



COMMONWEALTH OF AUSTRALIA

Official Committee Hansard

SENATE

ENVIRONMENT, COMMUNICATIONS, INFORMATION
TECHNOLOGY AND THE ARTS REFERENCES COMMITTEE

Reference: Extent and economic impact of salinity

TUESDAY, 6 SEPTEMBER 2005

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SENATE

ENVIRONMENT, COMMUNICATIONS, INFORMATION TECHNOLOGY AND THE ARTS

REFERENCES COMMITTEE

Tuesday, 6 September 2005

Members: Senator Bartlett (*Chair*), Senator Troeth (*Deputy Chair*), Senators Conroy, Lundy, Ronaldson and Wortley

Substitute members: Senator Stephens for Senator Conroy and Senator Adams for Senator Ronaldson

Participating members: Senators Abetz, Adams, Allison, Boswell, Brown, George Campbell, Carr, Chapman, Colbeck, Conroy, Coonan, Crossin, Eggleston, Evans, Faulkner, Ferguson, Ferris, Fielding, Forshaw, Humphries, Ludwig, Mason, McGauran, Moore, Nettle, O'Brien, Payne, Robert Ray, Siewert, Stephens, Watson and Webber

Senators in attendance: Senators Adams, Bartlett, Siewert, Stephens, Troeth, Webber and Wortley

Terms of reference for the inquiry:

To inquire into and report on:

An assessment of the long-term success of federal programs that seek to reduce the extent of and economic impact of salinity in the Australian environment, including:

- (a) whether goals of national programs to address salinity have been attained, including those stated in the National Action Plan for Salinity and Water Quality, National Heritage Trust and National Landcare programs;
- (b) the role that regional catchment management authorities are required to play in management of salinity-affected areas, and the legislative and financial support available to assist them in achieving national goals; and
- (c) what action has been taken as a result of recommendations made by the House of Representatives' Science and Innovation Committee's inquiry 'Science overcoming salinity: Coordinating and extending the science to address the nation's salinity problem', and how those recommendations may be furthered to assist land-holders, regional managers and affected communities to address and reduce the problems presented by salinity.

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Committee met at 6.05 pm**BAKER, Mr Peter, Program Leader, Integrated Water Sciences, Bureau of Rural Sciences****LEE, Mr Mike, General Manager, Australian Government Natural Resource Management Team, Natural Resource Management Division, Department of Agriculture, Fisheries and Forestry****STAUFFACHER, Dr Mirko, Scientific Adviser, Australian Government Natural Resource Management Team, Natural Resource Management Division, Department of Agriculture, Fisheries and Forestry****VEITCH, Mr Simon, Manager, Landcare and Invasive Species, Natural Resource Management Division, Department of Agriculture, Fisheries and Forestry****WILLCOCKS, Mr Charles, General Manager, Landcare and Sustainable Industries, Natural Resource Management Division, Department of Agriculture, Fisheries and Forestry****FORBES, Mr Malcolm, First Assistant Secretary, Natural Resources Management Programmes Division, Department of the Environment and Heritage**

CHAIR (Senator Bartlett)—I declare open the first public hearing of the Senate Environment, Communications, Information Technology and the Arts References Committee in relation to its inquiry into the extent and economic impact of salinity. The committee has been asked to inquire into the long-term success of federal programs that seek to reduce the extent and economic impact of salinity in the Australian environment. Amongst other matters, the committee has been asked to consider support available to regional catchment management authorities to achieve national goals. The full terms of reference and submissions for this inquiry are available on the committee's web site or from the secretariat. I welcome everyone here today.

For the benefit of all our witnesses and committee members, this is the first time I have been chair of a public hearing, so you can all be gentle with me and I will try to give everyone an equal chance and a fair go at the sandwiches. I point out that the committee prefers all evidence to be given in public but should you at any stage wish to give your evidence, part of your evidence or answers to specific questions in private you may ask to do so and we will consider your request. I now welcome the witnesses representing the Department of Agriculture, Fisheries and Forestry, the Department of the Environment and Heritage, and the Bureau of Rural Sciences. Thank you for coming along. We appreciate you giving us your time, particularly in the evening. The committee has received your departments' joint submission as submission No. 24. Do you wish to make any amendments or alterations to your submission?

Mr Forbes—Chair, we are thinking of tabling a revised attachment H, which is the funding associated with the national action plan and the NHT2 regional approved projects. It is a summary table that is updated to today. We can table that, and I have 10 copies here. We will also be making reference to a book during our opening statement, called *Salinity Mapping Methods in the Australian Context*. We can table that and provide additional copies tomorrow as well.

CHAIR—Thank you. If the committee is happy to receive those tabled documents, we will make them available for public consumption.

Senator STEPHENS—I move that we receive those documents.

CHAIR—It is so agreed. That will be good. You probably do not need reminding, but I will remind you anyway, that the evidence given to the committee is protected by parliamentary privilege, and the giving of false or misleading evidence to the committee may constitute a contempt of the Senate. I remind members of the committee that the Senate has resolved that departmental officers shall not be asked to give opinions on matters of policy and shall be given reasonable opportunity to refer questions to superior officers or to a minister. We are going to start with a short overview presentation by Mr Baker from the Bureau of Rural Sciences.

Mr Forbes—If possible, I would like to make an opening statement before we hear the presentation from the Bureau of Rural Sciences. Is that okay?

CHAIR—I am sure that is okay. I will let you kick off, Mr Forbes.

Mr Forbes—Thank you. We have a joint opening statement from both the Department of the Environment and Heritage and the Department of Agriculture, Fisheries and Forestry, because the two departments have made a joint submission. This reflects the joint effort in the delivery program aimed at managing salinity specifically and natural resource management in general. The Australian government's task in addressing salinity is to find practical solutions and to coordinate efforts at national, regional and local levels.

There are three key national programs, delivered by both departments, which are contributing to tackling the salinity problem in Australia: the National Action Plan for Salinity and Water Quality, the Natural Heritage Trust and the National Landcare Program. These programs allow for salinity problems to be addressed at various levels of intervention. The national action plan is specifically directed at improving salinity and water quality conditions, whilst the trust is directed at the protection and sustainable use of Australia's land, water and marine resources.

The focus of the National Landcare Program is on encouraging the use of sustainable agricultural practices and providing support to landholders at the local level. The programs allow community based responses that use integrated asset planning and target setting as a foundation for change. The goals of these programs are, by their nature, long term. As a reflection of that, the Australian National Audit Office, in its report No. 17 of 2004-05, recognises the long lead times inherent in addressing resource condition change in the Australian landscape.

Much of the focus to date has been on establishing the investment framework, funding priority actions and commencing implementation of investment strategies. Regional natural resource management bodies play a fundamental role in achieving successful natural resource outcomes at a catchment scale. The financial support and Australian government funding to assist regional groups have been significant, with more than \$993 million being provided or committed to the NAP and trust regions across Australia since the commencement of the 2000-01 financial year. This amount has been matched in cash or in kind by the states. Examples of achievements are provided in our submission. Fifty-two regional plans and investment strategies have now been accredited across Australia. The report of the House of Representatives Standing Committee on

Science and Innovation provides a comprehensive summary of salinity science and research. Our submission reports on a number of developments since that report was released.

CHAIR—Mr Forbes, I am sorry to interrupt, but some annoying person down in the Senate has called for a vote, so I will have to suspend for about 10 minutes.

Proceedings suspended from 6.13 pm to 6.23 pm

CHAIR—My apologies for the interruption; I am assured that it should be the last one. Mr Forbes, if you would like another go.

Mr Forbes—I was in full swing, Senator, so my apologies for having to stop and start again. I think I know where I was up to, so I will start at where I think I left off. It is not too far to go to the end of this statement. Recent actions include the following. To continue the knowledge brokering role, the Australian government, with the Cooperative Research Centre for Plant Based Management of Dryland Salinity, will be holding a salinity symposium later in the year. It will investigate opportunities for integrating the large body of research conducted over the past five years on the economic and policy design aspects of dryland salinity. It will present the lessons and implications of that research to the people involved in policy development or implementation, and look at options for better transfer of salinity research into the improved natural resource management practices and action through regional bodies.

The Australian government, with the states and territories through the Natural Resource Management Ministerial Council, has established a national coordinating committee on salinity, which is responsible for promoting collaboration, efficiency and consistency in salinity science and salinity information. On 24 August, Ministers Campbell and McGauran launched two new publications and a CD-ROM that offer a breakthrough in salinity mapping by comparing 22 satellite, airborne and ground mapping techniques. This is the material which I tabled earlier. Community land care groups, regional authorities and government agencies will benefit from new guides that help decide how to map, predict and monitor salinity in the Australian landscape. All of the programs and initiatives being undertaken by the Australian government show an ongoing commitment to fully understand, communicate and mitigate the effect and the economic impact that salinity has and has the potential to have on the Australian environment and community.

CHAIR—Thank you. Do you want to go straight on to the presentation now?

Mr Baker—Yes.

A PowerPoint presentation was then given—

I would like to present where we believe we are at with salinity now. I preface this by saying that I am talking specifically about eastern Australia. The conditions in Western Australia are quite different.

Senator WEBBER—Well, you have just lost half of us then!

Mr Baker—The geology is different. As we are all aware, the rocks are a lot older over there, and it has different conditions, but I am happy to discuss the west if there are questions about it. In eastern Australia, salt only occurs in parts of the landscape. It has become quite clear from work done over the last five years, largely financed through the National Action Plan for Salinity and Water Quality, that the concept of salt being everywhere and prevalent is not accurate. It is actually confined to some specific parts of the landscape, which I will demonstrate later.

Even though the salt is there, not all that salt will move. If water cannot get to it, then it will stay there for all time. The impact of salinity on agricultural production, by way of example, might be a lot smaller than we previously thought. The Bureau of Rural Sciences, in collaboration with a number of other parties—CSIRO, CRCs and universities—has done quite a deal of work within the Murray-Darling Basin and just outside it. I am presenting these slides as examples of where that work has been done. So we are not talking about an isolated case study and trying to extrapolate from that across a broad area. We are talking about 15 or 16-plus sites where we have done this work. It has been done using either community based stream sampling or by combining that with what is called airborne electromagnetics or salinity mapping to identify where the salt is getting into our rivers and streams, where it is occurring on the land, and where that salt is stored in the landscape.

By way of example of that, I will show you a slide of Billabong Creek, which is just north of Albury. There is a stream gauging station at Walbundrie, which is at the bottom of this part of the catchment. We know that it is spitting out salt at quite a rate. The best knowledge that we had at the time, before there was some work done—and part of this was done under the National Land and Water Resources Audit—was that we had 300,000 hectares from which that salt could be coming. We and the Department of Land and Water Conservation New South Wales, as it was then, went in and did some stream sampling, as did the local land care groups which were very important to this work. We identified that, basically, in this eastern part of the catchment, there was no salt being generated into the streams. All the samples—and we are talking about samples taken over an 18-month period—were better than drinking water standard.

It was not until we got to the west, at Culcairn, that we started to see salt entering the streams. Once you get down to the point you see illustrated in the slide, we are talking about 18,000 microsiemens, or EC units, per centimetre—about a third the salinity of seawater coming in. What that allowed us to do, through funding via the Murray-Darling Basin Commission, was to fly the airborne electromagnetics. Because we were able to target down, we were able to fly over that particular area and where you see the red in this slide is where the salt is stored in the landscape.

Using this whole approach we have come down from 300,000 hectares—only knowing that there was an outlet here spitting salt—to actually being able to identify down to about 20,000 hectares where this salt was stored in the landscape. In terms of identifying and targeting the remediation work that has to occur, we are no longer trying to fix a 300,000-hectare problem; we are trying to fix a 20,000-hectare problem.

Looking across a number of the locations that I showed on the map where we have done the work, this is Billabong Creek on the left-hand side and you can see the difference there. This is the 300,000 coming down to where the salt is stored. I said earlier that we need the water to get there to mobilise the salt. If you look at some of the other areas—this shows the Lower Balonne,

St George and Dirranbandi area in Queensland. About a third of the area is underlain by salt and I will show some pictures of that shortly, but we believe that only a very small part of that salt will ever be mobilised and ever impact on the environment or production. There are a number of different examples as we move across.

To show some specific examples I will move to the St George area. This is just one part of the work that was conducted in the St George area. Given that it is an irrigation area, we are interested in the impact of irrigation storages—ring tanks. If we could mobilise the salt, the solution was obviously to place them in the best locations so we set about trying to determine locations where it would be most appropriate. To give you a feel of how the salt is positioned—if I can put it that way—in the landscape, I am going to run through a series of depth slices. We start off at five to 10 metres down and the red area is where the salt is. At five to 10 metres, there are only a few isolated spots where salt is being stored in the landscape. By the time we get down to 25 to 30 metres you can see that there is much more salt being identified. Note in this particular part over here it stays blue the whole time. Fifty-five to 60 metres is probably the maximum extent of the salt store as it sits under the ground. At 75 to 80 metres, you can see that it is starting to diminish. By 95 to 100 metres it has contracted further though, right down to that depth, we still have fresh water over this part of the area that was studied, which is important for the irrigators there because they actually have a potential ground water resource that they can tap into that—whilst it was known—was thought to be quite small. They now actually have quite an extensive area that potentially could be used in a sustainable manner.

What you can see from cutting down those slices, and we can represent that in a 3-D picture, is that it gives us a feel for the shape and how the salt is actually stored under the ground. That allows us to understand, when water is getting in, how it contacts with the salt and therefore where that water can transport the salt out to. In terms of looking at a particular impact of irrigation storage, we are going to look specifically in this area over here. This is the 10 to 15 metre slice, so we are looking at some salt underlain in that particular area. This is a cross-section of it. We modelled a ring tank being placed in that particular location that was leaking 360 millilitres of water per year and we modelled what the impacts of that ring tank being full for 100 years, leaking at that rate. The actual area of ground water level rise, which is the blue line, is the original, the pink line represents where the ground watertable will get to after 100 years of that irrigation tank leaking. It only impacts at the surface at that particular location. There will be mobilisation of this salt sitting underneath here at that particular location, but you can see from the lines that are coming down here that any impact of salinity from that ring tank will be localised and will not impact. This is the Maranoa River over here, so there will actually be no impact into the Maranoa. So that is an example from an irrigation area.

I will move on to Jamestown, north of Adelaide in South Australia. The issue there was ground water-driven salinity. To fight that, obviously, we had to lower the water tables, so there was need to understand how the salt and the water were moving through the landscape. We knew there was a salinity problem. This next image shows examples where there have been outbreaks and attempts to revegetate. Some of the storages there are getting salt build-up. We know this is a rainfall curve. There has been an increase in rainfall in the area since the 1900s. That is obviously recharging the ground water and therefore affecting the salinity problem in what is generally quite a dry area.

This is a picture of the landscape out there. You can see that we have the odd outbreak which is being caused by salinity. I hope you are getting a feel from this. We really cannot understand where the salt is sitting. This is my little animation of how we find where it is. We use the aeroplane to track it down. That produces those lovely images I showed you for St George—we call them the red and the blue blobs. We are not just relying on what comes from the plane; we get out there and dig holes so that we can confirm the information from when we do the flying is real. So we dig the stuff out of the ground and get a feel for it.

One of the things that has been very important with this whole process—I mentioned it briefly before—is that all of this is being done with community groups. By and large, all of these projects that you have seen have been driven by the community. We have not gone in and said: ‘You’ve got a salinity problem. We’re here to fix it.’ We have gone in and talked to them to find out what they believe the problem is and how we can best address their problem. That has been a critical component. This next picture is a digital elevation model. Jamestown sits about there. Caltowie is a little town to the west. We have mapped saline areas, which are shown in pink. We have marked the current-day drainage lines for the surface water. You can see that this particular drainage line breaks through this line of hills. We were trying to determine whether we were going to get salinity outbreaks from build-up behind that line of hills. The other question we were looking to answer was whether the salinity outbreaks here were the cause of the salinity that we were seeing over this side, near Caltowie.

This next image shows the current-day topography from the digital elevation model. What we are using now is one of the other techniques called magnetics, which, in this example, shows where the old river channels sit underneath the ground. You can see some nice patterns that are coming through from those old river channels. You can see this is where the Jamestown salt was. The Caltowie salt outbreaks sit over there. You can see under the ground, represented by the green line, that there is a divide between the old drainage systems, so any of the ground water is going to flowing back that way from the divide or that way from the divide. So there is no way the outbreak, which was coloured pink in the previous image, can be the source of the salinity over there. You can see there is a divide between the two. They are not connected and not a part of the same process. This is the airborne electromagnetic image. We were looking for where the current-day drainage breaks through in this area to see if there would be a problem. You can see from the AEM image that the saline ground water is flowing out to the south and will not break through. It is being transported away, so the likelihood of a salt outbreak in that location is small to nonexistent.

In summary, what does that mean? We are certainly not saying that the problem is not big by any stretch of the imagination. What we are saying is that, with the methodologies that you have just seen presented here that we have done through the national action plan, we can now manage it. We can target where we need to do the work. We can make sure that we are putting that excellent work that has been done in the past in exactly the right place and maximising the bang for our buck where we do it. Importantly, the large-scale land use change is probably not required if we are talking in a general sense—in a localised sense, certainly, and if we went to a Western Australian example, yes, very much so, but we are talking about eastern Australia.

As somebody who works for the department of agriculture, I think it is important that the impacts on agricultural production may be quite limited. Also, in being able to do this we can prioritise investment so that, be it for a private farmer who needs to do some remediation work,

we can get it down to the paddock scale and say, ‘This is where you should plant your trees and this is where you should put your perennial pastures,’ or, if you are in Western Australia, ‘This is where you should be putting your drainage lines in.’

One of things I have just flagged here that always gets forgotten in the whole salinity debate is that, if we know where the salt is not, that means we have fresh water. One of the spin-offs that you get from using this technology is identifying where there are freshwater resources, be it under the ground or in our surface water systems. That is the completion of the presentation.

CHAIR—Thank you very much. Will we be able to access those slides, not now but at the end?

Mr Baker—Yes. There is a handout that I meant to say at the beginning was available, and if the committee would like a digital version of the presentation that is fine.

CHAIR—People can raise that with the secretariat. Are there any other opening comments from anybody? There being none, we will move on to questions. We have a lot of people here tonight, and it is fabulous to see such interest, but it means we will need to be fairly ruthless with the time available for each person to ask questions.

Senator TROETH—Carrying on from what we have seen, there do seem to be varying views on just how great a risk salinity poses to our environmental and economic future, which is part of our terms of reference. On one hand, some experts say that it is a lot worse than we ever expected, although, using the tools you have at your disposal, it is probably possible to pinpoint it to exactly where it is happening. So there is that view on the one hand. On the other hand, people say, ‘Look, it’s really nothing,’ and that there is not as much as everyone said there was going to be. Obviously, the truth lies somewhere in between those two viewpoints, and I wonder if somebody on your line-up of experts could tell us what the environmental and economic impacts have been so far and what the likely impacts will be if salinity is not sufficiently managed. I realise that is a very broad question, but perhaps we can have a general answer from you which we can explore later.

Mr Lee—I would start by making a few observations. Firstly, I think it is fair to say that, with increasing knowledge, it seems the picture may be a little more optimistic than we thought from the first review of salinity risk provided by the National Land and Water Resources Audit. For instance, I believe that, while the aggregate figures in the projections for salinisation in the wheat belt of Western Australia are still remarkably high, they have come down somewhat from the projections that were published in 1999 or 2000 from that work. With better understanding, we are also seeing the mechanisms of salinity and understanding them better. From the work you have seen tonight, we are seeing that the hazard in eastern Australia is more specific and perhaps more manageable, so the picture is more optimistic than we thought.

You can see with these emerging tools that it is possible to get a spatial understanding of salinity and actually plan interventions more closely. It is also not universally true that more leaky agriculture is, indeed, necessarily a bad thing for salinity. It may well be that we can seek solutions in a targeted way that do not necessarily require agricultural practice to change in all areas. So this new understanding is somewhat optimistic.

As for the situation as we have observed it, there is a counter-risk that the drought has essentially masked the appearance of the salinity problem over the last several years. Ground water levels have been depleted by drought, and you can see that there is a large seasonal and interseasonal component, no doubt, in ground water levels and the salinity that has been expressed. The impacts of salinity have been disguised somewhat by drought over the period.

So they are the points I would like to make. The emerging information is looking a little more optimistic in terms of the extent of the hazard and intervention. It is certainly pointing to the fact that we need a new generation of understanding and mapping of salinity to revise the previous hazard maps. The drought has probably masked the expression of salinity over this period. So what is actually happening in an underlying way is probably more severe than what we are observing. But I think by any calculation we are still faced with a major threat to our biodiversity, our agriculture and our civic infrastructure across the country.

Senator TROETH—Do you have any estimate of how many hectares of land have been removed from agricultural production so far because of the effects of salinity?

Mr Lee—No, I do not have that on hand.

Senator TROETH—If you do have available some sort of estimate, we would be interested in it.

Mr Lee—We can see what figures are available.

Mr Willcocks—In the joint submission, the area of land currently affected by salinity is recorded as 2.5 million hectares, or five per cent of cultivated land. Given what Mr Lee has just said, there might be some error bars around that assessment but it is probably in the right order.

Senator TROETH—Would all of that land be effectively removed from being productive or are there gradations of damage and land not being able to be used by farmers?

Mr Lee—This is where you are seeing some impacts of salinity on production. You are seeing a loss of production, not necessarily a removal of land completely from production.

Senator TROETH—One of the regional bodies has suggested that, with regard to the priority regions identified under the national action plan, it fails to capture all or the greatest high-risk areas. In particular, it was suggested that urban salinity was not given sufficient attention when the priority areas were identified. Do you have a comment on that?

Mr Lee—The prioritisation was done at the time in terms of the appreciation of the pressing issues at hand in relation to salinity and water quality. It is true that some areas of significant salinity hazard were not included, including Western Sydney and some area of the Hunter. But, of necessity, the action plan looked at the most pressing combinations of issues. The priority areas were settled on. They include significant areas of urban salinity and impacts on infrastructure, including the towns through Western Australia that are desperately affected by high ground waters and salinity and also towns like Wagga and elsewhere that have urban salinity problems.

Fortunately, we have the Natural Heritage Trust. With Landcare, they are able to address salinity issues as well beyond the NAP priority areas. The NAP priority areas were determined on the criteria for priorities across salinity and water quality at the time.

Senator TROETH—Could we have a copy of those criteria for the committee?

Mr Lee—We could provide you with the information we have on that.

Senator TROETH—We would like information on how the priority areas were selected, or the criteria.

Mr Lee—Perhaps we can take that on notice and provide you with the information we have.

Senator TROETH—That is fine. Thank you.

Senator STEPHENS—Mr Lee, I go back to your comments about the effects of the drought in masking the impacts of salinity. Is any work being done specifically on that issue in terms of whether that is the case?

Mr Lee—I believe there is, but there are other people who are better qualified to comment on that, including my colleague Dr Stauffacher, who is currently our scientific adviser. Also, later in the evening, you will be hearing from Land and Water Australia, who will be able to give you a broad perspective on current research in the area.

Dr Stauffacher—Basically, when you are a scientist looking at salinity you are looking at the long-term trends of salinity. Indeed, even if there is no work that is specifically done about the current drought, the studies that are currently going on about salinity take these conditions into consideration and make some conclusions about them. For instance, from a scientific point of view, the current drought has had some positives. It gave us an indication as to how quickly some systems respond to a change in water balance, and that also gives us a good indication as to what is possible in certain catchments. I am talking here about response times to land use change.

For instance, you might know that the response time to land use changes depending on the size of the ground water system. What we have realised recently is that, in the smaller ground water flow systems, the response times of these smaller catchments can actually be pretty quick—between, let us say, one, two, three to five years, which is pretty good news. That is something we realised thanks to the drought. That means that, from an intervention point of view, if you do the right thing in the catchment and target it properly, you are going to have a solution for these smaller catchments. To go back to my answers, no, there is nothing specific about the drought but, to a certain extent, the drought has always been part of the equation of salinity research.

Senator STEPHENS—Thank you very much. It is very interesting. I live in Goulburn, so we are dealing with this whole issue and the ground water supply all the time. I would like to move on to the issue of the regional governance structures and the regional decision-making body that is part of the terms of reference and the work that is being done in natural resource management. We had a submission from the Australian Local Government Association, in which they reject

any proposal to grant catchment authorities any legislative powers. There is already concern in the community that the catchment management organisations are just another form of government and providing them with legislative powers is likely to increase that criticism. Mr Forbes, you might be able to answer this. Are there any plans to confer legislative powers on regional bodies in terms of establishing authorities or something?

Mr Forbes—I think it will depend on the particular state. In New South Wales, they are statutory bodies, as they are in Victoria and South Australia. In Queensland and Western Australia, for example, they are not statutory bodies at all. Although they are incorporated bodies, they have been established by the communities themselves, so it would depend on which particular state you are in. Because some of these bodies have been used for purposes like natural resource management by the states as well as by the Commonwealth, you will find that, in some instances, they may be inferred powers which are coming from the states. They may be legislatively based, because some of them are statutory.

Mr Lee—They are all basically creatures of the state, so it is up to the state to decide whether it wishes the regional group to carry statutory powers. The issue of when a regional body acquires enough statutory powers to perhaps cease to feel like a representative of the community is an interesting one. At this stage right across the country we are seeing regional bodies having a very large community content; the people involved have great energies, enthusiasm and passion. That is very good for governments, because it allows us to work with these people and implement our programs. The issue you referred to is one that I can fully understand is of concern.

Senator STEPHENS—I recognise the criticisms that are in the ALGA submission as being fairly regular criticisms. Nevertheless, I suppose they have a point about regional decision-making. Mr Forbes, I have a question about the Murray-Darling Basin Commission's submission. The commission put forward a very specific recommendation to the inquiry:

The inquiry may like to consider the means of ensuring that the NAP & NHT deliver on shared outcomes of the BSMS—the Basin Salinity Management Strategy. Have you got a response on that issue?

Mr Forbes—Sorry, could you repeat that?

Senator STEPHENS—It is on page 3 of the Murray-Darling Basin Commission's submission, which is submission No. 21. They make the specific recommendation:

The inquiry may like to consider the means of ensuring that the NAP & NHT deliver on shared outcomes of the BSMS—the Basin Salinity Management Strategy.

Mr Lee—Senator, perhaps I could respond to that.

Senator STEPHENS—Thank you, Mr Lee.

Mr Lee—In the accreditation process for the regional plans it was required that the targets embedded in the plans had to recognise and be consonant with broader arrangements,

particularly the salinity targets, and the regional plans were required to be consistent with the Murray-Darling Basin salinity strategy. We understand that to be the case with the targets that are currently in the basin statement blueprints and catchment plans. Also, I would like to advise that, amongst the series of national evaluations that we are conducting in cooperation with the states and the regions, we do have an evaluation entitled 'Salinity outcomes for regional investment'. That national evaluation is looking at the expected outcomes. One of the things that we will be looking at is what we can see in terms of the coverage of and the adequacy of the target structures that relate to salinity across the various plans, trying to put the bigger picture together to see what it looks like at the regional, state, basin and national levels in terms of the coverage, the basis for a portfolio of investments and the likely expected outcomes. So we will have a better picture after that process of how the salinity targets across the various basin states actually integrate towards the basin strategy. We will be involving the Murray-Darling Basin Commission in that process as well.

Senator STEPHENS—When do you hope to have that piece of work completed?

Mr Lee—That is expected to be finished by the end of this calendar year.

CHAIR—I welcome Senator Adams to give us a Western Australian perspective.

Senator ADAMS—I am being good: I am staying in the Eastern States. Thank you very much, Witnesses, for that presentation. I was very impressed. I am a farmer from the south of Western Australia, so some of our area was flown over by the planes. It is certainly very good. On the practical side, at one stage everyone thought that trees was the answer. We go through all of these sorts of things. I said in my first speech recently: 'One size doesn't fit all,' with respect to salinity, and it took a long time for people to really realise that. They were out there planting lucerne and trees when something like Hooligans Creek was causing the problems. I can remember that as an example, given the amount of salt that was pouring out. It was down on a dike. I think your airborne electromagnetics are brilliant. It really is science helping those on the ground. The question that I am going to ask you is along those lines.

I think the need to better coordinate and communicate salinity science from the research level to the on-the-ground application is emphasised in a number of the submissions that have come through. Many of the recommendations flowing from the House of Representatives Standing Committee on Science and Innovation inquiry's report entitled *Science overcoming salinity* either proposed the creation of a national coordinating brokerage body or suggested that we should just rely on the existence of one. The committee understands that the government is still finalising its response to these recommendations. In your view, what would be the most appropriate vehicle or mechanism for achieving the coordination and communication of science research?

Mr Forbes—I will pitch a preface before others have a go at it. We are preparing a response which would clearly address that specific question. It is a policy issue for us and it creates a problem for us to answer that question correctly, but other activities are under way which create those coordination mechanisms which we can particularly comment on if others want to say something.

Mr Veitch—It is true that a strong collegiate group dealing with salinity science has been built up over the last decade. In more recent years it has directed its energy towards translating the research and development, and the understanding of salinity, for people on the ground. In fact, three products have come out as a result of the House of Representatives inquiry into salinity. They were purposely designed by that collegiate group so as to put information in the hands of people who could use it. Those products include *On-Farm decisions and catchment outcomes: a guide for leading producers and advisors*; *Dryland salinity and catchment management: a resource directory and action manual for catchment managers*; and *Breaking ground: key findings from 10 years of Australia's national dryland salinity program*. Together, they were the collective wisdom of that research and development. There is still a question concerning how research and development reaches the hands of people who directly manage the land. I think increasingly the question is now being translated more into one of whole-of-catchment type of management—that it is not just a single issue and that the issue of land uses needs to be considered and the impact that they have on water management. That will of course impact on salinity. There are other considerations. A single-issue approach to natural resource management will only take you so far, and we have seen some of the limitations of that. Now the focus is more on how we bring those things together and put useful information and useful tools in the hands of the people who directly manage land.

Mr Lee—I would add that our colleagues sitting behind us from Land and Water Australia will be able to talk very thoroughly on that issue. One of the central missions of Land Water Australia is in the area of brokering knowledge and turning science into practice—practical tools.

Senator ADAMS—Looking at the St George example, could you tell me how you would, in a practical way, deal with that particular situation? Are you allowed to do that?

Mr Baker—Specifically the irrigation storage issues?

Senator ADAMS—Yes, just looking at that.

Mr Baker—As I presented in the example, it was a matter of making sure that we put them in the right locations and with a view to looking at what the possible off-site impacts would be—whether they would be impacting on the farmer next-door or whether, by placing the ring tanks in the wrong place, it allowed salt to move in to one of the river systems in the region. By doing that sort of work, not just the individual farmer but community groups can then make informed decisions on what they believe are acceptable impacts from any particular action that is taken—the ring tanks being one of them.

Mr Willcocks—You would expect that sort of planning to be part of the regional NRM plan and the regional investment plan.

Senator WEBBER—I am not going to be as well behaved as Senator Adams. Mr Baker, I am going to invite you to make some comments on what is happening in my home state of Western Australia.

Mr Baker—I will do my best, Senator.

Senator WEBBER—As you offered.

Mr Baker—The primary difference with salinity in the west is essentially the age of the rocks. They have been around for a considerably longer period. You can view it as being a sponge that has been around for about 4½ billion years. During that time it has been soaking up salt. Like a sponge, once the water gets in there, you have to apply some pressure to get the water out. In the west they do it by way of the established drainage systems. It sets up low pressure in comparison to what is caught up in the rocks; therefore the water can move out. It is an extremely effective way of dealing with a salinity problem. For that particular aspect, doing the airborne electromagnetics is probably not required because we know the salt is distributed over much wider areas. In many areas there are old river channels that sit underneath that cause pressure systems and exacerbate the problems. We can use the magnetics and the airborne electromagnetics to identify those and target them. Used in combination, it becomes an extremely effective tool. As we discussed before, it is not just about tree planting. There are a whole range of vegetation issues that we can look at. To my knowledge, that is all that is currently being done.

Senator WEBBER—One of the debates that we are having in the west—in fact, I bumped into another colleague from Western Australia on my way back here after attending the chamber for the division—is not just about vegetation; there is also the debate about the supposed engineering solution, which is to dig channels all over the place because this will apparently fix the problem. Do any of you have a view on that?

Mr Veitch—It is fair to say that the notion of a silver bullet solution to these things is patently wrong. Landscapes are complicated. Western Australian landscapes, albeit that they are very old, are just as complicated and just as tricky to manage as those in eastern Australia—some would say more, because of the climate. It requires careful consideration of the consequences of any management intervention. A drain is a significant intervention. It can have unintended consequences to do with the acidity of the ground, for example. We have seen some evidence of that, apparently. Also, the work of the CRC for plant based management of salinity is investigating the potential for using saline tolerant plants as a means of sopping up—

Senator WEBBER—They are doing some excellent work.

Mr Veitch—Yes. So there should be a wide range of potential solutions for salinity in Western Australia. Certainly, there is some worthwhile research being undertaken. An approach of trying to find a single solution is not likely to be useful.

Mr Baker—Whilst drainage is certainly a good option when used in conjunction with other methods, there is also the consideration of where that saline water is to be disposed of.

Senator WEBBER—Indeed.

Mr Lee—The Australian and Western Australian governments are contributing \$158 million each to the national action plan, which is a very significant investment. I think the answer will be that it is horses for courses and that it requires careful analysis of situations. Both governments are committed to spending up to \$64 million in actually revegetating and getting some commercial species of trees into the western part of the wheat belt, to the extent that is the

relevant salinity mitigation measure. We are also jointly financing engineering studies to look at the reality, impacts and efficiency of drainage works in the wheat belt as well. It is a very divisive issue—some people believe in one or the other—but both governments are working across that divide to try to inject that science information into getting better answers. But it is quite an emotional field to work in.

Senator WEBBER—It certainly is.

Senator WORTLEY—I am a senator from South Australia, so that is an area of interest to me. I would be interested in hearing about the response from farmers and landowners in relation to the salinity management program. Your submission provides an overview of the Upper South East Dryland Salinity and Flood Management Program as an example of a recent major achievement in addressing salinity. However, the committee has received a submission from a landowner in South Australia which registers concern about this program. Specifically, it is claimed that the drains are being dug too deep, so consequently it will drain not only surface water but also underground water, which in turn will cause damage to the soils and will be very expensive to repair. The point is also made that we should be conserving water where possible and making use of this vital resource, not draining it out to sea. I wonder what your response to that is.

Mr Lee—While I am personally involved in some of the states I am not directly involved in South Australian projects. But I do know something of the south-east project. The science has been extensively explored and environmental studies done which validate the approach. I am sure there are some people who may have differing views. We could provide further briefing on the project and its scientific underpinnings if that would assist.

Senator WORTLEY—Yes, it would in this case. Thank you. In relation to the programs that have already been put in place, when there was concern from landowners or farmers in the area, how was that addressed?

Mr Forbes—As I understand it, in the context of at least the upper south-east region, they have a mechanism which brings together the community, the state government and the federal government agencies to talk about what the best solutions are. My understanding, certainly in the upper south-east, is that they have such a committee. Quite often, where there are specific problems, the community is actively encouraged in finding the solutions to these problems—getting involved and identifying the cause. It is about finding the solutions, not just about addressing the symptoms. It is an old catchcry which we continually put forward. The symptoms have to be addressed. The community ownership of the solutions to that—addressing the causes—is really important. There are many examples across Australia where the community have actively engaged in that.

Mr Lee—It is some years since I have been involved in the upper south-east project, but there has always been an extensive consultation process with landholders to set the alignment of those drains. I will leave it there.

Senator WORTLEY—Thank you. We look forward to receiving any additional information.

Senator STEPHENS—I ask a question about the Australian Water Fund. One of the issues that is part of the thinking around the National Water Initiative is the participation by government at all levels in the way in which the Water Fund operates. Can you tell us a little about what mechanisms there might be other than the Natural Resource Management Ministerial Council to ensure that there is some information exchange, to avoid duplication in the implementation of the Water Fund? Is anyone able to respond to that?

Mr Forbes—Clearly, at the Commonwealth level there are a lot of intersections between our two departments in relationship to that and also with the commission itself. This is to ensure that, at least at our level, there is a good understanding and cross-fertilisation of the projects which are being put forward to ensure duplication does not occur. There are intersections with our state colleagues as well to again ensure that duplication is avoided.

Senator STEPHENS—I am sure you are all aware of Goulburn's water supply issues. I am also aware of the Toowoomba proposal, which is quite a comprehensive proposal that is seeking funding under the Water Smart Australia program. I am interested in how those projects, which are being delivered up as community based solutions to a water supply issue and involve the improvement of technologies, are married with these natural resource management priorities of the government. Does that happen in any practical sense or is it just in terms of the guidance that you have alluded to?

Mr Forbes—It is really the intersection that we have with the commission which is quite important in terms of the development of the guidelines and also establishing priorities. We are actively engaged in assisting the commission in looking at the various proposals from our perspective as well. There is a marriage between the natural resource management side and what is actually coming out of the Water Smart projects. We may need to take on notice as to how that intersection occurs, if you like, in a structured way because we are not actively engaged in that particular intersection, though we are commenting on individual projects and we do provide comments to the National Water Commission on individual projects.

Mr Lee—The regional bodies are often considerable players in the major project proposals, including the Toowoomba project, which the Condamine Alliance was involved in early in the piece. In cases like that, some of those major infrastructure projects do not really fit the parameters of the NHT very well or the National Action Plan for Salinity and Water Quality. The regional body plays a part in pursuing funding through the emerging National Water Commission funding arrangements. While we have interaction at the officer level across our various programs, there is also, if you like, something happening at the regional level where the regional bodies are getting in behind the major projects as well to target their pursuit of funds at the various program sources that are available.

Senator STEPHENS—Thank you, that is very helpful.

CHAIR—In regard to the decision making at local government level, particularly about rezoning for urban development and those sorts of things, the committee has received some evidence that, at times, the local government is either not aware of some of the issues to do with salinity or, for whatever reason, chooses not to pay attention to it. Is there any power at your level to prevent damaging decisions like that or do you just use powers of persuasion and cooperation?

Mr Forbes—From the local government perspective, the zoning is strictly a state and local government responsibility. It is not a federal responsibility. Where there can be an intersection—if you like, where a stick could be raised because we tend to sit with a carrot in our hand rather than a stick—is in regard to the EPBC Act, but only in relation to an individual project which could arise out of a particular zoning, not the zoning itself.

CHAIR—The EPBC Act does not have salinity itself as a trigger, though, does it?

Mr Forbes—No, it does not.

CHAIR—It might be a bit of a tangent, but as I understand it the EPBC Act is under review at the moment. Is there any consideration being given to whether or not amendments could be made to that to overcome any of these sorts of issues or is it that you do not think it is a significant enough problem to want to go down that path?

Mr Forbes—I do not think I am in a position to comment.

CHAIR—I realise that it is a state-federal cooperative process and everybody has to try to work through it. Are you able to give us any indication of any particular areas that are working better than others or working less well than others in terms of different states?

Mr Lee—Returning to your previous point about local government, I would like to add that, as this process matures, the accredited natural resource management plans are being more widely recognised as a source of information. Various states are exploring options to give them some sort of recognition in their planning processes. Our hope and expectation is that over time these accredited regional plans will play a greater part in the normal planning processes of local government. Local government in most cases is an active partner in the regional bodies, with lots of local government representatives directly on the bodies. We are also working with local government associations across the country and with the national association to increase the links between local government and regional processes as well. The expectation we have is that, as I said, over time these natural resource plans will have a bigger impact on advising and informing local planning schemes and a very large communication role in relation to the salinity hazard in particular.

CHAIR—In terms of my follow-up question about any areas that we should perhaps give some extra focus—by way of context, this being our opening hearing we have not finalised the detail yet, but we aim to travel to a few different parts of the country—are there any particular areas that are going well or not going well that you want to single out to aid us in our investigations?

Mr Lee—I would like to suggest as a personal observation that it would be good to consider the balance of investment and attention being paid to civic infrastructure—roads, rail, foundations, sewage treatment and what have you—in relation to salinity hazard. That was certainly one of the specific references in the national action plan. But we have found with experience that that area is not appearing in the investment proposals or strategies as strongly as it might in terms of what is coming forward, and yet we know that impacts on infrastructure in terms of the economic effect of salinity are very large. So this is one area that we will certainly be looking at in our salinity evaluation, which I referred to previously, of the balance of the

investment portfolio that we have in salinity. Our suspicion is that it is potentially weak in the area of protecting civic infrastructure. That is an area which local government has a very strong interest in, as do other state agencies that are involved in road, rail and what have you. It spreads the net further than the more traditional aspects of salinity impacts that we have looked at.

Mr Willcocks—It is also important to point out that local government intersects with natural resource management in a number of areas—think about weeds and feral animal management, management of public land, roads and so on—so it is not just a salinity issue. Local governments engage pretty heavily on natural resources across a range of issues.

Senator SIEWERT—I apologise if some of the questions I am about to ask were covered whilst I was in the chamber. My colleagues from Western Australia may have picked this up already. I was a little disappointed that that you did not cover Western Australia because the issues there are vastly different from those that you pointed out in the Eastern States. You did not cover the impact on biodiversity in this presentation. In Western Australia it is, of course, very significant. Four hundred and fifty endemic plant species are at risk. Nine hundred regionally significant plant species are at risk. How many are at risk in the Eastern States? Has any work been done on the impact of salinity on biodiversity in the east?

Mr Forbes—I think that there has been, but I do not know the answer. I might need to take that on notice, if I may.

Senator SIEWERT—And, while you are at it, information on water bodies, wetlands, water birds et cetera would be useful as well. I know what it is in Western Australia but I think that the committee would be interested in the Eastern States. Going to the extent of salinity, I understand that, whilst figures for salinity in Western Australia have been relooked at, it is the time frame for the impact of salinity rather than the extent of the impact of salinity in Western Australia that has changed. My understanding is that the prediction is still that around six million hectares of 18 million hectares of agricultural land will become saline but the time frame has changed.

Mr Lee—The observation I made was a reference to a briefing I had some time ago in Western Australia with Western Australian officials. I thought we were looking at a lower equilibrium result rather than just a time frame issue, but I will stand corrected if that is not the case.

Senator SIEWERT—I understood that it was the time frame rather than the equilibrium figures.

Mr Lee—Perhaps we can seek information from our Western Australian colleagues and provide it to you.

Senator SIEWERT—Thank you. In terms of the prioritisation of the investment process, which you refer to at point 6, both public and private, what process has been used at the Commonwealth level to look at how you prioritise investment? What decision-making tools have been used?

Mr Lee—In establishing this investment process through regional bodies, we are really relying on the regional bodies to make judgments within regional priorities. There is no central

direction of prioritisation from the Australian government. We are relying on the integrity of the planning process and the planning accreditation and the work of the regional bodies to come forward with a set of priorities. The priority investment sets that come forward are examined technically, particularly at state level, but the actual prioritisation process is really one that the community makes on the basis of the targets it has articulated in the regional strategies.

Senator SIEWERT—And finally, could you let us know who is on the national body that Mr Forbes was talking about, the coordination body?

Mr Veitch—I chair that national coordinating committee on salinity. It has representation from each state and also from the CSIRO and Geoscience Australia.

Senator SIEWERT—So it is all government?

Mr Veitch—Yes, that is correct.

CHAIR—Thank you for your contribution this evening. While the committee has not discussed it yet, I expect that we will be taking as much time as we need to do the job properly. In terms of getting those questions on notice back to us, it is quality rather than speed that is the way to go, if you are worried about that.

[7.30 pm]

CAMPBELL, Mr Andrew, Executive Director, Land and Water Australia

ROBINS, Ms Lisa, Consultant, Land and Water Australia

CHAIR—I welcome witnesses representing Land and Water Australia. Thank you for coming along this evening and for waiting a bit later than was scheduled. The committee has received your submission as submission No. 26. Are there any amendments or alterations you wish to make to it?

Mr Campbell—No.

CHAIR—You are reminded that the evidence you give to the committee is protected by parliamentary privilege and that the giving of false or misleading evidence to the committee may constitute a contempt of the Senate. I also remind you that, if for some reason you may wish to give your evidence, part thereof or answers to specific questions in private, you may ask to do so and we will consider your request. I invite you to make an opening statement. I gather you want to follow up with a visual display for us at the start of your evidence.

Mr Campbell—Yes. While Lisa is connecting the technology, I will make some introductory remarks. Thank you very much for the opportunity to talk to the submission. In presenting the submission, I would like in particular to refer to a couple of recent outputs. The first was unfortunately concluded just after the previous salinity inquiry in the last parliament. We thought it was appropriate to draw the committee's attention to it. We believe it is a current, state-of-the-art compendium of Australia's salinity science, prepared after 10 years of the National Dryland Salinity Program. It was launched by Senator Troeth last year in Melbourne. In effect, it is aimed at providing an easily navigable guide to all of the science that we had up until last year in Australia around dryland salinity. It is aimed in particular at catchment managers, leading landholders and the people who advise them, and the policy audience, with quite specific products identified and developed for each audience. This kit effectively gives people access to a uteload of research reports on one disk in an easily navigable form.

In our submission we referred to coordination work being done across the rural R&D corporations on dryland salinity. Land and Water Australia is one of 14 rural R&D corporations. We do not carry out research; we fund it, coordinate it and broker it. At the direction of Senator Troeth, we undertook an effort to coordinate a collation of the work across all the R&D corporations on natural resource management. That was printed today. I do have some copies, if committee members want them. You will be the first audience to receive it.

CHAIR—A world premiere.

Mr Campbell—Indeed, a global premiere. In response to a couple of questions while that is getting going, it was clear from the National Dryland Salinity Program work that the largest economic impacts of dryland salinity are not really on agricultural production. The largest economic impacts are off-farm, although some of those economic impacts will be on

downstream irrigation areas so they will then become agricultural impacts again. The largest economic impacts are likely to be on urban infrastructure and on other public assets such as biodiversity. In answer to Senator Siewert's question, there has not been a fine-grained analysis of impacts on biodiversity in eastern Australia comparable to the work that CALM has done in the Western Australian wheat belt. We have funded an extremely detailed database of the salinity tolerance of the taxa that live in fresh water so we understand the thresholds at which different elements of biodiversity will drop out within wetlands down to microinvertebrates and invertebrates and bugs and fish and everything else that lives in our freshwater systems and so we can give you a good understanding, based on known salinity levels, which critters are likely to have been affected. But there has not been a comparable analysis to that done by CALM that suggested 450 plant species at risk.

In answer to Senator Troeth's question about land affected, 2½ million hectares are affected to date—that is mapping areas on the ground; that is not modelled data. However, not all of that land is lost to agricultural production. It is usually lost to cropping, but there are some quite good grazing options being developed for that salty country, particularly through the Sustainable Grazing on Saline Lands program, which is a collaboration between Meat and Livestock Australia, Australian Wool Innovation, the Salinity CRC in Western Australia and us. Particularly where land-holders have access to freshwater resources, sheep can actually graze some quite salty material as long as they have got fresh water to drink to help them process the salt. You can have reasonable grazing and some Western Australian land-holders are achieving quite high production numbers off saline valley floors. So it is not necessarily lost to agriculture but often is lost to cropping.

Lisa Robins is a consultant who assisted, along with others, the National Dryland Salinity Program to develop what we think is a world-class package of what we call synthesis products. We are drawing on a whole range of research projects—not any single research project but, in this case, about 400 individual projects—including work on best practice examples from local government with respect to salinity management. With reference to an earlier question, there are some local governments doing a very good job with salinity but, unfortunately, not many out of the 722 local governments in Australia.

Ms Robins—This package was actually launched by Senator Troeth in July 2004 down in Melbourne. The information here has been compiled according to what we see as the three key target audiences—catchment managers; farmers and their advisers; and the third category of natural resource management policy makers. I am going to focus on the catchment level information by way of example. What you are seeing there is an electronic version of this report here and all of the information that backs that report up.

The menu on the left-hand side gives us the contents of the report. You can enter the document by clicking on anything here in the menu or by clicking on some of the text within the report itself. Basically, we constructed the information—it has been compiled around answering what we considered to be the big questions for catchment managers. What is the current extent of dryland salinity and its risk of spread? What are the causes and processes of dryland salinity? What are the current and predicted impacts and costs of dryland salinity? What is it that we can actually do and how do we measure our progress? How do we integrate with other natural resource management issues?'

We have also compiled a checklist of actions, which are basically suggested ways forward for the reader. It gives them an idea of the cost, the time and the confidence that they could have in achieving the anticipated result. When we go through the body of the document, you will see these actions in the margin of the report. There is also a section called ‘Where to get help’, and this provides information on all of the contacts, products and services that are available in Australia that relate to dryland salinity. You can see it goes through all the states and a lot of institutions. It is quite a complex database.

Mr Campbell—If you happen to be online, you can immediately hit the websites of those particular resources.

Ms Robins—You can see we have got what we have called ‘road map structures’ at the beginning of each chapter, particularly in this electronic environment, and it allows you to access the information very quickly. The road maps for each of these five questions start off with the same subquestions. They answer the question ‘Why is the question important?’ ‘What did we know in 1998’—1998 being the end of the first phase of the National Dryland Salinity Program—‘What advances have we made since?’ and we also look at ‘Where to from here.’ The bulk of the information lies with ‘What advances have we made since?’ That has all been categorised according to these more major subheadings. By way of example, we have, ‘What information do we have about ground water flow systems?’ or, for example, data. Then you have got these other subsections here, and once again they allow you to interrogate the document at a more micro level.

Mr Campbell—Could I interrupt for a moment. The significance of ground water flow systems, as we saw in the excellent BRS presentation: there are great technologies for telling you where the salt is in the landscape, but that is only part of the picture. That salt may or may not be a problem, depending on what the water is doing. So you need to understand the ground water system and whether or not it is mobilised in order to then interpret the information that comes off the aeroplane. So this is a critical piece of the jigsaw that needs to be used in conjunction with the coloured maps.

Ms Robins—Let us then drill down into the question of extent and risk and pretend that you are a reader who is very interested in the outcome of the National Land and Water Resources Audit. If you click on this, it links you into that part of the report under ‘What advances have we made since?’ and here are the outcomes of the National Land and Water Resources Audit. The findings and implications of that work are summarised here in the text. Many readers will not want to go any further than that; they will just want the key bullet points of the findings. But many readers, particularly technical people, will want to drill down even further and look at the information that underpins that summary.

In the margins we have these bars, and that gives us the reference number for where that information has come from. If that bar is coloured orange, it means that the report is on the CD and it can be accessed. If the bar is blue, it means that there is a full citation there but the report or the resource is not there. That might be because it has to be purchased or because there are copyright issues or because it had not been published at the time that this document was produced.

Let us look at reference 9. At the end of the report all of the references are compiled. Here we have question 1 and, if we look down to reference No. 9, it is not just one reference but the reports of the national land and water resources for each of the states and the overarching report produced by the Commonwealth. These icons tell us, for example, that that file you can see for Queensland is a Word document, whereas the other ones are PDF or Acrobat files. If we were to access that overarching report online, I would click on that and it would take me automatically out to that web page and to the report so that I could access it.

Mr Campbell—Essentially, the whole thing is a road map to the sites.

Ms Robins—If we look at the South Australian one, by way of example, one click on that and there is a 34-page report that we can scan through specifically on the South Australian information. We can shut that down and go back to reference No. 9 by hitting the back arrow. It will take me back to where I was reading in the text. Very quickly, I can click on the icons and decide, ‘Is that information of interest to me? No, it is not quite what I was looking for.’ I can then continue my search. You can continue to read on down through the report and you would see maps and graphs and different aspects.

There is also an advanced search facility as well. Say, for example, the reader is interested in a particular topic that does not fit neatly under one of those five macro questions. Say, they are interested in infrastructure. Using this search facility, I type in the word ‘infrastructure’ and it scans that whole PDF document to find anywhere where the word ‘infrastructure’ pops up. If I click on each of those, I can see in the text that it is highlighting where the word ‘infrastructure’ is. You can follow that part in the text and, by using your hard copy document to follow it, you can read up and see if there is something of interest to you. Say, for example, the person was interested in the infrastructure assets project. Once again, they can decide to go there and open that report and they will find a report from the infrastructure assets project. Once again, they might decide that they are not just interested in infrastructure but also interested in infrastructure insofar as it relates to local government. They can search within this PDF document as well as within that. Local government will pop up and, again, by clicking on each, you can scan through the report and find out what is there.

Mr Campbell—I would remind the committee that this is national work; it is not just the work of CSIRO, the Bureau of Rural Sciences, any particular state or the National Dryland Salinity Program. It is all the science that we were aware of in Australia relevant to the issue up until, I guess, the end of 2003 or early 2004.

Ms Robins—Generally, that is the demonstration. This catchment report alone is linked to about 350 reports on that CD. There is one that interprets the information, the research at the farm level, and also looking at the policy level.

Mr Campbell—In closing, I draw your attention to page 5 of the Land and Water Australia submission. We are currently undertaking a project funded by the Natural Heritage Trust, under Mr Lee’s stewardship. It is experimenting with how we service the knowledge needs of the new regional bodies under the national action plan and the Natural Heritage Trust. We are looking at experimenting with different ways of assisting them to access what they see as a vast and intimidating amount of scientific information from a whole range of different sources. A

synthesis product such as this is one tool; face-to-face is clearly the best. But it is difficult to organise across 57 bodies and many hundreds of science organisations.

We are also looking at some of the technical ways of ensuring that we can make the information that might be available through the web sites of any particular agency transparent from wherever you enter the system. We are not looking at a centralised hub and spoke model, with all the information having to be in the one place, but at ways of using the latest technologies to ensure that people in any part of the system can find out what information is sitting in other parts of the system and how to access it. It is very clear from our work with the regional bodies that they are going to need some skilled assistance to help them to better navigate their way through what is a vast amount of information and work out which bits are most relevant to them and how to apply it in their own situation. There is a House of Representatives inquiry at the moment into rural skills training and research, which is considering some of those issues, too.

CHAIR—Thank you. Before we go to questions, I note for the record the tabling of the Rural Industries Research and Development Corporation's report of 2005 titled *Natural resource management: research and development*. I also note that it was produced on the initiative of Senator Troeth. I congratulate her for doing so. Senator Troeth, would you like to go first?

Senator TROETH—Yes. Andrew, as you and I know, and as the committee now knows, a tremendous suite of management tools and knowledge is provided in something like the interactive CD-ROM. What can each of the bodies involved in salinity management do to improve the use of those particular tools and techniques, in your estimation?

Mr Campbell—The partners in the National Dryland Salinity Program, which include the Murray-Darling Basin Commission, several states and territories and several agricultural industries, including meat and grains, are all promoting this through their networks. A communication network was set up through the National Dryland Salinity Program. As we said in our submission to the last salinity inquiry, the National Dryland Salinity Program is no longer continuing as it was. We put in place some mechanisms to promote this information but it is fair to say that, in the absence of some specific resources being dedicated to it, this work will not be promoted as well as it could or should have been.

Through the national knowledge brokering project, we hope to create ways of ensuring that the regional bodies will access this work. Nevertheless, there is lots of room for improvement in the way in which current extension arrangements service the needs of people on the ground. I think the extension system is servicing the needs of very progressive and switched-on farmers very well—in particular, through the private sector—but, if we look at where natural resource management problems are occurring, it is probably fair to say that in the main it is not the most progressive producers who are involved, and they are not naturally proactive information seekers. So servicing their knowledge needs is more complex. I think there is a lot of room for improvement in that regard. As you know, rural R&D corporations are having to spend greater and greater proportions of their research budgets on funding what used to be called extension activities.

Senator TROETH—So we are looking for practical ways in which we can communicate this knowledge to the people who should be using it.

Mr Campbell—It is not just a matter of getting it out to them; we offered free distribution through a free call number: ‘Dial a free number and get it delivered to your mailbox free.’ It is not just a matter of dissemination; it is a matter of assisting people to work out how to apply it in their own circumstances and how to interpret it, and that requires skilled people on the ground.

Ms Robins—This is the set of reports—and look at them together. When I was presenting some of this to a committee in South Australia I was sitting in the audience and the people behind me did not realise that I was the presenter. They had this bag and they went, ‘Bloody hell, what do they think we are going to do with all of this?’ This was something that we picked up when we did a lot of product testing with people in producing this. They said, ‘This is not something that you can just post to people, because they will see it as part of the problem rather than part of the solution.’ When they see how it actually works as a tool of the CD then suddenly they say, ‘Okay, this could help me rather than just being another pile of papers in my in-tray.’

Mr Campbell—Skilled advisers and consultants can see immediately that that CD is a goldmine for them. But, if you get that turning up in the mailbox, cold, you are more likely to resent it than appreciate it.

Senator STEPHENS—I would like to pursue Senator Troeth’s questions. We have got this fantastic CD-ROM—congratulations on that wonderful outcome—but of course there has to be some kind of connect between the knowledge base and practice on the ground, and the issue of extension services is one that always comes to mind, or some kind of intermediary. We have had the CSIRO lamenting the closure of the National Dryland Salinity Program, and the House of Representatives report made a recommendation that that program be continued with an expanded role to include irrigation and urban salinity and to be managed within Land and Water Australia. They suggest that program could play a research coordination and communication role. Do you think that a revived NDSP with an expanded role would be the appropriate vehicle to play that ongoing communication and coordination role? In hindsight, looking at what is now needed as the programs mature, is there a better model, or is that the answer?

Mr Campbell—In our submission to the previous inquiry, Land and Water Australia clarified its position. I know that it is always crass for agencies to appear before committees such as this and lament their budgets, so I will not do that. But our corporation has had a static appropriation for about the last 14 years and the only way the board has been able to invest in new areas of research, such as Australia’s northern rivers or new work on vegetation and biodiversity or on the social aspects of natural resource management, has been to discontinue work that we have been funding for 10 years. So the corporation took a very hard decision to stop funding the National Dryland Salinity Program but did invest in this final year to ensure that we at least had good legacy products from all that wonderful research.

In our submission we said that were we resourced to do so, we would be only too delighted to continue providing that sort of service for salinity science through a revamped National Dryland Salinity Program. I think that it would need to be tweaked to better meet the needs of the regional model, with 57 new catchment bodies around the country. You would need some explicit connection with those groups. But that would be just a matter of design and would be extremely feasible, as would some of the other infrastructure and urban issues—although for us as a rural R&D corporation getting into core urban areas is stretching our mandate somewhat.

Nevertheless, certainly in terms of funding science on water management and the impact of salinity work, there is a lot of urban relevance there without having to operate in the CBD.

So, yes, we stand ready to do that but, on a fixed appropriation—and, given that the board has had a very hard look at research priorities and has decided that it needed to be investing more in Northern Australia, particularly on the water resources of Northern Australia—we had to make a very hard decision after 11 years to stop funding the NDSP. Nevertheless, I believe that it was a terrific vehicle and if we had additional resources we would love to continue doing it.

Senator STEPHENS—I totally agree with you that these products that you have produced are a wonderful legacy. The program had a fantastic reputation in regional Australia in terms of delivering those kinds of services and injecting a lot of local capacity for responding to salinity needs. I am quite concerned about the extent to which losing that capacity by not having a footprint on the ground is going to make a difference.

Mr Campbell—Given the levels of public investment in natural resource management programs that we have heard about through the national action plan, the Natural Heritage Trust and, now, the National Water Initiative, I think there should be a lot more resources on the ground than we have ever had in the past for delivering public good natural resource management work. So I do not perceive that with the demise of the NDSP there will be an impact on the resources on the ground. The gap that the NDSP leaves is with the coordination of the research activities and some of the communication of that science in ways that advisory services, catchment bodies and policymakers can pick up and find accessible.

Senator STEPHENS—It sounds like you are optimistic that we will not lose too many of those skills from the regions.

Mr Campbell—I have just taken some sabbatical time to have a hard look at the research and extension system for natural resource management in Australia. I do have some grave concerns about extension in particular and think that we need to change our approach to it. We also need to be reorganising ourselves to be able to meet the needs of catchment bodies and land-holders for natural resource management work and, in particular, to bridge the gap between catchment scale targets and priorities, and farm and paddock scale action. At the end of the day, the action mainly happens on farm, and decisions are made at that scale. There is some very challenging science involved in moving up and down between a decision as to what to plant in a particular paddock or where to put trees and the impact on a river 100 kilometres away. There is a lot of unfinished business there, and in my view we are going to need highly skilled intermediaries between the science and the practice if we are going to inform good decision making at those difference scales—farm, catchment and region.

Senator SIEWERT—Firstly I would like to pursue the coordination of the research and salinity work in Australia. You commented that, with the demise of NDSP, there is a concern about coordination. Do you think that the body that we heard about from the department earlier is going to fill that need?

Mr Campbell—I would need to hear more detail about what the plans are. As I understand it, the body referred to is the Executive Steering Committee for Australia's Salinity Information, which sits under a ministerial council. So it is not a body as such; it is a committee of people

from different state and commonwealth agencies. Frankly, I do not think even the members of the committee would claim that it would replicate the NDSP in being able to provide genuine coordination of either the science or its communication.

Senator SIEWERT—What would you suggest would be adequate to fill in at least part of that gap?

Mr Campbell—I think that that should be seen as one element. We are setting up a regional model which is about natural resource management—it is not just about salinity—and so there is a need for coordination of salinity science at some stage. We are asking catchment bodies and farmers to integrate across all these issues. Building more silos higher up in government is not necessarily a more helpful way to service the needs of the catchment bodies who are actually pulling information together—as Mr Willcocks said—across weeds, soils, feral animals, water quality and biodiversity issues, not just salinity. There is a danger in going too far down the single-issue track and setting up bodies. If you have just one body on salinity and another one on weeds and another one on something else, then it just makes it even more confusing for the punters. It behoves government at some stage to start integrating its approach as well.

Senator SIEWERT—Changing tack slightly—I can argue with you about that one a bit more maybe later—in your submission you talk about the need to enhance capacity building and extension of policy, which I do not disagree with. However, my understanding of one of the NDSP findings was that one of the most significant things that we need to do—or one of the most significant things holding up progress—is investment in and having available commercial species to plant. Do you think that we are investing enough in developing commercial species?

Mr Campbell—I think that the CRC for Plant-based Management and Dryland Salinity is doing a terrific job with agronomic options. I also happen to chair the Joint Venture Agroforestry Program, which is a collaboration between Land and Water Australia, the Rural Industries Research and Development Corporation and the Forest and Wood Products Research and Development Corporation, and it is managed by Rural Industries Research and Development Corporation. That program has been funding the oil mallee work that you may be well aware of in Western Australia. We are just scratching the surface there in terms of the use of woody perennials. To get on top of ground water issues in some of the valley floors in the Western Australian situation is going to be very difficult with annual plants so we are going to get some woody perennial options. The oil mallee work is just a taste of the sort of options that could be done there.

But on that front I would like to draw the committee's attention to the fact that that the integrated wood processing plant at Narrogin is about to commence its wet commissioning process, its trial process. That is one of the most significant developments in salinity management in Australia. Wheat belt landholders have planted more than 10,000 hectares of oil mallees to go into a plant which will produce bioenergy, high-quality natural essential oils and activated carbon. The plant will provide its own energy to run itself from the eucalyptus oil biomass. It is the first time in the world that these three processes have been brought together in the one plant and it is being trialled at the moment, funded by Western Power to date, which is terrific.

However, Western Power, understandably, are evaluating it on the basis of how well it performs as a source of green energy. But it is not just a source of green energy; it is an option that will help to control salinity in the Western Australian wheat belt, if it is successful. I think we all should be watching this experiment extremely closely from a broader public policy point of view, not just an energy point of view. Western Power is not a dryland salinity agency or a land management agency; it is an energy utility and it is interested in seeing how the plant goes from an energy point of view. That is perfectly rational but it will be a tragedy for the landholders who have established 10,000 hectares of oil mallees and for broader salinity management options if that plant is not evaluated across the whole triple bottom line and not just its energy production. The next three or four months are going to be critical in that process, after 10 or 15 years work.

Senator SIEWERT—An awful lot of work went in from an awful lot of people to get that off the ground. We stalled at one stage until a significant amount of lobbying went on to get that additional funding to make it happen.

Senator ADAMS—I come from exactly where the oil mallees are—from Kojonup, which is about 90 kilometres from Narrogin. I am very interested—especially as this year we have had absolutely exceptionally high rainfall in that particular area, so of course the water table has risen considerably—to hear you talking about infrastructure and civic infrastructure damage from salinity. I am really concerned. It has not been mentioned very much, even though we have roads that are still underwater—they are absolutely gone and we need some funding to get them back. Has it been identified just how bad this risk is? Have you got anything on that?

Mr Campbell—Yes. There was a suite of projects funded through the NDSP that looked at the off-farm, infrastructure and local government impacts. As I said, the broad conclusion was that in the long run those costs are likely to be more significant than the on-farm costs—certainly the on-farm costs in terms of lost agricultural production. I agree with Mr Lee that the investment proposals coming through the national action plan so far have not put a lot of emphasis on those issues.

Senator ADAMS—Is anybody picking up on them?

Mr Campbell—I am sure some are, but I cannot give you any names off the top of my head. But that is one of those architectural issues with the relationship between local government and catchment bodies that is quite significant. There was an NDSP project that highlighted best practice in local government and provided examples of what the more progressive councils are doing around salinity. It is very heartening, but they are little candles in the darkness in comparison to the scale of the issue.

CHAIR—We will try to shed a bit more brightness on it over the course of the next few months.

Senator WEBBER—I have a small technical question. I received my copy of the CD yesterday—congratulations on that—so I have not had a chance to have a look at it properly. Given the target audience, and that we have a huge problem with broadband access, how dependent is it on using internet links?

Ms Robins—It is not highly dependent—

Senator WEBBER—Or is it incredibly accessible? If I cannot use the internet link to get to the Commonwealth bit, or what have you, am I still going to be fine?

Mr Campbell—You are.

Senator WEBBER—Will I miss anything important?

Ms Robins—You will be okay. Obviously there are web page links, so that if people have web access they can go to a particular department's web page and see the list of who is on the catchment management committee and all those sorts of things. So that is all there. But the whole idea, wherever it was possible, was to take the file of the report and put it on the CD, so that someone would not have to worry about the rate of download on a poor line; it would all be there in front of them.

Mr Campbell—However, as time goes on—as more new projects get put on the web sites of those agencies—being able to access it online—

Senator WEBBER—That is the issue: whether it is all on the CD or has to be accessed online. This CD will date because we are going to keep moving forward, I hope.

Mr Campbell—That is right. It will date quite quickly.

Ms Robins—Basically, the reports on the CD are completed and near-completed research. We had criteria for what research went on it. It had to be nationally significant—which did not mean it had to be national research; it could have been regional or local research—and interesting because it was a case study or a good way of presenting information or whatever. So all of that information is on it, and it benchmarks information to that particular point. Obviously, there is a whole raft of research going on continually, and a lot of the recommendations of the reports on the CD are partly what have informed the strategic directions for current research and development. So some of the issues that have been raised are a part of the current research agenda, as you would imagine.

CHAIR—You're not making a late bid for the Telstra bills to be referred to this inquiry! Thank you very much for being with us so late this evening, and good luck with your work. If there is any extra information that you want to provide to the committee, we will be at this for a few months so feel free to pass it on to us.

Mr Campbell—I have a few extra copies of this and there is a four-pager for anyone who missed the presentation; I am happy to leave them for the committee.

CHAIR—Thank you.

[8.16 pm]

PROSSER, Dr Ian, Theme Leader, Water Resources, Commonwealth Scientific and Industrial Research Organisation Land and Water

CHAIR—Welcome and thank you for giving us your time tonight; it is much appreciated, especially as we have made you wait a little longer than the time we had suggested. We have your submission, which we have numbered 15. Are there any amendments or alterations you want to make to it?

Dr Prosser—No.

CHAIR—I remind you that evidence given to the committee is protected by parliamentary privilege and that the giving of false or misleading evidence to the committee may constitute a contempt of the Senate. I also remind you that if for some reason you want to give evidence, part of your evidence or an answer to a specific question in private you may ask to do so and the committee will consider that request. I invite you to make an opening statement before we move to some questions.

Dr Prosser—Thank you. First of all, it is a pleasure to be here today on behalf of CSIRO to appear before the committee. The submission from CSIRO focuses on the scientific and knowledge adoption challenges that remain to be met to address salinity across Australia, because that is our area of particular interest. But can I say, first of all, that salinity really is a wicked problem. You have to appreciate that it is very hard to observe directly as most of the processes actually occur underground and they change very slowly and often imperceptibly, but, as we have seen, ultimately they can be crippling.

Salinity management spans many scientific disciplines: it includes hydrology, agriculture, economics and the social sciences. It also occurs across a wide range of environments in Australia, as we have heard earlier tonight. It follows well-understood hydrological processes, and these are shared between these environments. However, the management of salinity depends on the precise local conditions and the trade-off decisions with other regional goals that have to be made within each region on its own. So this requires that the general principles are interpreted through a deep knowledge of the local conditions in each region. This is the real crux of the challenge of salinity management.

There are no institutions in Australia that span all the required areas of expertise to face these challenges. And, at present, there are no regional management bodies that have the capacity themselves to synthesise all the knowledge required to tackle the problems, as we have heard in Andrew's submission. That is why we believe that we need a greater emphasis on knowledge generation and management around salinity.

The goals of the national action plan and the Natural Heritage Trust are laudable. They show continuous improvement in the way that salinity is being tackled in Australia. The central role of regional groups recognises that salinity occurs at a regional scale and recognises the need for priority setting. The framework of target setting and strategic investment plans has excellent

potential, we believe, for addressing salinity in a much more effective way. However, it relies on good understanding of whether the local land use changes, the often local farm scale changes that occur are actually meeting the end-of-valley targets, which can be several hundred kilometres downstream. Often there is no specific connection between those local management actions and those end-of-valley targets. To really tackle the salinity problem we have got to be able to make those links; we have to be able to capture those links much more effectively than we are at the moment.

We have also heard tonight—and CSIRO would agree—that new and innovative solutions are required to manage salinity in an economically viable way. Often, there are not many immediately obvious economic solutions. This might include the design of land use mosaics in a more clever way than is done at present, better design of farm forestry and the broadening of economic activities to include things such as environmental services—carbon sequestration, for example. We have also heard tonight about some of the engineering options. They need to be better evaluated and put into the broader regional context of some of the socioeconomic and downstream environmental impacts. We are doing projects on those engineering options at the moment, particularly in Western Australia.

There is no doubt that progress is being made towards meeting the goals of the Natural Heritage Trust and the national action plan. It is unlikely, though, in our view that the end-of-valley salinity targets are being met by the current investments. Ultimately, the problem is that it is very hard to judge what progress has been made against those end-of-valley targets, because monitoring and evaluation is inadequate. Significant resources are put into monitoring and evaluation, but the long time scale of salinity and its sensitivity to climate variations—the particular weather conditions from one year to the next—make it a very difficult situation to monitor and evaluate. It requires the use of predictive models that can look long into the future to evaluate whether the actions being taken today are going to meet targets for the future.

Fortunately, rapid developments are occurring in monitoring technology—in remote sensing, in web based data management and in the fusion between predictive models and online data. These can be used to greatly improve the ability to evaluate progress against the targets. The CSIRO is paying particular attention to these opportunities and developing them through something called the Water Resources Observation Network. This is a major technology program aimed at improving the forecasting, planning, monitoring and evaluation of water and salinity across Australia and will be carried out in collaboration with the jurisdictions.

We believe that regional authorities have a crucial role to play in salinity management, but they have widely ranging capacities to meet their goals. As I have pointed out, there are significant technical challenges in assessing how to manage salinity in each catchment. Techniques are available to identify the assets for protection, the salt sources and the flow pathways and to design the management options. Research in these areas is continuing to provide more accurate and sophisticated techniques. Such improvements are demanded by the sophistication of the policy through its targets and strategic investment plans—they bring strong demands of the research. However, our experience is that the use of that research is limited, because it requires translation to be relevant to local conditions. The general principles are understood, but their application to each local condition needs to take into account the local environment and the local cause and effect relationships of salinity. That requires expert

interpretation of those general principles using the local knowledge. Many regional groups have not developed those skills to date. They do not have the skills amongst their staff to do that.

Furthermore, our regional catchments are large and very environmentally diverse, so for effective management of these end-of-valley targets we need to know the detailed patterns of salt generation within those catchments and we need accurate methods to predict how salinity will respond to management. This detailed spatial variability, and how to influence the sources of salt through management actions, is the greatest technical challenge at the moment. It requires much better environmental mapping—not just geophysics mapping but the mapping of flow paths as well. It also requires the innovative use of that information in predictive tools—in hydrological models—and the testing of all those against field observations.

Much work remains to be done. However, there are wonderful opportunities to greatly improve our capacities in this and to greatly improve the dissemination of that information through to the regional bodies. The research skills reside in many bodies. CSIRO possesses many of them, but they also reside in the CRCs. They reside in the CRC for plant based solutions that we have heard of and also in the eWater CRC through the predictive modelling tools that it will be developing, taking on the legacy of the CRC for Catchment Hydrology. BRS and the universities all have valuable skills to bring to this, but they are a very disseminated set of organisations and they are trying to deal with regional groups, which are also a very disseminated set of organisations. So we need some form of coordination and national knowledge strategy that works between those two sets of very disseminated organisations.

Senator STEPHENS—Thank you very much for this submission, which I found very insightful. The question that I want to ask does not totally relate to salinity research. It comes back to the issue in your submission about research coordination and the connection between knowledge and practice on the ground. You mentioned in the submission that South Australia has formed a Centre for Natural Resource Management to broker research on natural resource management issues. I presume that you might be in a position to answer this question. There is now a national school of government, which coordinates public administration, education and professionalisation. Is there any kind of concept like that for natural resource management that brings people's skills up to a common level and allows for transfers in accreditation and those kinds of things?

Dr Prosser—That is the type of thing we are looking at. I am not aware of the details of that governance organisation. I can elaborate a bit more on the Centre for Natural Resource Management in South Australia.

Senator STEPHENS—I would be quite interested to hear about that.

Dr Prosser—Our researchers have found it very useful. It brings our researchers, particularly those based in South Australia in our Adelaide laboratories, together with the staff and the boards of the regional catchment management authorities. They work together to look at research projects. This makes the research projects far more targeted and far more directly applicable to the problems being faced by the managers, and it lets them get some direct input in the early stages of their planning. They are able to reconceptualise the problems and define them better by talking to the experts who know the underlying physical processes better. It is quite a deep partnership in developing those projects, and it is that sort of deep partnership that we are

looking at. It could include accreditation, training and things like that. The CRC for Catchment Hydrology has had training in techniques for models of salinity assessment. Once again, the strength of those still relies on the expertise of the people doing the training. They have a one-week training course and then they are back out in their local regions. It still relies on them having a high level of skill to know how to use those techniques properly in their local conditions.

Senator STEPHENS—As I said, I found the submission very clear, concise and useful. Thank you.

Senator ADAMS—Thanks very much again. I enjoyed reading this. In your view, have high-risk salinity areas been adequately identified?

Dr Prosser—They have at a coarse scale across most jurisdictions, particularly in the Murray-Darling Basin and Western Australia. They are essentially largely desktop exercises. To use those in targeting local action on the ground requires more detailed field investigation of those situations. Within each of those potentially high-risk areas, there needs to be some more detailed follow-up investigation—which, in many cases, occurs, but it is a bit uneven.

Senator ADAMS—Getting right down to the basics, where I come from, the shires are trying to fund their land care offices and anyone involved with land care, and it is becoming a huge problem. You might have an identified high-risk area, but no-one can do anything because there is no funding. I am just coming from the grassroots side of it, not from where I am here. It is very difficult, and there are complaints all time. There are other issues in the shires—populations decreasing, infrastructure and that type of thing—and the money has to be prioritised. The problem that is causing it is not being dealt with because they have to do patching up and catching up.

Dr Prosser—And there is a very limited range of economic options to deal with it in those situations. I agree: it is a wicked problem, I am afraid.

Senator SIEWERT—I would like to follow up the interaction between science and the uptake of the research and the regional organisations. What has been your experience, not only in their ability to take it up but also in their timing—when they are planning and their ability to take on the science in the planning process?

Dr Prosser—It is probably most important in the planning process. I believe the regional groups have felt a bit rushed over that. I can only speak from our perspective, but it has often been hard to know when to engage the regional groups. Certainly very early on in the process they were still getting on top of the new procedures and getting all the governance arrangements in place. That was obviously too early, and then they felt rather rushed to get all the plans in place and often did that without seeking advice. Often they would get advice through professional consultants, and that is fine, but that is an intermediary and then we need to get the latest research information out to those intermediaries.

One of the things for us is to map the networks—to know the networks and to know where people are getting their information from. With 57 regional groups spread out across the country, they are highly varied and it is quite a task for us to know how each one works. The other factor

is that this local information is crucial to them. They want someone who knows their region. That makes it difficult for a national organisation. We are about as broadly spread out and decentralised in laboratories around Australia as we can be, but we cannot possibly have staff in every one of those regions. We notice that the interactions we have with the regional groups are strongest in the regions that are closest to our laboratories and they are weakest in the distant ones.

Senator SIEWERT—Is it a wise use of resources for regional organisations to be doing their own research?

Dr Prosser—No, I do not believe so. You run the risk—and Andrew has a good phrase for this—of inventing 57 rail gauges across Australia if they are all doing their own research. They share many common things, particularly with neighbouring regions which may have similar environments, and it would be very inefficient for each one to be doing their own investigations.

Senator TROETH—You have also drawn attention to climate change and its impact on water resources. You say that it needs to be factored into the development of management options. Are you aware of any existing work on climate change and salinity management?

Dr Prosser—Indirectly through its effect on the water balance and ground water flow paths, but that is very much in its infancy. There is a major program in CSIRO on that at the moment, and we would be expecting significant developments in that in the next three to five years, particularly through the Water for Healthy Country Flagship Program.

Senator TROETH—I understand your comments about the different levels of regional groups and the way in which they operate. Is that just about money, or are there other factors in their differing performances?

Dr Prosser—No, it is about their capacity, it is about their skill levels and it is about their youth as institutions. A lot of these regional groups are fairly young institutions. The longest existing ones are the Victorian CMAs, and they are the most sophisticated. I do not believe that is a coincidence. It is just the time it takes to develop up that regional scale, the thinking and the tackling of these problems in a strategic way to develop other skills in house.

Senator TROETH—You have also mentioned—and I am quoting from page 4 of your submission—that:

There are too few sustainable and financially attractive solutions for salinity.

Then you talk about:

... the development and design of combined biophysical and engineering solutions ...

Could you give us a few examples of both of those types of solutions that could be used?

Dr Prosser—Yes. Some of the biophysical ones include clever design of farm forestry so that it is targeting a particular position on slopes and things where salinity expresses itself most clearly, so that you have to turn over the smallest possible proportion of the farm to farm forestry

and the rest can be used for shorter term cropping. Farm forestry is economically viable in some circumstances but not in all, and often salinity expresses itself most in the pretty marginal areas for farm forestry. So we are looking at much smarter design there, really targeting the position of farm forestry rather than just a blanket, whole-of-operation forestry.

On the engineering side of things, I think the drainage options in Western Australia were mentioned earlier tonight, just as I entered. We have two large projects evaluating those at the moment. They are technically feasible. There seems to be a willingness to pay the cost of them. The big issue is the potential downstream impacts on water bodies downstream. You are essentially just exporting the salt from one place to another, so there is the whole salt disposal issue and the issue of potential impacts on freshwater and saline ecosystems downstream. We are evaluating those at the moment.

Senator WEBBER—I have had a look at some of the work you are undertaking in Western Australia. Congratulations; some of it is very interesting. I want to pick up on one of your earlier comments that those regional bodies and what have you that are closest to your laboratories are working best. Apart from the need for greater national coordination, how do we deal with that? How do we improve on that in a state like Western Australia?

Dr Prosser—I think that the regional bodies themselves have to be skilled up. They need to have a situation where they can employ the people we are training in these areas as management officers. That means improving the tenure of the jobs that are offered to them, instead of these rolling annual contracts and things like that. So there is a case there for higher skilling. Then there needs to be a coordinated approach to the ongoing training of those people. I have not been involved in the salinity one, but I was personally involved in a riparian program through Land and Water Australia where we annually organised state based workshops. We brought people from every region in the state together each year and talked about the latest developments and the latest techniques, so there was that continual updating. We rotated those meetings around a different region each year. Another part of it was to go through and demonstrate how the latest developments and techniques would be applied to a particular region. We need to have a deeper relationship between the people doing the ongoing research and knowledge generation and those actually responsible for managing it, in an ongoing way.

Senator WEBBER—But how do we develop that community capacity when some of the people employed regionally and some of the researchers are employed on six-month contracts? That does not give a community a lot of confidence to lift its capacity and be open to these new ideas.

Dr Prosser—That is right. There needs to be a recognition that we are in for a long haul here to solve these problems, so we need a long commitment to resourcing that.

Senator WEBBER—More money?

Dr Prosser—Not so much more money. As Andrew said, there is a significant amount of money going in; it is just a matter of the use of that money.

Senator WEBBER—And greater national coordination would address some of that.

Dr Prosser—Yes. Most technically difficult program areas would invest about five per cent into research and development, into making sure that the money you were investing on the solution was being invested in the smartest way. Five to 10 per cent of the total budget of NAP and NHT would give a more significant resource than the National Dryland Salinity Program to tackle this coordination role. So it is not that you need more money; it is the way the money is used.

Senator WORTLEY—You said that monitoring and evaluation is really inadequate but that there was a development of adequate monitoring and evaluation equipment that CSIRO was involved in?

Dr Prosser—Yes, we are exploring new technologies.

Senator WORTLEY—What sort of time frame are we looking at for that? Also, what is it reliant on—is it, again, money?

Dr Prosser—Yes. That is a new program, CSIRO have their own resources and we are dedicating our own resources to that, but we are also looking for external support. We are looking at a \$50 million to \$60 million program, all up, for that. We are negotiating with, for example, the National Water Commission for their support of it and we are working with eWater CRC for support of it. So there are significant resources around that, and we are breaking it up into manageable pieces; we are not looking to any one body to resource the whole vision—although of course if someone offered, such as the National Water Commission, we would gratefully accept that.

The other point is that we are looking at exploiting these new technologies but, in the end, they are going to have to be used by the jurisdictions, by the states and the regional groups, so we will be working closely with them to see what sorts of decisions they are making, where they get their information, what their capacities are in IT, connection to the web and that sort of thing. We are only just scoping this up now; it is just beginning. We are certainly looking at good outputs in the next three to five years, but to achieve the overall vision we are looking at around a 10-year program. The Koreans have one of these things up and running, so it is possible with significant investment. We have been working with the Koreans to see what they have done. We have very different contexts in Australia, but they are showing what can be done with the latest technology.

Senator WORTLEY—Do you think we will be moving fast enough to address the damage that has been done and is likely to be done if we do not put the resources into developing the equipment that is required?

Dr Prosser—I have two views on that. I often, on a short-term view, get a bit impatient about progress. But whenever I get frustrated about it I always look at it in the longer term. If you look at where we have come in the last 10 years or so, you see that there are grounds to be optimistic. There have been massive improvements in the way we manage salinity in the last 10 years, and if we continue to make those improvements then I am optimistic that we can get on top of the problem.

Senator SIEWERT—I would like to follow up on the comment you made about it not being a lack of resources. When Andrew answered a question asked by, I think, Senator Stephens—it was a question I was going to ask—about the demise of the NDSP, he said that it was about resources, that it was about them making a decision to invest their resources elsewhere. What is your response to that? I would also like to ask about your comment on the need for coordination of information to regional groups. What body do you think would be the best one to coordinate that research? Would it be Land and Water Australia?

Dr Prosser—Land and Water Australia does an excellent job at that, so it would be that or some similar body. There are CRCs around but it is beyond the jurisdiction and scope of any particular CRC. So I think Land and Water Australia, who did such a successful job with the National Dryland Salinity Program, would be a suitable organisation. I have worked at Land and Water Australia, I should say. It was a very satisfying place to work as a scientist too because of their expertise at the knowledge transfer and coordination role. I recognise that they are completely hampered by their static appropriation budget, but Andrew did say later that if you look more broadly, beyond his resources he has at his disposal, to the total resources that are addressing this issue you get a different answer. When you look at the total resources addressing this issue there should be enough resources for national coordination of knowledge; it is just that they have not been given to the body that is perhaps the Australian leader in that area in NRM.

Senator SIEWERT—So what you would be suggesting is that money is allocated for better coordination?

Dr Prosser—Yes, I would suggest that there is money that could be allocated.

Senator SIEWERT—You do not need to increase funding; you just need to reallocate it?

Dr Prosser—Obviously it would be nice to increase it, but if you wanted Land and Water Australia to do it you would have to increase their funding, yes.

CHAIR—Thank you for your evidence and for your widely appreciated submission.

Dr Prosser—Thank you for the opportunity.

[8.45 pm]

KENDALL, Mr Matthew Bruce, Salinity Manager, Murray-Darling Basin Commission

MEISSNER, Mr Anthony Phillip, Project Officer, Irrigation Salinity Impacts, Murray-Darling Basin Commission

ROBERTS, Mr Leslie John, General Manager, Natural Resource Management, Murray-Darling Basin Commission

CHAIR—Welcome. I remind you that evidence given to the committee is protected by parliamentary privilege and that the giving of false or misleading evidence to the committee may constitute a contempt of the Senate. If at any stage you wish to give part of your evidence or an answer to a specific question in private, you may ask to do so and we will consider your request. We have your submission, which we have numbered 21. Would you like to make any alterations or amendments to your submission?

Mr Roberts—No. We have a couple of opening slides, and we also have some copies of the salinity audit report to provide to the committee.

CHAIR—I now invite you to make an opening statement.

Mr Roberts—As senators are probably aware, the Murray-Darling Basin Commission is an unincorporated joint venture between six governments: the Commonwealth, New South Wales, Victoria, South Australia, Queensland and the Australian Capital Territory. We have a ministerial council, with up to three ministers from each jurisdiction; a commission, with two commissioners from each jurisdiction; and an independent president, Ian Sinclair. The commission's office is based in Canberra and works with each of the jurisdictions. Our role as a commission is to advise the ministerial council on all matters relating to the sustainable management of water and land and the environmental resources of the Murray-Darling Basin. That work is delivered through a series of strategies, including the strategy which is of most interest to this committee, the Basin Salinity Management Strategy, which seeks to coordinate and report on all of the investments, of all the governments, within the Murray-Darling Basin.

The slide which is probably of most interest to you is the slide which outlines the Basin Salinity Management Strategy and the operational protocols that underpin it. The critical element to that is that, as a part of the Murray-Darling Basin agreement, which is a piece of legislation in each of the jurisdictions, there is a legislated schedule—schedule C—which outlines the obligations of jurisdictions in relation to the Basin Salinity Management Strategy and provides the reporting framework to the commission and the ministerial council in relation to performance against the salinity management strategy.

Those accountability arrangements under schedule C include annual implementation reports from each of the jurisdictions, rolling five-year reviews and audits through an independent audit group that reports to the commission and the council, and the exception reporting, which goes through to ministerial council where there are issues which need to be addressed at the

ministerial council level. It is important that we recognise that all of those programs and activities designed to address salinity management—including state based initiatives, community plans, catchment management authority activities, and obviously also the national and basin-wide initiatives, the national action plan and Natural Heritage Trust activities—are all coloured by reporting through the schedule C processes and the Basin Salinity Management Strategy reporting. That is an area of increasing and developing interest. The commission, even at its most recent meeting of last week, agreed to further arrangements to better integrate the full range of activities that address salinity into the reporting and monitoring framework under the Basin Salinity Management Strategy.

Mr Kendall—Salinity is obviously a very complex issue and highly variable. Salinity in the river Murray has got a bit of attention in the media in the last couple of years. Salinity levels in the river have been very good, despite the major drought across the Murray-Darling Basin. Some of the improved understanding is telling us that climate is very dependent in terms of the causes of salinity. The drought has actually had the perverse outcome of lowering ground water levels in a lot of areas, hence reducing those saline inputs to the river, at the same time that the majority of the water in the Murray is being sourced out of Dartmouth Dam, which is one of the freshest storages in the basin. Salinity has been very good, but work has looked back over a long period of data record. If you go down to the flood plains along the river you will find a very large amount of stored salt right next to the river, and when we do get a return to more normal climatic conditions it does not take a lot of assessment to understand that that salt will move into the river. There is a risk with a return to a more normal climate and flooding. That is one point to make.

The other issue with the Murray-Darling Basin is that salinity is very much about trade-offs. Managing salinity in the upper states—Victoria and New South Wales—may involve, for example, putting drains in irrigation areas. The drains in irrigation areas will improve local salinity and are an essential part of managing salinity, but the trade-off is that that drainage puts more salt into the river. That can increase river salinity levels and, obviously, for the downstream jurisdiction—South Australia—that is a major issue. Adelaide, with over one million people, relies on the Murray for a large proportion of its water. The role of the Murray-Darling Basin Commission is to bring the governments together, look at those trade-offs and manage salinity within limits. Les has already talked about the system of credits and debits that allows for that.

Finally—this is a key issue—the regional plans really do require the science to understand the land use change and the effect that that will have on the rivers in terms of end-of-valley salinity targets and the basin target further downstream in South Australia.

Senator TROETH—In your submission you have put a recommendation to the committee:

The inquiry may like to consider the means of ensuring that the NAP & NHT deliver on shared outcomes of the BSMS.

Could you give us a brief overview of the issues behind that recommendation and how the recommendation could best be achieved?

Mr Kendall—I have mentioned that example about irrigation and drainage. If you were a regional catchment group and you wanted to manage irrigation salinity, then putting drains in would be a great thing. There is obviously a trade-off in terms of downstream water users.

Another example of that would be planting trees. There are private sector interests that are very keen to plant large areas of trees. If those trees go into the salt affected catchments, then that can provide positive outcomes for salinity and also for timber interests. But if the trees go into the fresher catchments and take away those dilution flows, the trees could actually make salinity worse. To understand these issues and get the science in place are key issues.

The Independent Audit Group for Salinity, in their latest report, of which you have a copy there, have picked up on this issue, and there are over 20 regional plans within the Murray-Darling Basin currently established and accredited through bilateral agreements between the Commonwealth and the respective states. Within the Murray-Darling Basin there is a need to think beyond the region and beyond the state border. The BSMS Implementation Working Group, which the Murray-Darling Basin Commission sponsors, includes representatives of all jurisdictions within the Murray-Darling Basin. That group funds work to improve the science in terms of catchment salt and water modelling, river salt and water modelling and identification of salt stores, as you have heard about earlier from the Commonwealth. I guess it is the MDBC role to look at that from a basin perspective.

Senator TROETH—If you have 20 regions within the Murray-Darling Basin Commission, you would obviously notice different levels of performance and ability to get on with identifying and implementing some of the questions that have to be looked at. Is it simply a question of money in terms of the difference between performance in the regions, or do you think there are other factors at work?

Mr Roberts—I do not think it is just a question of money. I will step back to the original question in relation to that recommendation. The recommendation was more of a statement of intent on our part in terms of where we wanted to go. That was, in fact, part of the discussion that was occurring in the commission context in the last couple of weeks. It is not as simple as money or science; there is a whole range of factors that need to be taken into account in looking at these regional plans. They do require additional science. Some of that science is water modelling and some of the services that go with that in terms of predicting the impacts and understanding the hydrology and the hydrogeology of the area to predict the impacts of particular sorts of interventions and plans.

The things that ties this all back together in the context of the basin are the monitoring and reporting functions, the independent audit group and the fact that they are reporting to each of the jurisdictional governments, who are working either directly with the Commonwealth or with their own catchment authorities to implement actions. It is really about all of the different skills—‘science’ is the general terminology that we would apply to it—required to link that local investment to achieving end-of-valley targets and basin-wide targets. There is obviously a desire within the jurisdictions that form the commission to be able to do that and have that information flow through the commission into the Basin Salinity Management Strategy and the reporting on that strategy.

Senator TROETH—What has been your experience in interacting with both regional bodies and local government in terms of their being able to demonstrate that they have the knowledge they need in order to do what they have to do?

Mr Kendall—The commission forms part of a relationship between governments. The catchment authorities are not signatories, nor are they responsible. The key issue is that they are the ones delivering the outcomes on the ground. Certainly at the jurisdictional level between the governments there are groups coming together looking at the trade-offs. That creates a very proactive peer group, if you like, in terms of the downstream and upstream interests at the table. Obviously, the challenge gets greater by an order of magnitude when you go to 20 or more regional catchment groups. It really just emphasises that that need for coordination has grown because of the devolution of that role.

Senator TROETH—Do you feel that in theory they have access to the amount of knowledge that they need to do what they have to do?

Mr Meissner—Regional bodies have difficulty in understanding the broader picture. They very much see, and are very much involved in, their own problems. Sometimes it is very difficult for them to take a step back. There needs to be communication which paints that broader picture.

Senator TROETH—Do you think that is happening at the moment? Is that provided by anybody?

Mr Meissner—It probably gets filtered a little bit because, as Matt and Les have said, we work through the jurisdictions. At times there are some difficulties in getting the message across.

Mr Roberts—I think it is fair to say that there are very high performers and there are others that are a fair way down in their performance. It is quite variable. Our view is that, in general, the resources are available. It is really about people coming to grips with the process that they are working with.

Senator TROETH—It is about them needing to access what they need to know, and them needing to do that.

Mr Roberts—I reinforce Matt's view that our relationship is with the jurisdictions themselves and not with the catchment authorities.

Mr Kendall—Looking at the Victorian example, where they have had catchment groups in place for 10 years or more, there has been an increasing level of coordination, to the degree where there is very good integration between the state government, those catchment groups and the Commonwealth through the national action plan. Certainly the independent audit group has reflected on the differing stages that each state is at in terms of its catchment bodies. Some are much newer—for example, Queensland.

Senator STEPHENS—Thank you for your submission; this slide is very useful. One thing that struck me is that the basin salinity management strategy does have a life of 15 years, which gives you a bit of time to manage some of the longer lead issues. Even so, the independent audit group report's scorecard rates the implementing salinity and catchment management plans as having 'limited achievement'. Do you anticipate that the slower-than-expected implementation of the catchment plans will impact on the outcomes of your management strategy by 2015? Do you have a sense that you are falling behind in what you had hoped to achieve?

Mr Roberts—The reason there was quite slow implementation initially was that there were delays in negotiation of agreements between the jurisdictions, the Commonwealth and the catchment authorities. We have to put this into context: some of the salinity issues that we are dealing with now are products of action from many years ago—40, 50, 60 years ago. So you are dealing with problems that have a very long time frame. The strategy itself is designed with some quite hard targets, but they are very much directional targets. It would be very difficult to make a judgment now as to whether that would delay meeting the 2015 obligation.

Mr Kendall—It is a 15-year strategy. Les has already reflected on schedule C to the Murray-Darling Basin Agreement, which is not time-bound in that regard. That schedule was first set up under the Salinity and Drainage Strategy, which was agreed in 1988. There is another slide that illustrates the improvement. There has been an improvement of 20 per cent in River Murray salinity since the 1980s. It is certainly possible to get on the front foot with salinity and make those improvements. The biggest challenge is actions which could make salinity worse if there is not good science and coordination, such as trees planted in the wrong part of the catchment and drains which drain irrigation areas and put a lot of salt into the river without limits. That is one of the key challenges, I think.

Mr Meissner—One important thing about the strategy is that it is continually under review. Every five years the targets have to be reviewed. So, in that sense, you get a better feel for where the strategy is going and how effective it is, rather than waiting until 2015. With better science and better knowledge, we can make adjustments as we go along. That is one of the strengths of the strategies.

Senator STEPHENS—I would hope we would not be waiting until 2015 and saying, ‘Oops, we didn’t get there.’ I am quite interested in your project, Mr Meissner. Perhaps you can tell us about the irrigation project you manage.

Mr Meissner—The commission, along with Land and Water Australia, is investing in a particular project to look at the effect of improved water use and the effect of salinity. As you might appreciate, you need water to leach salts but, as you become much more efficient in irrigation practices, you tend to leave behind a lot more salt in the soil profile, and that can affect the production of vines and oranges. The project is looking at how we can best use the water and, at the same time, best manage the salinity within the soil. At the same time, whenever you irrigate you have a certain amount of water draining through to the regional ground water. In lots of places the regional ground water is very saline, which drives salinity into the river. So, as Matt said, there are trade-offs. Hopefully, out of this project we can get a much better way to maintain production and, at the same time, minimise drainage going through and prevent losses in production to salinity.

Senator STEPHENS—Can you suggest where the committee should be looking to see the work being undertaken in that project?

Mr Meissner—That project is focused in the Mallee region of South Australia, Victoria and New South Wales. If senators are interested, the person to contact is Dr Gerrit Schrale at the South Australian Research and Development Institute in Adelaide. He could provide much more detail on that if senators are interested.

Senator STEPHENS—I have a final question in relation to the national competition policy reforms and the establishment of a water market and water trading regime. Does the bigger picture water issue have an impact on the commission's considerations in terms of salinity or on what you have to think about?

Mr Roberts—I think the point Mr Campbell made earlier about the fact that these problems do not exist in isolation is really important. For all of the different issues that we are dealing with—recovering water for the Living Murray, establishing interstate water trade—you need to take into account the salinity impacts and other impacts of moving water around the system or even recovering water. A lot of the work that has been done which may well address dryland salinity by reducing water tables may well have negative impacts on total stream flow and therefore on river salinity levels. In all of these things—I think this was Matt's point as well—there are trade-offs to be made in this. In fact, we have a group of people in the commission office who are modellers. We have a salinity modeller. It is all about modelling the impacts of water trade, water recovery and environmental watering—putting water into wetlands—and the impacts that that has. The silos are a bit of a risk here. We have to deal with this as an integrated system, and that is the attempt that is being made.

Senator ADAMS—I come from Western Australia, where we have quite a lot of trouble with the people at the top of the catchment versus the people right down at the lower end of the catchment. I am just wondering, with those jurisdictions you have which expand over a number of states, whether you are getting the same sort of cooperation from the top end as from the bottom end. Are they really doing what they should be doing because of the people at the bottom?

Mr Roberts—In terms of the broader strategies, obviously all of the jurisdictions have signed on to this. You are quite right, in that, based on the size of the Murray-Darling Basin, the issues are very different between the northern part of the basin and the interconnected southern part of the basin. There are different levels of focus on particular issues in different parts of the basin, but I think the performance of the Murray-Darling Basin Commission as a whole and the commitment of the jurisdictions is very high. I would not take it for granted, but people are very committed and certainly are addressing the issues and taking them very seriously, because they can see the interrelationship both up and down the system.

Senator ADAMS—That is a win.

Mr Meissner—May I just add something. I think the practitioners—the irrigators and the dryland farmers—are very interested in now visiting the northern basin, the southern basin and so on. I think there is a growing awareness amongst the community that it is not somebody's problem upstream or 'Blow those people downstream'; it is really an attitude that we are all in it together and we all need to contribute.

Senator ADAMS—The reason I am asking this question is that we have a feasibility study which is going through 18 shires, looking at putting a drain through into a river to drain it right out to sea. So of course the bottom shires, down near the coast where it is a resort area, are saying, 'No way; you can't touch it,' and the top shires, of course, are having the other problem: they are just floating away. The water has to go somewhere. So I think the model you have set up

as a commission could be brought into other areas. That was what I was interested in there. In your view, have high-risk salinity areas been adequately identified in the whole Murray-Darling?

Mr Kendall—I will have a go at that one, and I will bring it back to the previous question from Senator Stephens about the water trading. Water trading is a major issue for salinity in the River Murray. Water is moving around the tri-state Mallee that Tony mentioned. There is an interstate water-trading pilot which has been under way since the late 1990s. Within that area, there are high-salinity impact zones, in terms of salinity impact on the river, and lower salinity impact zones. The Victorian and South Australian governments have both set up salinity zoning policies which basically identify those zones through maps and put in rules about where the irrigators can trade the water to and from. In the case of Victoria, they also charge a levy for irrigators, to offset the cost of that salinity impact to downstream users. So, in terms of irrigation, there is some quite good understanding of high- and low-salinity impact zones and even regulation around that.

When it comes to the dryland, I think the dryland is probably 10 or 15 years behind where the irrigation understanding is. When it comes to trees, there is now some emerging work which again identifies the importance of the fresh catchment to provide the dilution flows and the real need to encourage trees into the more saline catchments to get the salinity outcomes both locally and downstream.

Senator SIEWERT—Can I go back to the interaction between the commission, the NHT and NAP? I must admit I am struggling with the fact that there seems to be a dissociation between the two and your interaction with regional bodies. I am going back to the recommendation that you made. You must have put a lot of thought into how you can deal with this issue. Can you give us a bit more detail about your thinking on how you would deal with it?

Mr Roberts—In some senses, I think the common factor here is that the jurisdictions are involved in both the commission and the NAP processes. There is already immediately a linkage between the NHT, the regional catchment authorities, the NAP program and the Basin Salinity Management Strategy through the involvement of the jurisdictions in the commission and as signatories to the Basin Salinity Management Strategy and under the obligations of schedule C to the agreement. So there is already that level of linkage there. What has been happening in the commission recently is a further discussion with the jurisdictions about how we had better get into those regional plans the science that is going to link that investment to the valley targets. That is the part that we are really trying to focus attention on. You need to have that linkage so it comes through in the monitoring and reporting framework for all those activities, linked in to the Basin Salinity Management Strategy.

Senator SIEWERT—Are you doing that now? I do not know what stage the various regional groups in the area are at with the accreditation of their plans, but surely they are at a fairly significantly advanced stage.

Mr Roberts—That is true, isn't it?

Mr Kendall—Certainly the regional plans are accredited and being implemented. I think the question still needs to be answered about what the proposed and actual investment on the ground is going to do to the rivers and to the salinity in the rivers. Certainly I think that is an area that

further effort could be put into. The accredited plans obviously represent investments that the regional groups are keen on and that the states and the Commonwealth are keen on. Possibly, they could better assess what the impact is on end-of-valley targets and further downstream in terms of downstream jurisdictions. Really, the jury is probably still out on that one.

Senator SIEWERT—Have you had involvement with the development of those regional plans?

Mr Kendall—At a minimal level.

Mr Roberts—I think the answer is really no. There has been a minimal level of involvement. The plans have been developed bilaterally through the national action plan, to a large extent. So the commission itself has not had a direct involvement but, in as much as the New South Wales government, the Queensland government and the South Australian government are part of the commission, there is that direct jurisdictional involvement. We are not a separate entity from the Commonwealth or anybody else. We are simply an arm of each of those jurisdictions. So it is quite difficult to draw the line and say, 'That's not the commission.'

Senator WORTLEY—My question follows on from Senator Adams's. You spoke about the impact of the drought on salinity levels and the subsequent outcome when we return to a more usual pattern of weather. What plans have been put in place to address this, particularly in South Australia?

Mr Kendall—I can have a go at answering this one. Certainly, understanding is the first step and I think there is an improving understanding. For example, studies looking at over 30 years of records have looked at the interaction between flood flows and climate and corresponding salinity levels. The understanding coming from those studies is that high salinity levels often follow a flood. A flood spills out and fills up the ground water systems on the flood plain. The floods recede in a matter of weeks or months, but the ground water can take up to a couple of years to come back at a much higher salinity.

I can give an example from last year. Early last year there was some good rainfall up in the northern basin of the Darling. It was great to see some flow in the rivers but, as it came down, it mobilised a lot of salt out of saline pools in the river. As it came through Menindee Lakes, very high salinities were recorded in the Darling below the lakes. Immediately that raised concerns about what it might mean for salinity levels further downstream. In that case, the River Murray Water operational arm of the commission looked at what could be done through river operation to mitigate the salt peak. In that case, they diverted the saline flows into Lake Victoria, where there is a large body of water at fresher salinity, thereby capturing the salt peak, and diluting it with the fresher water and minimising the peak. That is an example of a real-time operation of salinity levels being reduced.

Regarding longer term strategies—obviously, the regional plans will play an important role—the commission is also implementing a number of salt interception schemes with engineering options that pump ground water to lower the levels close to the river. They target the high salinity inflows. Over the next five years, there is a planned program of salt interception schemes, with about \$100 million of investment, which will reduce River Murray salinity by a

further 60 EC or about 10 per cent. Again, that is trying to get on the front foot in reducing base salinities so that, when the floods come, the salinity will be coming off a lower base.

Mr Meissner—In addition, there is the Living Murray strategy. In the longer term, if we can divert more water down the river under normal conditions, not flood conditions, there is the ability to transport salt out of the floodplain rather than to let it build up. That is the other long-term initiative.

Mr Roberts—There is no doubt—I think the former chief executive Don Blackmore said it many times—that a salinity holiday was generated by the current dry conditions. The planning is in place to do what is possible to mitigate what will be quite significant salt slugs on the recession of floods through the river system and it includes a whole suite of these sorts of initiatives. But, at the end of the day, it will be an issue of management and attempting to minimise those impacts to manage the dilution flows.

Senator WORTLEY—This question is a little more general. Certainly, discussion about this has been had with some of my constituents in South Australia, as I am sure it has been had with others. For the quality of Australia's water supply now and into the future, how big an issue is salinity?

Mr Roberts—The knowledge base about salinity, both riverine and dryland—their varieties and impacts and the approaches needed for managing them—is growing all the time. With all the information that is around, the work that is being done and the understanding of the linkages between different parts of the system, we are certainly in a much better position now to look at how you manage long-term salinity than we ever have been in the past. Obviously, there are no guarantees in the longer term, but the science and the processes are in place to better understand it. A lot of that work will bear fruit in years to come. I think the impacts of a lot of the catchment work that has been done since the early eighties will only start to materialise in the landscape in the next 20, 30 and 40 years. We are dealing with quite long-term processes. As I said earlier, some of the problems we are dealing with were generated 30 or 40 years ago.

Senator STEPHENS—I noticed on your folder that the Murray-Darling Basin initiative is the largest integrated catchment management program in the world and I wondered if there was anything similar for the Mississippi.

Mr Kendall—I do not know about the Mississippi but certainly the Colorado River Basin in America has a lot of parallels with the Murray-Darling Basin. I thought it was difficult to get agreement with six governments but they actually have nine governments: seven states, the federal US and Mexico. They have a water sharing agreement and they have a lot of problems with salinity, quite similar to what we have. Certainly there are a lot of lessons to be learnt from looking at the Colorado, and vice versa. Whereas at the Murray-Darling Basin Commission we have focused on engineering options and salt interception schemes, they have looked much more at land use change and improved irrigation efficiency to drive their improvements. When I was able to have a look at what they had done, that was an important message for me from the Colorado.

Senator STEPHENS—Are there parallel kinds of organisations in Europe?

Mr Roberts—We have got the Mekong River Commission coming to talk to us tomorrow or Thursday. Now there is a challenge in terms of jurisdictional arrangements—Queensland and New South Wales might be tough, but the Mekong!

Senator TROETH—On another matter, you talked about the works that you put in place: do you let those out to engineering firms for professional assistance?

Mr Roberts—For our salt interception schemes?

Senator TROETH—Yes, that sort of thing.

Mr Roberts—The vast bulk of that work is actually done by state constructing authorities. A fairly large portion of the Murray-Darling Basin Commission budget which comes in to us from the jurisdictions actually goes back to state constructing authorities to do that work. It is certainly done by world-standard engineers.

Senator TROETH—I did not meant to imply that it was not; I was just interested in how you did it. I guess they are in charge of land and water management, when all is said and done.

Mr Kendall—Yes, and they also co-opt a range of resources to assist them, including consulting resources and the agencies.

CHAIR—As there are no further questions, thank you very much for your attendance, particular late into the evening. I thank all witnesses for their informative presentations. The committee will be taking a while on this, so if anyone has any extra brainwaves they would like to feed through to us please do so. Thank you to Hansard and to the secretariat. I also thank the committee members for their attendance, attentiveness and, I might say, discipline.

Committee adjourned at 9.28 pm