a position on the management framework there, in that situation?

Mr HOLDEN: Maybe they are the sorts of species that we could list. They may be threatened already, and may already be listed, but some of those species may not be threatened and do not meet the criteria for listing. Hopefully, we should be thinking about listing them.

Mr SMITH: Essentially it is a bootstraps argument. If you can save those obviously the rest would be there. The logic is that if you save those and the ecosystem is saved, that is better than targeting the things that may or may not die off or go extinct anyway. That is trying a different approach among the matrix of approaches that we can do.

Mrs KARYN PALUZZANO: Your concern over the priority action statements is that there are so many of them?

Mr HOLDEN: There were just so many priority actions listed against each species. Every species had priority actions listed against it. I forget the figures, but there were thousands of high priority actions. Obviously the Government is not going to have the resources to implement each one.

Mrs KARYN PALUZZANO: How could that be improved?

Mr HOLDEN: Firstly we need some criteria to prioritise between the species. So instead of having high priority actions against each of the thousand species, we have high priority actions against only 200 of those species. That decision-making criteria for deciding what species we give funding towards is obviously really important. As Jeff said, we need scientific input into that, but also society needs to get involved in making those decisions.

CHAIR: What sort of role does conservation of private land have in maintaining biodiversity? How do you think the options for private conservation could be improved to encourage more landholders to participate in such schemes?

Mr SMITH: I am happy to answer that. What is the first part of the question?

CHAIR: How important is the role of private land in conservation?

Mr SMITH: As I said in my response to the question from Mr Williams, we think it is fundamental and will become increasingly so. The public land estate is never going to be able to get the conservation benefits that are needed, nor would you want to rely on that as an instrument in itself. Climate change throws up issues around connectivity and the fact that the ecological values will change over time, so you would want to be protecting land in different areas. One of the obvious ways to do it is through the management of private land. Most land in New South Wales, if not Australia, is privately owned, so it is clearly an important part of what we do.

The second part of your question was about how well we do it and some of the ways that we can do it. I think we have made enormous strides in the past few years with, for example, the Native Vegetation Act and the way it brings the logic of the matrix to the individual landholder's parcel of land. That is the same logic that we have at large: some land should be public, some should be private, some should be developable and some should be betwixt and between. We do a fair amount of work on private conservation because it is an area that we are interested in and we think gains can be made. Also, our Northern Rivers office does quite a lot of work giving advice in relation to that.

There is a degree of frustration around what is clearly an issue, without getting too romantic about it, that is theoretically in everyone's interests. It is one of the few issues that are a win-win situation. Yet for people who want to engage in private conservation there is a degree of frustration. If they want to do a voluntary conservation agreement, it takes a long time. You need a certain amount of personal will and dedication to make it happen. At a policy level it should happen a lot more easily than that. There should be enough bells and whistles in the system to encourage farmers to go down that path if that is what the Government wants to happen. There is an enormous degree of frustration about how bureaucratic that process is and how long it takes. That is one example.

I think we need to look at those options where the conservation of land as a stewardship arrangement begins to make economic sense. You cannot talk about private conservation as a purely philanthropic measure. If we are going to go there, then we have probably got a lot of the low hanging fruit already. We need to move to the next level of people who want to preserve their land but also want to make a living out of it. That is where the economic incentives need to be ratcheted up, I guess, so that that equation is easier for people to make and more palatable. Things like biobanking are starting to get to that point. We have not seen that in practice but at least it takes up the logic of ongoing payments for land and hopefully over time the logic of the market will push people in that direction and we may see some gains. That is the kind of mechanism we need to be looking at.

CHAIR: In my area on the Central Coast there is a fair bit of greenfield development happening and people are being asked to set aside land for wildlife corridors when they are doing a development. One of the big problems we have is that that sounds good and looks good on paper. I think they are setting 50-metre wide corridors but if there is a powerful owl in the area, you need more than that. Is some of this making us feel good but not actually achieving anything? Are we in some ways getting worse outcomes because the land is not being used to its potential and we are not saving the species either? We have the trees but through those actions we are killing everything anyway.

Mr SMITH: I will leave that one to Tom. It is in no-one's interests to mean well but not to do well. I could not agree more with that. We need to do it properly from everyone's point of view, and it needs to be scientifically based to make sense. Those kinds of deals do not work if they keep people happy at a political level but do not have the conservation benefit that they purport to have.

Mr HOLDEN: One of the difficulties is that if you ask five consultants the technical question of whether an offset is adequate, they will have five different answers. It is very difficult to know whether an offset is adequate. In any case, when you are offsetting in a development sense it is always in exchange for a loss elsewhere. Whether you are getting an overall maintain or improve outcome is always going to be dubious. Biobanking is very controversial but at least there has been some attempt to clearly define offset rules. We understand a fair bit of work has gone into scientific data that backs up those offset rules. We understand they have got expert panels together and in determining the question of whether an offset is adequate you refer to the data that has been collected through this expert panel process. That will tell you whether the offset is adequate. Using expert panels is a consensus building process and in our view it is better than using the opinion of one or two ecological consultants. In terms of the rules around offsetting and what makes an adequate offset, biobanking has gone a step in the right direction.

CHAIR: What about where people are asked to set aside their land but it does not meet the criteria for biobanking? Is that a hole at the moment?

Mr HOLDEN: Do you mean in terms of an offset site?

CHAIR: Yes. We have an area in which a certain amount of land had to be offset under the biocertification. That has been set aside but the quality of the land does not meet the criteria for biobanking, because it has been used for goat farming and that sort of thing. They are caught in no-man's land.

Mr HOLDEN: My understanding is that with biobank sites, the offset sites, the director-general can determine whether an offset site can participate in the scheme. He has some things to consider when making the decision but they are fairly vague. My understanding is that most sites are eligible to be biobanking sites, but the issue is there will be less credit for a site in really poor condition than there is for a site in better condition or moderate condition. You actually get most credits for sites in moderate condition and fewer credits for sites in high or low condition. There are no clear criteria on the adequacy of biobank sites.

CHAIR: Thank you for coming along this afternoon and for your submission to the inquiry. We look forward to seeing the finalised paper in a few weeks' time. Hopefully it will feed back more information for us to use as part of the recommendations we make.

Mr SMITH: Would you like us to send the final version to this Committee?

CHAIR: Absolutely, thank you. We would appreciate it.

(The witnesses withdrew)

JOHN MARK DANGERFIELD, Environmental consultant and author, scientific representative of the Natural Resources Advisory Council, 6 Banjo Place, Springwood 2777, affirmed and examined:

CHAIR: Thank you for coming along this afternoon. I am advised you have been issued with a copy of this Committee's terms of reference and a copy of the Legislative Assembly's Standing Orders Nos 291, 292 and 293, which relate to the examination of witnesses.

Dr DANGERFIELD: I have.

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?

Dr DANGERFIELD: I am pleased to do that. On behalf of the Convenor of the Natural Resources Advisory Council, Phyllis Miller, we are grateful for being able to make a submission to the inquiry. We welcome it and we think it is an excellent initiative and an important topic. You will have received our written submission. I would just like to highlight a few points from the submission.

As you know, the Natural Resources Advisory Council is a stakeholder forum for advice to Government on natural resource management and land use policy, so we have a wide range of differing views and opinions around the table. What I am going to present to you is some of the collective wisdom, if you like, of those people but it does not detract from their individual thoughts, as I am sure you know.

We are all aware that climate change and natural resource management issues are complex and require an enormous amount of knowledge and management of that knowledge. In fact, you might think of it in this way: there are issues that we know about; there are issues that are unknown but knowable; and there are unknowables. In this area the issues that we know about have stayed more or less the same—we have increased a little of what we know—but our unknowns that are knowable have increased dramatically, so our uncertainty level has gone up. That issue affects everyone and it will also affect our sources of information. It is important that our institutional, financial and knowledge building systems become strengthened and more innovative. We need to be much lighter on our feet than we have been in the past and government has a strong role to play in that process.

I refer, next, to our general recommendations. These are in no particular order but overall they are indicative of the general consensus among Council members. We imagine that the future economy of New South Wales would work with nature rather than using nature as a straight utilisation process from a production point of view. That is an important issue and a view that is held widely as we go forward. Another important issue is: What is biodiversity? It is not just a series of entities; it has value and goals in itself and it relates to more than just species and habitats. Government actions to sustain the health of systems and their biodiversity must be well coordinated. I will not say too much about whether we think that that is the case at the moment, but we believe that issue is important.

Clearly that is an area for policy direction and accountability. We need a general approach to how we understand those issues that are known and those unknown issues to which I referred earlier. Integrated assessment monitoring and accountability for that information, both at a local and a regional level, are important. We still struggle with the idea of measuring outcomes and output. We are not too bad at measuring output but we are not so clever at measuring outcomes, which is particularly important when we are dealing with biodiversity issues as the effect of climate change impinges upon them. It is important for us to respect and to acknowledge the Aboriginal heritage relating to these issues. It must be understood that Aboriginal people have considerable knowledge about these issues.

Management agreements, in which the Council has been involved quite heavily, are an important part of this process. As a council we recognise that there will be significant costs as a result of our inaction. If we sit on our hands on this issue it will cost us a lot more to fix later. When we take action on this issue it is important to involve everyone. A bit of an "us" and a "them" thing is going on in relation to this issue. Some people are destroying biodiversity and other people are there to protect it. Clearly, that is not the reality. In reality,

everyone is involved in the process of management and the process of sustaining biodiversity. As you will see in the documentation we made more specific points, in particular, relating to information and accounting systems. We believe that information is critical.

Generally, the Council members are not convinced that our current information systems are as effective as they could be, in particular, for the biodiversity issue. We also believe that capacity building and partnerships are extremely important. You might be aware that the Council has in place a forging partnership program—a small grants program that enables innovative relationships to be built in the community. We believe that those things should continue and be promoted. Notwithstanding that, biodiversity conservation in itself through these traditional methods is important. From a scientific perspective I have my own views about how we might go about that. However, the whole idea of conservation measures is still critical to its overall success, particularly in a changing climate. Our future investment must be aligned with many of the things that I have already mentioned, and there are ways of doing that which I am sure we will be able to discuss.

Summing up, three of those things should be condensed. First, I think—and the Council talks in this way—this is an opportunity for landscape management. It is a difficulty and a challenge but it is also an opportunity for us to come together and manage the landscape more effectively. Clearly, government is a critical part of that process. Second, what we do is natural resource management. As a society we go out and we manage the environment and that changes things. That cannot be avoided. Conservation has to be balanced around that change. We now have an external change that is impinging upon our actions. That interrelationship and synergy are critical for us to understand. Under those circumstances it is not an "us" and a "them" issue.

Finally, biodiversity is a consequence—it is not an "it". It is not an object that we can put in a box or in a reserve and save; it is a consequence of what the environment is and has done over millennia, and it is also a consequence of what we have done to it over the past few hundred or past few thousand years. That is a brief submission from the Natural Resources Advisory Council. I again thank the Committee for allowing us to present that information.

CHAIR: Thank you. Your submission states:

> New South Wales government policies and programs for sustaining ecosystem health and biodiversity are worthwhile and necessary but need to be improved in order to sustain resilient ecosystems facing the likely impacts of climate change.

To date, what do you consider to have been the most successful policies and programs and what key improvements could be made?

Dr DANGERFIELD: If you asked the Council that question, it would be encouraged by some of the policies that are around, for example, the development of accounting for natural resource and biodiversity issues such as the biobanking scheme. The property vegetation planning process has its pros and cons but, overall, it is considered to be a step forward. When the Council put riders on these things it often suggests improvements in the following areas. For example, if you could put more than one business unit into a property vegetation planning process and get a sub-catchment scale type outcome, that would be an improvement to the overall policy. Little things like that have not been included in our presentation. We think that the details of some of the policies have been well developed, but clearly there are areas for improvement.

CHAIR: Your submission calls for all policy and pricing disincentives for biodiversity restoration and conservation on private land to be eliminated. What are the current disincentives and what policies or incentives should be in place to encourage biodiversity conservation on private land?

Dr DANGERFIELD: I will have to pass on that question or take it on notice because that comes from a different part of the Council and I am not aware of the detail.

Mrs KARYN PALUZZANO: You referred in your submission to communication and you said that the Council believed in communication strategies. What do you or the Council recommend? Does the Council have a position on how we should improve these things?

Dr DANGERFIELD: The Council is developing a position on communication. It has realised that communication is an important issue in the climate change scenario. Stakeholders are saying that their members are aware of the issue but their understanding of the issue is not what it might be. The whole policy of communication and how it is delivered are issues at which the Council is beginning to look. We believe it is

important and it will achieve togetherness. If everybody is to work in the same direction, obviously good communication and understanding are essential. Does that answer your question?

Mrs KARYN PALUZZANO: Yes. I was interested in the Council's position on it. The spread of pests and weeds is a threat as a result of climate change. Do you believe that current practices are having an effect on the management of invasive species? What policies or programs should be implemented to prevent their introduction and limit the spread of invasive species?

Dr DANGERFIELD: I do not think I can speak for the Council but I can give you some indication of what we might be able to tell you. Many Council members—I include myself in that equation—are concerned about the issue of weeds. The approach to managing on a species-by-species basis is probably unsustainable in that individual species are of considerable economic concern and need to be dealt with as individual species. As a collective issue, how do we manage the integrity and resilience of ecosystems as a whole that will give them their own resilience against weedy species? It is more a question of us getting land management right across the landscape rather than a question of tackling individual species. The list will continue to get longer as the climate changes.

Mrs KARYN PALUZZANO: Does that relate also to monitoring threats? You advocated for the development of systems that assess and monitor threats to the health and diversity of our ecosystem. Could you explain further what that system might look like?

Dr DANGERFIELD: We have talked about this from an overall information management point of view, but our current approach to gathering data is mostly from the top down. It comes from a State environment level type of reporting initiative, which is important and is included in what needs to be done but it does not deliver information to the individual landholder, forester or conservation manager to be able to deliver sound management on the ground at the management unit level. One of the things for which we advocate is an improvement in the way we go about measuring things—we might measure slightly different things from those that we have done in the past—and they should be well integrated.

The current monitoring evaluation systems, if you like, should provide a platform for that. Rather than defining what is measured from the top down we should begin to build a sequence of measurements from the ground up, but they should be able to be implemented and sustained by a framework that is delivered potentially by government. Our technologies are well advanced to do that but it requires a different level of thinking, in particular among agencies, as to how that is delivered.

Mrs KARYN PALUZZANO: Did the Council provide a submission relating to the Climate Change Action Plan? Was it part of the stakeholder group?

Dr DANGERFIELD: I do not think that we did, but I will also take that question on notice.

Mrs KARYN PALUZZANO: Are Catchment Management Authorities represented on your Council?

Dr DANGERFIELD: The Council represents a wide range of stakeholders Catchment Management Authorities are represented by two members. Also represented on the Council are conservation groups, agencies—ex officio directors general or members—and a number of individual producer groups including farmers, the Minerals Council, and so forth—in other words, a broad spectrum of people. Consequently, consensus on the detail is often difficult, but I think the broad picture is a strong one—that is, there is a will for better cooperation, for want of a better term, between parties on this issue. Farmers will not be the people who destroy biodiversity in the future and nor will conservationists be the people who preserve biodiversity in the future: it will be a combination of those groups and many others doing things together in a collective fashion. That is how the landscape will function in our changing climate.

Mrs KARYN PALUZZANO: Obviously it is the role of your Council to feed the data that it has collected to the Minister?

Dr DANGERFIELD: We have done that in a number of ways. We have worked closely with agencies in working through their monitoring and evaluation reporting [MER] process and we have commented positively on the MER strategy. We have also looked at the current State catchment reports. Generally, we try to be encouraging about all those things, and some significant advances have been made. We have a tremendous capability in the scientific staff in those agencies in relation to those issues. However, coordination is lacking. I

believe that top-down issue to be a problem because it tends to make facilitation a little difficult. The stakeholder groups who are more involved with the practical aspects of life on a day-to-day basis want some of that information. They would be very happy to use, and feed into, that information, so do not ignore them as a source of valuable insight in that box of unknowables that we talked about earlier.

Mrs KARYN PALUZZANO: What would you see as the best case scenario for reversing what you have just said from the top down? How would it work?

Dr DANGERFIELD: I think the way it would work is that the agencies should continue to embed their structures for their current reporting systems, but perhaps they should not be so wedded to the suite of indicators they currently have because they are operating at a very low scale. Often money is spent on these things that is not necessarily a good return on investment. But then I think there needs to be—and I am talking more off the top of my head really here, so again take it as it is coming out—more of a working with the information needs of stakeholders so that we can start to manage the sorts of information they need.

For example, if you are looking at biodiversity loss on a regional basis, we simply do not have the data points on the ground to measure whether that is happening very well, and currently not even the vegetation types are spatially mapped. So the Council has done a lot of work in trying to encourage that process of getting native grasslands particularly well mapped and categorised. That basis of information, if it is made available to individual users and producers, would enable them to say, for example, that they can manage their property—"Well, look, I have managed this more efficiently which has increased this proportion of these species on my paddocks." That kind of direct interaction with the database is what I think we would need to encourage. It is more about enabling than it is about actually saying, "We're going to be the ones that provide the data." Do you see what I am getting at?

Mrs KARYN PALUZZANO: Yes, I do.

Dr DANGERFIELD: It is a really tricky one because it is not a traditional thing that we have done in the past. The scientists have gone out and collected the data, and the scientists employed by the agencies are the ones who have gone and done it. And, yes, they need to provide the framework for it. They need to be the quality assurers and the quality control people, but they are not necessarily the people who gather all the data.

Mrs KARYN PALUZZANO: It is also a cycle. In the first statement, you mentioned communication as well. If it was easily communicated, that would not be an issue.

Dr DANGERFIELD: Correct.

Mrs KARYN PALUZZANO: But obviously it has slumped dramatically, and it is coming out narrowly. As community representatives, we often see the flipside of the local hands-on groups acquiring that information. When they are applying for grants, they are actually doing these community action plans.

Dr DANGERFIELD: The other thing that would be really good is if you could report the outcomes at that level. The ability to report project level outcomes is really difficult partly because of what you say—the capability is not there in the local groups because they have other things that they are good at. We need to enable that a little more.

Mrs KARYN PALUZZANO: That is right.

Dr DANGERFIELD: I think that is one of the solutions.

Mrs KARYN PALUZZANO: This has come up in other inquiries on what would be the best group, the best agency and the best way to facilitate that.

CHAIR: Linking into that, the submission talks about past public investment not being sufficiently well targeted or long term. What do you consider being the key problems with that? What should be the priorities and focuses for investment?

Dr DANGERFIELD: Again, I do not think that is something that the Council has directly addressed. However, there are some general principles. Just going back to information management as an example, a considerable amount of money is spent on the State MER strategy, for example; yet the infrastructure for data

management did not emerge from that spending. That is where we would question the targeting of the spending. The spending was probably correct and was reasonably well resourced. There will always be people saying they need more money, but the targeting of it really did not build in the foundation for developing information management into the future at the levels that we need it. I think there are other examples like that—for instance, the reserve system, and purchases of the reserve system. I think this will not be a Council view, but there are members on the Council who might argue that some of the recent purchases—for example, out in the west for water flow—were not necessarily well-spent money, even though they would have direct potential benefits.

Targeting the spend is something that I think the Council would certainly be keen to see. How you go about that requires everyone to be more open in what their requirements and needs are. I suspect that will be a challenge for government because those needs are going to become more acute as time passes.

CHAIR: I suppose soil mapping would come under that as well.

Dr DANGERFIELD: Soil mapping would be part of that process. Anything that gives base level information for more than one user would be extremely valuable for government to provide, but it is no good going out and doing that if it sits in a system that nobody can access.

Mrs KARYN PALUZZANO: That is right.

Dr DANGERFIELD: That is a real problem. When wearing other hats, I have been involved in gathering some of those data and trying to use them. Even though they are publicly available, they are extremely difficult to use and you need a couple of PhDs to be able to figure them out. That is not very helpful for local landholders.

Mrs KARYN PALUZZANO: No.

CHAIR: This is a question you may not be able to answer. A few of the stakeholders who have put in submissions are concerned about unsustainable logging of native forests. I note there was a report published either yesterday or today stating that the forests are not growing back as fast as people originally thought they would. Do you consider that the current practices to ensure sustainable logging are sufficient?

Dr DANGERFIELD: Speaking for the Council, I would say there would be both views—yes, and no. There would be members of the Council who would say that logging must stop yesterday, and there will be members of the Council who will say that it is still sustainable. Those are the kinds of detail of the debate that are being tested around the table in the form of the Natural Resources Advisory Council. In the end it is about people not necessarily understanding what we mean by sustainability.

Sustainability economically is not the same as sustainability from an environmental perspective, and particularly from the biodiversity perspective. Sustainability does not mean we will keep everything, and I think that is a real challenge. You probably heard it today. There are strategies around saving this and keeping that and looking after the next thing. We will not be able to keep everything. That has to be a given. So it becomes a prioritisation of what we want to keep and what we should be keeping.

Again this is not necessarily a Council view but rather a more personal one from a person who as a scientist spent 20 years or so trying to figure this stuff out. We should focus on the serviceability of biodiversity as well as the ability of the environment and nature to deliver the services that we use and to keep our systems running smoothly.

Putting carbon back in would be quite handy, actually. The whole soil carbon issue is really relevant in this debate. If you put another 1 per cent of carbon back in the soils of New South Wales on a broad level, you not only would make a fair bit of cash on the sequestration front, but also you would probably save a lot of biodiversity because the system would start to be much more healthy, retain more nutrient, retain more water, grow more trees and the forest would become more sustainable. You would end up with a much healthier system. The reason it is denuded by 2 to 3 per cent carbon is because we cut down the trees over a period of 200 years.

Mrs KARYN PALUZZANO: That is right.

Dr DANGERFIELD: So it is simple. It is not rocket science.

Mrs KARYN PALUZZANO: We put those old D9s in, or a couple of horses and a bit of chain.

CHAIR: We actually saw that in practice when we visited a property near Orange where they had gone back to more traditional non-plough methods. The paddocks certainly were healthier. They had worked out that the worms, et cetera, were positive and they did not have to go out and kill them all if they managed the pasture properly. So I think out that way they are starting to learn that. There is quite a big group that is pushing those techniques.

Dr DANGERFIELD: It is not simple in our environments in New South Wales: There are parts of the State in which that system works just like that—no problem at all—and you do not even have to worry about it. No till or minimum till, or you go to rotational grazing, and it works perfectly. But in other parts of the State, it is a bit slower: maybe it is drier, but there are still mechanisms and methods, and you can play with the tactics that are used to perform land management. So it is really getting our natural resource management right. That is more what it is about. If we do that, then everybody should be happy.

CHAIR: Thank you very much for attending this afternoon, and thank you for your submission. We have another date of hearing after which we will be publishing our recommendations. I am sure people will be interested to comment on those when they are published. Thank you very much.

Dr DANGERFIELD: Thank you.

(The witness withdrew)

The Committee adjourned at 2.54 p.m.