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TRANSCRIPT OF PROCEEDINGS

O/N H-921193

MR B. WALKER SC, Royal Commissioner

IN THE MATTER OF THE MURRAY-DARLING BASIN ROYAL COMMISSION

ADELAIDE

10.01 AM, THURSDAY, 26 JULY 2018

Continued from 25.7.18

DAY 14

MR R. BEASLEY SC, Senior Counsel Assisting, appears with MS J. MASTERS, Junior Counsel Assisting

MR BEASLEY: Good morning, Commissioner. I appear this morning with my learned Junior Ms Masters. Before we begin, we acknowledge this land that we meet on today is the traditional lands of the Kaurna people and that we respect their spiritual relationship with their country. We also acknowledge the Kaurna people are the custodians of the Adelaide region and cultural and heritage beliefs are still as important to the living Kaurna people today. We also pay respects to the cultural authority of Aboriginal people attending from other areas of Australia present here.

Before we have Professor Grafton to give evidence here this morning, Professor Grafton has supplied two submissions to the Commission: (1) a joint submission with Professor Williams, who has already given evidence, and another joint submission with Professor Wheeler, who has also already given evidence, amongst other economists.

Before I have Professor Grafton called, though – sworn – I want to tender a document produced that has been supplied by The Australian Institute, which they have obtained under an FOI request. I think you have a copy of it. It's a Murray-Darling Basin Authority minute dated 17 February 2014 to the then chief executive of the Basin Authority, Ms Dickson, from the director of Cap Transition, which deals with the issue of the IQQM modelling for the Barwon-Darling that we have been discussing over the last couple of days. To save time, can I ask, have you had an opportunity to read that document?

THE COMMISSIONER: Yes.

MR BEASLEY: Yes. What is surprising, to me at least, in relation to the recommendations of this memo and what was ultimately supported, recommended and approved by – supported by Mr McLeod of the MDBA; recommended by Mr James, the Executive Director of the MDBA; and approved by Ms Dickson, the Chief Executive of the MDBA, is the recommendation that the model is considered provisionally meeting the criteria of the cap model in accordance with the clause 11(5) of schedule E of the Basin Agreement, which provides – and this is at page 502 of the Water Act, the printed Water Act. Clause 11, Schedule E of Schedule 1:

> *The Authority may only approve an analytical model or a modification to an analytical model if the Authority considers that the model when approved or modified will fairly determine the relevant annual diversion targets given the climatic conditions experienced in any year.*

THE COMMISSIONER: I think the upshot of the apparent acceptance in this minute of the auditor's misgivings is that the Authority's position was in fact the opposite of 11(5). That is, the so-called provisional approval was provisional because the Authority did not consider the model when approved or modified would fairly determine.

MR BEASLEY: I think that's right. I'm just struggling with why it was provisionally approved.

THE COMMISSIONER: Or what provisional approval means.

MR BEASLEY: Yes.

THE COMMISSIONER: Approval – "when approved or modified" is not an expression, I think, that incorporates the notion of the model improvements that the auditor had suggested and that recommendations to the board of the Authority records in recommendation 1(d).

MR BEASLEY: Yes.

THE COMMISSIONER: I say that because the notion in this part of the agreement is of the original promulgation of the model. That's the approval stage. And its later modification, which is, as I say, of something that has already been approved.

MR BEASLEY: Yes.

THE COMMISSIONER: That is, if it's an updating, sometimes a correction. But, for those reasons, it does appear from the official records of the Authority that something has been done for which the Act, picking up the agreement, does not provide.

MR BEASLEY: Yes. I mean - - -

THE COMMISSIONER: A provisional approval seems to be a creature that says it's provisional, because we can't approve, but nonetheless something is being done. Now, it may be recognised in administrative, if not strictly lawful, terms that, to use the cliché, the facts on the ground were that that was all they had.

MR BEASLEY: Well, it is strange. I mean, paragraph 8, for example, notes that the auditor found significant shortcomings. And we have gone through that 2013 report by Bewsher.

THE COMMISSIONER: Yes.

MR BEASLEY: 19:

> *The Barwon-Darling has been problematic for cap compliance since the beginning of the cap.*

THE COMMISSIONER: Yes.

MR BEASLEY:

For six out of 10 years between '99 to 2008/09 Barwon-Darling caused the cap reaches of the combined valley. Had it not merged with the lower Darling, the Barwon-Darling would have been in breach for continuous 14 years.

22:

There are reasonable doubts over the veracity of the model as noted by the model audit. This is the reason that the Barwon-Darling should not be given approval for a longer period.

But my question is why at all?

THE COMMISSIONER: Well, now - - -

MR BEASLEY: Approval for a shorter period is recommended by the auditor and it acknowledges the effort of New South Wales.

THE COMMISSIONER: Well, now - - -

MR BEASLEY: So what?

THE COMMISSIONER: Where do I find in this document the period for which this so-called provisional approval is recommended and thereafter made?

MR BEASLEY: If you look at 1(c)(i) - - -

THE COMMISSIONER: Yes.

MR BEASLEY: - - - for a period up to December 2015 – but you should note that New South Wales actually sought an approval until 2019. That's set out in the letter - - -

THE COMMISSIONER: I know. Yes.

MR BEASLEY: - - - by Mr Harris to Ms Dickson of – it was stamped 18 December 2013.

THE COMMISSIONER: What I suppose I don't understand is it may be recalled that New South Wales had dealt with the auditor by proposing provisional approval until "say" – the expression appears until "say" 2014.

MR BEASLEY: Yes.

THE COMMISSIONER: I suppose that should have been a bit of a flag for the fact that 2014 wasn't being categorically stated by New South Wales and it turns out that's right, because they sought a further five years. The auditor said, "No, December 2014" in his recommendation.

MR BEASLEY: Yes.

THE COMMISSIONER: And it appears, as you say, from recommendation 1(c)(ii) – sorry – is it 1(c)(ii)? 1(c)(i) – that it be approved for the purpose of assessing compliance up to December '15. And I can't find in the reasoning why it should be '15. Paragraph 16 refers to the lapse of time.

MR BEASLEY: And is therefore considered reasonable.

THE COMMISSIONER: For the life of me I don't understand how that affects the Authority's consideration that you can fairly determine matters simply because there has been administrative delay.

MR BEASLEY: I have no idea how that is explained. And I should also say that I skipped over, I think, something important at paragraph 21. I went to 22 too quickly. 21:

> *The Barwon-Darling valley has not yet had an audited cap model. Changes to the model have been occurring as improvements have been incorporated. However, these changes have generally created a more favourable cap compliance outcome, especially in the last five years. The latest version of the model shows that the combined valley would never have breached the cap until 2011/2012.*

Then the significance of 22 is:

> *If there are doubts over the veracity of the model, i.e., the improved model - - -*

THE COMMISSIONER: Yes.

MR BEASLEY: So - - -

THE COMMISSIONER: Which is the graph that is said to demonstrate the proposition in paragraph 21? Attachment E? Which is that?

MR BEASLEY: I would read that as the very last page.

THE COMMISSIONER: It doesn't say attachment E.

MR BEASLEY: No, it doesn't. And - - -

THE COMMISSIONER: So how do I know which is which?

MR BEASLEY: I don't know and I'm not sure we can have tremendous confidence, given how this document was obtained. There might be attachments that have been left out – not by the Commission staff, but maybe didn't make their way into the FOI production. I don't know.

THE COMMISSIONER: Yes.

MR BEASLEY: In any event, I tender this bundle of documents which commence with a document entitled "Murray-Darling Basin Authority to the Chief Executive from Director Cap Transition Re response to NSW accreditation of the Barwon-Darling Cap Model", dated 17 February 2014.

THE COMMISSIONER: Thank you.

MR BEASLEY: And so Professor Grafton is here and we can have him sworn, please.

<RUPERT QUENTIN GRAFTON, SWORN [10.12 am]

<EXAMINATION-IN-CHIEF BY MR BEASLEY

THE COMMISSIONER: Please sit down, Professor.

MR BEASLEY: Professor Grafton, can you provide the Commission with your work address. I think you're a Professor at the Crawford School of Public Policy at the Australian National University.

PROF GRAFTON: Yes, that is correct. I'm a Professor of Economics there.

MR BEASLEY: Yes. And how long have you been a Professor of Economics at the ANU?

PROF GRAFTON: I believe I became a Professor in 2004. And before that I was a Senior Fellow at the – what now is called the Fenner School of the Environment at the ANU.

MR BEASLEY: And prior to that you were at the University of Ottawa at the Institute of the Environment?

PROF GRAFTON: That's correct. I directed the Institute of the Environment and I was an Associate Professor there when I left in 2001 to join the ANU.

MR BEASLEY: And your tertiary qualifications are a Bachelor of Agricultural Economics from Massey University.

PROF GRAFTON: Correct.

MR BEASLEY: A Master of Science in Agricultural Economics from Iowa State University.

PROF GRAFTON: Yes, that's true.

MR BEASLEY: And you have a PhD in Economics from the University of British Columbia in the field of environment and resources and development.

PROF GRAFTON: That is correct.

MR BEASLEY: All right. Behind tab C of the folder, Commissioner, is Professor Grafton's curriculum vitae - - -

THE COMMISSIONER: When you say tab C - - -

MR BEASLEY: Yes. You may not have it. That's unhelpful, but it doesn't matter. I will tender that curriculum vitae and, rather than going through, all of what it contains - - -

THE COMMISSIONER: No, there's no need to go through it.

MR BEASLEY: Professor, you have for a large number of years written published journal articles and published chapters in various books concerning matters, both as a co-author and on your own, and also have authored many submissions on your own and co-authors to various Senate or House of Reps inquiries on the subject of the Basin Plan.

PROF GRAFTON: Yes, that's correct. I've been writing on the Basin issues since – well, more than a decade.

MR BEASLEY: All right. And you are the co-author of two submissions that have been supplied to the Commission.

PROF GRAFTON: Yes, that is correct. One that was led by Sarah Wheeler, and the other one that was done jointly with Professor Williams.

MR BEASLEY: So the first – what I'm calling submission one, is a submission to the Murray Darling Basin Royal Commission, authors Professor Sarah Wheeler, Professor Geoff Connor, Professor Quentin Grafton - - -

PROF GRAFTON: Yes.

MR BEASLEY: - - - Professor Lynn Cray and Professor John Quiggin, dated 30 April 2018, which for the record is exhibit RCE52. Can I just ask you, was that – and I may have asked Professor Wheeler this but was that submission a joint work or did she take primary responsibility for drafting the submission with the rest of you providing input or - - -

PROF GRAFTON: I would say it's something in between. So Professor Wheeler certainly led the submission. That's why her name is first. But we all made

contributions to it in various way, some more than others. I certainly made contributions to the document, both in terms of the written word and also in terms of providing advice about how to structure the document in terms of the submission.

MR BEASLEY: And does that mean you had an input into all aspects of the submission, including the criticisms that – the critique that's contained in the submission concerning various other consultants and MDBA's own analysis, socio-economic impacts?

PROF GRAFTON: Yes. And so I certainly stand by the submission, yes.

MR BEASLEY: All right. Thank you. And you provided us a second submission. I don't know why I've called it submission 2, because it actually predates submission 1, but never mind. You provided another submission to the Commission dated 19 April 2018 with Professor John Williams, entitled "Failures to Deliver on the Key Objectives of the Water Act 2007".

PROF GRAFTON: Yes, that's correct.

MR BEASLEY: And, again, can I ask you was that done jointly or did one or other of you take main responsibility for drafting the submission?

PROF GRAFTON: It was done jointly, but I would say that I did most of the drafting. But it's not just a question of the wordsmithing and writing; it's a question of the intellectual content. And in that context I would say it was jointly done equally by Professor Williams and myself.

MR BEASLEY: Your background is agricultural economics, as we've just discussed.

PROF GRAFTON: That is correct. And resource and environmental economics, applied economics in general, yes.

MR BEASLEY: Sure. And Professor Williams is a hydrologist.

PROF GRAFTON: Yes. Professor Williams is a hydrologist and a soil scientist.

MR BEASLEY: And does that mean in relation to any aspects of the submission that were mainly relevant to hydrology, he took the lead and in relation to any matters concerning economic matters you took the lead?

PROF GRAFTON: I would say that's a correct interpretation. So he certainly took the intellectual lead, but I would also add that it was a joint work. So Professor Williams and I discussed various issues about the submission... our joint work. So it's very much joint work.

MR BEASLEY: Just remind me, was Professor Williams – was he at one stage or still is a colleague from ANU?

PROF GRAFTON: Yes, that's correct. So Professor Williams is an Honorary Professor, I think is the title that he holds at the Australian National University.

MR BEASLEY: And he and you have been working jointly on writing papers – sorry – articles and submissions concerning the Basin Plan for a number of years. Is that correct?

PROF GRAFTON: Quite a number of years. Yes. I think the first publication we did together with others was published in Nature Climate Change at the end of 2012, I believe. We published in... we published in other journals, as well.

MR BEASLEY: So that's – end of 2012 is right at the beginning of when the Basin Plan was enacted.

PROF GRAFTON: That's correct. The end of November 2012. Yes.

MR BEASLEY: Yes. All right. That submission I'm referring to is RCE27, so it doesn't need to be tendered. Can I take you, firstly, to the submission RCE52, 30 April 2018 - - -

PROF GRAFTON: Yes.

MR BEASLEY: - - - that Professor Wheeler led. Tell me if I get this wrong, but in terms of the work of KPMG and RMCG and also the MDBA in relation to their analysis of the economic impacts of a reduction of water, the main criticism of all of you is that they base their findings, in particular their estimates of job losses, on a proportional link between a reduction in water and a reduction in farm production.

PROF GRAFTON: That is correct, yes. That's my understanding of their work.

MR BEASLEY: And my understanding of the submission is that the view of all of you is that that, first of all, is not an appropriate link to make and has never been the subject of anything any of you have seen in a peer reviewed paper and that a more appropriate means of assessing economic impacts of reduction of water is to look at farm revenue or reduction in profit.

PROF GRAFTON: Yes, that would be correct.

MR BEASLEY: And also that by only using the simple input of reduction of water and reduction of either land farmed or farm production, you're missing several inputs into consideration that need to be considered, and those matters are the ones that I think are mentioned at 1.3 of this submission, things like increasing urbanisation is one matter that should be looked at. In other words, changing land zoning around

towns, causing an increase in property prices such that people leave because they can sell at a high price. That's one factor that needs to be considered.

PROF GRAFTON: Yes.

MR BEASLEY: If you agree, just say yes so we get it on the transcript.

PROF GRAFTON: Yes, I – yes, I do agree.

MR BEASLEY: Increasing temperature in the sense of soil becoming less productive, and hence production goes down with increasing temperatures.

PROF GRAFTON: That's right. And, of course, there's also land use change. You shift a different crop, that crop that you have shifted to may have different levels of employment, different levels of profitability, etcetera.

MR BEASLEY: And that brings in an aspect of adaptation by a farmer.

PROF GRAFTON: Absolutely.

MR BEASLEY: Who is faced with having less water?

PROF GRAFTON: Correct. So farmers run businesses. They need to make a profit over the long-term, and so they will make adjustments depending on temperatures, depending on water, depending on a whole range of factors. And those adjustments, that adaptation, makes the determination of what happens to them in terms of a change in water diversions, for example, water allocations. You can't make – in any sense, suggest that it's a linear relationship, because it doesn't make any sense.

MR BEASLEY: And also in 1.3 you raise change in commodity prices. To give you an example, in relation to the dairy industry there was a significant drop in the price of milk, I think, in around 2015.

PROF GRAFTON: Yes.

MR BEASLEY: That's the sort of thing that needs to be factored into, in terms of any proper analysis of what are really the impacts of a reduction in water to rural areas.

PROF GRAFTON: Absolutely. Absolutely. As the revenues change in the context of the price of milk then you are going to make adjustments to your costs.

MR BEASLEY: You might be better off selling water than making milk and selling that.

PROF GRAFTON: Correct. Drying your herd off. There's a number of things farmers have done. Indeed, during the Millennium Drought, that was fairly common

that dairy farmers would sell the water allocations attached to the entitlements because they could make more money doing that rather than growing pasture to feed their dairy cows, so there are examples of that.

MR BEASLEY: And another thing you mentioned that's – I think seems to be fundamentally important is technological change. For example, the impact of something like round bailing for cotton jobs.

PROF GRAFTON: That's right.

MR BEASLEY: Meaning so many less casual workers are needed.

PROF GRAFTON: Yes.

MR BEASLEY: Just on the – if I can take you to the various reports that you've criticised. Do we have a copy of the RMCG report? I just want to make sure that I identify what the concerns are, of all of you, in your joint submission. No, the – sorry, I want the 2016 report, because that's the one that has been analysed by the – if it helps there's a copy in Mr Rendell's brief. Sorry, RCE53. Let me see. That's even better, because it's colour. Yes, go on. This is the RMCG report, GMI, "Goulburn-Murray Irrigation District Socio-economic Impact Assessment: Final Report", October 2016.

PROF GRAFTON: Yes.

MR BEASLEY: What is exhibit RCE53. This wasn't in fact commissioned by the Basin Authority, I think it was commissioned by a local - - -

THE COMMISSIONER: Goulburn-Murray.

MR BEASLEY: - - - group of stakeholders within Goulburn Murray. I think that's mentioned on page 1, they included the local councils, water authorities, irrigation sectors, CMAs, food processing companies, the VFF. What would that be? Victorian Farmers Federation, I guess. And the local member for Shepparton. What I wanted to take you to first in this report is at page 16 and the last paragraph on 16:

> *A comparison of two periods: post the 02/03 drought and then post the millennium drought shows a reduction in the level of annual average milk production of around 500 megalitres. The water available was around 21% less due primarily to buyback as the two periods had very similar allocation levels. It is proposed that the change in production over these two periods is a very good indicator of the net effect of buyback.*

That's the concern you've got: that this – only this one input into the analysis is the basis for the entire analysis of job losses and the things that we've just discussed that are also of perhaps or even more importance have been left out.

PROF GRAFTON: Absolutely. This doesn't make any sense. They said – they call it a proposal.

MR BEASLEY: Yes, I don't know what that means.

PROF GRAFTON: It's an assumption. Okay? So it's an assumption that they've made to do the analysis and generate their results, and the assumption – yes.

MR BEASLEY: And, in fairness, that might be one assumption that you should consider amongst many others though.

PROF GRAFTON: Well it's a false assumption, I would argue.

MR BEASLEY: All right.

PROF GRAFTON: And indeed the way to do this is to have a series of factors, including the milk price, including input prices, including of course water, including ...facts.

MR BEASLEY: When you say false assumption, that gets to the point does it that you consider it's false, in any event that you don't look at the link between a reduction of water and a reduction of production. You've got to look at a link between a reduction in water and a reduction in revenue. You're just looking at – fundamentally looking at the wrong thing.

PROF GRAFTON: That's correct. So you can have a hypothesis. So they could call this as, "We have a hypothesis." If you have a hypothesis, then you test the hypothesis and then you confirm or don't confirm the hypothesis. What they've done is they made an assumption that this is correct. So they said, "This is the hypothesis, we assume this," and therefore then you generate a set of results. So it follows from the assumption. That's not a scientific approach to doing research.

MR BEASLEY: Yes. And I will take you to it, but this is a – exactly the same problem is in the MDBA's own economic analysis, socio-economic analysis that you've criticised in – or you critiqued in the submission and, exactly the same, the work of KPMG.

PROF GRAFTON: Yes.

MR BEASLEY: In fairness to KPMG, I think they identify in the report that, "This might be a limited analysis, because this is what we're doing." I will come to that.

THE COMMISSIONER: Professor, does it come down to this: that it appears that instead of questioning whether a linear relationship existed, the data were analysed and conclusions expressed based on the assumed linear relationship.

PROF GRAFTON: That's my understanding, Commissioner, yes.

THE COMMISSIONER: Now, without trivialising the issue, there are a number of variables that could be compared with each other and you could make assumptions about any number of different kinds of relationship: direct, inverse, linear, on a predetermined curve. Have I understood correctly the gravamen of a lot of your published work, as well as your submissions to me, that in order to evaluate what the Act mandates, which is an awareness of socio-economic effect because of the duty to optimise socio-economic outcomes, it's unavoidable that you would examine all the factors and the nature, the true nature of the relationship between them before proceeding to analyse on an assumed basis?

PROF GRAFTON: Yes. That is correct, Commissioner. So you can have a hypothesis, but that hypothesis needs to be tested. So this is a hypothesis that has been turned into an assumption that has generated a series of results. So that's not how scientific research is done. If you have a hypothesis you must test it, and there's a variety of models that have been published in the peer review literature that shows that that assumption or that hypothesis is in fact incorrect in the Murray-Darling Basin, and indeed not just in a modelling context. It's also true empirically.

There's a paper, I think from 2013/2014, by Kirby et al, it was published in Agricultural Water Management, which actually goes to using ABS, Australian Bureau of Statistics data which actually shows that despite a 70 per cent reduction in terms of diversions there was only a 10 per cent in revenue. So that's just – that's not how the model – that's just the actual data telling you for that, for the Basin as a whole.

MR BEASLEY: I've got a memory that's either in your submission or one of your papers.

PROF GRAFTON: It certainly is a listed reference in one of my – I've cited it.

MR BEASLEY: It might – is it – it might be the editorial or - - -

PROF GRAFTON: This – it could have been. I've cited it more than once.

MR BEASLEY: Yes. Anyway, we will come to it, because I know I've made a note of it. Yes. Sorry, I interrupted.

THE COMMISSIONER: And just also in general terms, if I were to regard the Act as mandating a reduction in consumptive use, and that's a question of law, then to examine socio-economic impact in order to obey the admonition to maximise socio-economic outcomes it would seem odd to me, legally, to say, "Well, there can't be any reduction in irrigation and water because all reduction in irrigation water will produce an adverse socio-economic impact." In other words, you can't deny the premise of the Act in working out its implementation. That's a question of law.

So it means that when one comes to the socio-economic studies, which the Act requires the Authority and other relevant agencies to use and furthermore requires

them to use the best available, how should one ensure that you don't commit the absurdity of saying this Act can't do what the Act requires to be done because all reductions in irrigation water will produce adverse socio-economic impact? How do you design a study to ensure that you are not committing that absurdity?

PROF GRAFTON: Well, I think you have to separate two issues. So the issue about what the sustainable diversion limit should be, the issues about adjustments in terms of the Basin plan, needs to be separate from any evidence that's provided in terms of the deliberations that people are making. So the idea is that you should use the best available evidence or the best available science, however you want to call it, then that evidence should be publicly available and it should be useful to decision makers. But they're two separate issues. The actual decision and then the actual evidence.

And I think what's being raised here, and what we raised in our submission that was led by Professor Wheeler, is that the evidence that has been used for whatever purposes in terms of decision-making is fundamentally flawed evidence. And, more to the point, it's not like that's the only evidence that was available or has been available to the Murray-Darling Basin Authority or to the Department of Agricultural Resources. There was in fact already existing literature, published in peer reviewed journals well before this evidence was made available from the report that I'm just examining, and yet that evidence appears to have been entirely ignored.

THE COMMISSIONER: Put to one side the basically legal question as to whether one can properly reach an ESLT by ecologically determining it should meet a certain level but reducing that – I should say increasing that level, increasing the take, in order to avoid or mitigate economic disruption. Put that to one side. Just looking at trying to inform the Authority and the population as to the economic effect on just the farming communities, and the Act doesn't confine it to farming communities but let's just focus on the farming communities, Professor Wheeler pressed upon me the need to remember the demonstrated resilience of farming communities in this country, no doubt by reason of our variable climate, and one of the examples she gave of that is of the capacity to switch between different kinds of crops, different extents of cropping and, I suppose at its most stark, moving from irrigation enterprise to dry land enterprise. Are those – those are matters that you agree with, are they?

PROF GRAFTON: Yes, I would agree with. So farmers are able to adapt. They are resilient and they have increased their productivity as measured as an output over an input measure over time in the Murray-Darling Basin. So that is an indication that farmers are adapting. They're doing different things managerially, they're doing different things in terms of how they're using their inputs, that's allowing them to increase their productivity. So that's all – that evidence, I think, supports the statements that Professor Wheeler – if that's what she said, then I would agree with it, because that's exactly what's happening.

THE COMMISSIONER: I just want to expand - - -

PROF GRAFTON: Yes.

THE COMMISSIONER: - - - to a more macrosocial level at this point, because I'm finding the policy behind the use of the socio-economic impacts really quite difficult to pin down. It can be seen from the support, mainly through the taxation system, that this country along with many other developed countries gives to research and development that it's seen as a social good for scientists and technologists to come up with, for example, chemicals, genetically manipulated seeds and animals, and engineers to come up with machinery that will – all of them, among other things – reduce the costs of farming enterprise including by reducing the amount of labour necessary to produce an equivalent unit of production.

And it goes by various different names, all of which are by and large regarded as social goods. That is they're not a neutral, they're a social good that industry should be more efficient; that enterprise should be more productive; that labour per unit should be more productive. And you increase labour productivity, among other ways, by reducing the amount of labour necessary for a fixed unit of production. Isn't that – is what I've just said in accordance with your understanding?

PROF GRAFTON: Yes, it would. I mean, I could add to it that's not simply an issue of labour.

THE COMMISSIONER: I'm sure it's not.

PROF GRAFTON: As you've highlighted. But yes, there's - - -

THE COMMISSIONER: Why I'm saying labour obviously is because of jobs.

PROF GRAFTON: Yes. Certainly in terms of labour, yes, labour productivity is a measure of output divided by number of hours employed and the particular enterprise.

THE COMMISSIONER: Well, it may be in financial terms it's cheaper to employ 10 people to do something than to buy the fuel necessary for the machine that will replace them. In other words, it's not just the number of jobs. But leaving aside analyses like that, I'm really unclear as to why one would focus on what I will call job losses caused by reduction in irrigation water without regarding it of at least equal social significance to notice that mechanisation, chemicals, and plant and animal breeding also have an effect of reducing jobs.

PROF GRAFTON: I would agree with you.

THE COMMISSIONER: Socially, it seems to me to be an odd idea to say that there are social goods involved in the improved efficiency which may have a devastatingly awful impact on individuals who lose their jobs – not just lose their jobs as employees, but lose their work as contractors, which in these parts of the world that I'm interested in is probably even more significant, seasonal work in particular. How

do you understand one should approach the question under the Act and the Plan of working out how many job losses are attributable to a reduction in irrigation water in light of job losses that you have therefore assessed as being the responsibility of mechanisation or less need for weeding because you've got a chemical?

PROF GRAFTON: Yes. So the nub of the issue from my perspective is that there are a whole range of inputs, as you've highlighted Commissioner, in terms of the production of a variety of outputs. So typically farmers will produce more than one output, but they will have a whole range of inputs. So if you are wanting to assess what a particular input, in this case it's employment within in a particular sector, then you need to look at a whole range of factors, because it's simply not going to be the case that water is the only factor that will determine the level of employment in the irrigation sector.

We know that's patently false, the models do not indicate that, and there will be a whole range of other factors. So if you want to tease out, in other words try to quantify, what the impact of a change in water diversions will have on jobs then, or employment, then you will need to have a modelling context that accounts for all these other factors.

THE COMMISSIONER: And includes, for example, if somebody is not cotton harvesting because the new harvester requires fewer - - -

MR BEASLEY: Correct.

THE COMMISSIONER: - - - people to attend it then they may be doing something in the cattle sector.

PROF GRAFTON: That is correct.

THE COMMISSIONER: And has any of the studies you have assembled and critiqued – have they done that?

PROF GRAFTON: Not that I'm aware of, in terms of thinking through the multiple inputs and the multiple impacts.

THE COMMISSIONER: So a rural contractor who may have derived income, that is work – paid work, from an irrigated sector, may not simply be out of work – and this is all speculation and hypothetical – may get work in some other rural sector.

PROF GRAFTON: That's correct.

THE COMMISSIONER: How would you, how could you assess economic effect of reducing the number of hectares of cotton because of a reduction in water without inquiring into what, if anything, else those displaced workers did?

PROF GRAFTON: That would be two separate issues. So one is the impact of change in water diversions in the cotton production in the context of employment within cotton where again, as I've highlighted previously, that would require a multiple input and multiple output approach. The second issue is what happens to the people who may lose their employment for whatever reason it may be: water, change of water diversions, change in cotton prices, mechanisation of cotton, which I think has been an important factor in the last few years, then you need to look at what the economists call churn. And that's a rather silly term, I suppose, but it basically means people go out of employment, into unemployment, and then into employment. And there's a lot of churn that takes place within the labour market in Australia and, indeed, in all OECD countries. The amount of churn is very high.

THE COMMISSIONER: I don't want to minimise the personal significance and thus in aggregate the social significance of the uncertainty, anguish and deprivation that comes from losing paid work. Far from it. But as I said earlier, it does seem to me that we are more or less committed to the proposition that this must happen, because it is a social good that factories become more efficient including by automation. That is not a social neutral, and that the word Luddite is treated – it's a term of ridicule and criticism of people who resist mechanisation in order to maintain work. I don't want to get into philosophical questions not because they are irrelevant. They're far more important than others, no doubt.

But if I'm looking at socio-economic impact I'm really struggling why on the one hand we applaud a farmer for mechanising and on the other hand the expectation is that we would deplore environmental expedients which would have a similar outcome, namely reducing paid work.

PROF GRAFTON: So, from my perspective, there's the issue of the public good and the private good or private benefits and public benefits. So a farmer that mechanises, obviously, presumably, gets an expectation of some benefits that may impose - - -

THE COMMISSIONER: Gets a tax deduction directly for the expenditure involved in mechanising.

PROF GRAFTON: That's correct. So they get some gain of whatever that might be. They may - - -

THE COMMISSIONER: And correctly, by the way. I'm not criticising that for a moment.

PROF GRAFTON: Yes. Yes. And there's – potentially, there's some change in employment. Now, just because you have mechanisation doesn't mean employment declines. There can be a rebound effect.

THE COMMISSIONER: Production may increase enormously.

PROF GRAFTON: Correct. It's possible that your employment could rise. There's not a zero sum .....

THE COMMISSIONER: But it is a very familiar historical and current phenomenon that mechanising, automation reduces paid work.

PROF GRAFTON: Correct.

THE COMMISSIONER: Not as a rule – sorry – as - - -

PROF GRAFTON: But certainly in the agricultural - - -

THE COMMISSIONER: - - - commonly observed outcome.

PROF GRAFTON: Certainly in the agricultural sector. So, you know, we go a century ago there were a lot of farm animals, you know, horses, etcetera that were used and that required additional labour and it required additional inputs to provide those inputs into the sector, but now that's no longer required, so - - -

THE COMMISSIONER: Alas, outside the racing industry, as it's called - - -

PROF GRAFTON: Yes.

THE COMMISSIONER: And there is very small call for stable hands in the bush, I understand.

PROF GRAFTON: Correct. So that's the nature of the change – you know, we call it churn on a short term basis, but over a long term basis the nature of the employment has changed. So I think the pertinent question, from my perspective, if you will, Commissioner, is that if there's billions of dollars on the table, so to speak, to provide adjustments in the context of reductions in water diversions within the Murray-Darling Basin to achieve the Water Act, then presumably if there is a concern, a social concern, which is a perfectly legitimate concern, about employment associated with any changes associated with the Basin Plan, then it seems to me that you would want to think about how those – that sum of money could be allocated in a way that to deal with that might be viewed as a social – in the context of increased employment. That's a context that I think is relevant here.

But, to get back to my original point, and I think I need to highlight it just to be clear, that you can't assume – or you can't make a hypothesis into an assumption in the context of employment. And so that appears to be the case in terms of the GMID Commission report. And it's peculiar, because there's literature, as I've highlighted, that actually shows that there's not that relationship. So whatever that relationship is, it's certainly not going to be an assumed relationship. We have to discover what that relationship is. And then if we have discovered in a meaningful, scientifically-based way, then that can hopefully feed into good public policy. But you can't have good public policy if you start off with evidence that's, in my view, fundamentally flawed.

THE COMMISSIONER: Now, I don't want to oversimplify, but I make no bones about it and I would like to simplify – is what I'm about to say correct, that at the heart of your critique of the reports that you've detailed is this sequence of reasoning. Something more or less in the nature of a linear relationship between reduction in available irrigation water and paid work in the irrigation industry is used to generate estimates of the number of jobs which will be lost upon specified levels of reduction in available irrigation water. Is that so far correct?

PROF GRAFTON: That is correct.

THE COMMISSIONER: In order to know by way of respectable estimate the number of jobs lost by reduction in available irrigation water, the first question is what is the relationship between reduction in available irrigation water and number of jobs? Is that correct?

PROF GRAFTON: That is correct.

THE COMMISSIONER: You cannot know that by assuming it.

PROF GRAFTON: That is correct.

THE COMMISSIONER: And you do not demonstrate the number of jobs by assuming a relationship, the existence of which is not established by assumption.

PROF GRAFTON: That is correct.

THE COMMISSIONER: Now, in lay thinking, not scientific or scholarly thinking, intuition often substitutes for evidence. And a good thing, too, because we wouldn't be able to move down the street otherwise. Is there a place for intuition, that is, common sense or "everybody knows" or "why do I need a professor?" in relation to less irrigation water, therefore less irrigated agriculture, therefore less irrigated agricultural workers? What do you say to that proposition?

PROF GRAFTON: I would say that's not correct, because we're talking about numbers and quantification. So you can't quantify something without having some sort of evidence, model in context or information that allows you to make some number context of response to that question. But the supposition that reductions in diversions automatically, which, again, is... assumption, leads to job losses in the irrigation sector – is an assumption. So to say that it intuitively makes sense, that might make sense to some people, but it doesn't make sense to me.

THE COMMISSIONER: So the intuition might generate a hypothesis, but it won't establish it?

PROF GRAFTON: That's correct. So, from my perspective, it's a reasonable hypothesis. If someone wants to start with a hypothesis, I have not got a problem with that.

THE COMMISSIONER: No.

PROF GRAFTON: But you have to test the hypothesis.

THE COMMISSIONER: Yes.

PROF GRAFTON: And until you have tested the hypothesis, you can't make it an assumption. Therefore, your results become – it's back to front. So you start with a hypothesis, you test the hypothesis, you confirm or you don't confirm. You don't have a hypothesis and turn it into an assumption and then get a set of results.

THE COMMISSIONER: It's very close to the well-established fallacy of assuming your conclusion.

PROF GRAFTON: Correct. Correct.

MR BEASLEY: Just going back to this report, because the author is coming to give evidence, so there's a couple of things that I need to understand about it. And I don't make too much criticism of the authors of the RMCG report for producing a report that wouldn't be admissible in the court, because that's not the purpose of their report. But, just so we can get a good understanding of this report. At page 30, if you turn to page 30, Professor, of the report, it commences with a heading 'Production Impacts', which I think is the key chapter. This establishes the base case for the studies, the status quo taking into account, the Basin Plan today. The chapter then has got these five bullet points:

> *Recognises the considerable commercial challenges to the region's irrigated producers following the drought and then the floods.*

I'm not sure where that leads to:

> *Records and analyses the reductions that have occurred over the last few years as a result of buyback, both of the scale of SCB –*

I think is Southern Connected Basin –

> …*GMID –*

Goulburn-Murray Irrigation District –

> *…identifies the likelihood reduction in allocation, volume and distribution between sectors that will occur in the future across the Southern Connected Basin. Extrapolates from the Southern Connected Basin to establish the total volumes and distribution that would you have occurred in the future across the GMID... absence of the Basin Plan and the quantum and value of the reduction in production that will therefore result.*

So in other words saying, "We will work out how much water will be taken away and therefore we will jump to that to working out the reduction in production as a dollar sum".

PROF GRAFTON: That's my understanding, yes.

MR BEASLEY: Yes. And I think they then go through some scenarios estimating what the reduction in water will be, depending on whether there's an average climate scenario or a drought scenario or a median wet scenario. And then we leap to page 36, 5.5, 'Economic Impact of the With Plan Option on Irrigation Production'. And a couple of things under the heading 5.5.1 'Milk Production' that I didn't quite understand:

> *The Basin Plan has impacted both on the total value of milk production and on the resilience of the sector in the face of any future drought.*

Bullet point 1:

> *The modelling shows a reduction of 234 gigalitres in the available allocation for the dairy sector in the average climate scenario.*

I will assume that that's correct for the purposes of what I'm asking you. Then it says:

> *This translates into 440 megalitres of lost milk production at an average conversion rate of 1,872 litres which is based on 5,600 litres a cow and three megalitres per cow.*

THE COMMISSIONER: I think one is milk and the other is water.

MR BEASLEY: Yes. So I will accept that for the purposes of what I want to ask you. Then it says:

> *And an average milk price of $1.46 per litre –*

And I will accept that for what I want to ask you:

> *This is equivalent to a reduction in the annual farm gate value of dairy production by $200 million.*

Then the author goes on to say:

> *Section 8.4.2 confirms an even larger loss in the value of dairy processing output at over $300 million a year.*

Now - - -

THE COMMISSIONER: Are they net or gross figures?

MR BEASLEY: I'm not actually sure.

THE COMMISSIONER: I mean, the water costs money is what I mean.

MR BEASLEY: Yes.

THE COMMISSIONER: If you use less water, you spend less money on water. That's right, isn't it, Professor?

PROF GRAFTON: It depends. So if they have a water entitlement and a water allocation, they don't have an explicit cost in the sense that they don't have to pay for it, but there's certainly an implicit cost, because if you choose not to use the water, you can certainly sell the allocation.

THE COMMISSIONER: That's my point.

PROF GRAFTON: And that would represent revenue. So that is correct, Commissioner, in that sense.

MR BEASLEY: All right. So let's assume the figures of $200 million or $300 million are right for the purposes of what I want to ask you. If you go to page 54, I've been trying to work out what has happened here. In 8.2 they say:

> *The modelling by EconSearch –*

And I will come to that –

> *…uses established models built for the Victorian Government to enable the wider regional economic impacts of infrastructure projects to be assessed. The assessment model is the impact of the identified changes in the gross regional product. It is concerned with the gross operating surplus or product of an enterprise, rather than its turnover. A copy of the modelling report is provided in annexure 5.*

So if we go to annexure 5, which is on page 83, we get this EconSearch report. Before I ask you a question, are you familiar with the company EconSearch and its working?

PROF GRAFTON: I have heard of the name EconSearch, but I have had no dealings with them. I can make no comment on - - -

MR BEASLEY: All right.

PROF GRAFTON: - - - what the quality of their work is.

MR BEASLEY: So they say RMCG commissioned them to assess the economic impact on the GMID of the Basin Plan to date. The brief for the work required estimates of economic impact in terms of, bullet point 1:

> *Number of jobs lost or created i.e., impact on employment, contribution to the economy, impact on gross regional product. Estimates of economic impact presented are based on a use of the extension of the conventional input/output method.*

They refer to this RISE model which they say is widely used by the Victorian Government.

And, over the page, am I right that it seems to be – over the page, pages 2 and 3 of this report – that you punch in the estimate of the production dollars that are estimated to be lost and you end up with a figure for job losses?

PROF GRAFTON: Yes. So I'm not familiar with the RISE model, but it's input/output model. So in other words you change the level of inputs, then you get some change in the level of outputs. And you can look at a range - - -

MR BEASLEY: The only thing that I can see that's being input into the model is the estimated loss of production as a dollar figure, which seems to just punch out a figure for job losses.

PROF GRAFTON: Yes. So table 2 says estimates of reduction in agricultural output. So that's coming as a modelling input, I suppose, is my understanding of that.

MR BEASLEY: In terms of the usefulness of this, I know we've discussed your views about – what – your view about whether it's appropriate or proper to have a linear relationship between a reduction in water and a reduction in production as being just the wrong thing altogether. But, even doing this process, I mean, aren't economies more complex than this? You punch in a dollar figure for a loss of production; you end up with a figure for jobs.

PROF GRAFTON: Economies are complex. And the nature of employment and how it changes across sectors requires a more detailed analysis than simply assuming various inputs and outputs. But I can't comment on the actual model.

MR BEASLEY: Yes. All right.

PROF GRAFTON: I would comment, though, that there are other models that are available, computer... equilibrium models. I can highlight a model that was used by Glen... actually looked at changes in the water diversions in the Murray-Darling Basin, had a subcomponent on water, which I would say is superior to the RISE I-O model and also generates a series of results. So it actually showed in fact from their

modelling there was an increase in the gross regional product of the Murray-Darling Basin associated with the use of buybacks.

MR BEASLEY: You said – sorry – in fairness - - -

PROF GRAFTON: So the reason I'm saying - - -

MR BEASLEY: Sorry. Yes. Go ahead.

PROF GRAFTON: - - - is that they are alternative models that are available which actually show a different result to what is shown here in the report that you have available to me. And I think it highlights the other peculiarities in terms of what they've done, which I'm happy to talk to. And one of them I would highlight immediately is, of course, when you have reductions in water diversions associated with the Basin Plan, coupling that is a complementary program of water recovery. And water recovery involves two aspects of it. One is the purchase to reverse tenders at least until 2015 of entitlements. So they are... getting money for the entitlements they sell. You can't ignore that money. So that has to be incorporated into not only the employment issues but also in terms of the economic impact issues.

MR BEASLEY: In terms of the economic, you can't ignore – is what you're saying you can't ignore what are, despite assertions by people that buybacks is something invented by the devil, you can't ignore what in reality are positive economic benefits from buybacks, such as the fact that a majority of people that sold water to the government sold only a partial entitlement and actually kept the majority of their entitlement. Correct? Sorry. A majority of farmers maintained an entitlement of some sort for a start.

PROF GRAFTON: That is my understanding.

MR BEASLEY: I think the figure is about 70 per cent. Secondly, the money they receive, the evidence is usually spent locally producing an economic benefit.

PROF GRAFTON: That's my understanding.

THE COMMISSIONER: . repaying your bank is local.

MR BEASLEY: Well, it depends – the money spent might be spent actually buying something in town, but it also might be spent reducing your debt. But reducing your debt can have an economic benefit, can't it? Because that might mean you're paying less interest, so the farmer has got more money to spend.

PROF GRAFTON: And, also, when farmers sell entitlements, they also, as you say, receive funds. They use that as part of the adaptation process in terms of dealing with and managing their enterprise. That involves, typically, some purchase of inputs and some recalibration of their enterprise, which will mean if they stay farming, which most of them have done, it means expenditures in the local economy.

THE COMMISSIONER: Professor, I assume that, at least in theory, and this is no doubt based on my intuition, that when farmers sell temporary water, these observations can be made: the farmer is subject only to credit risks assured of that return from that entitlement. The farmer, depending upon terms of trade, gets the money, probably up-front. Compared with what would happen if the farmer had used that water, where he or she is subject to the vagaries of farming, natural and social, that is, climate, weather and prices, leaving aside other disasters, bushfires, and gets the money from the enterprise, if any, only after revenues have come in from all sales of product. Presumably, in the pricing of temporary water, those radical differences between the two lucrative resorts to your temporary water rights, that is, sell it or use it, is taken into account by seller and buyer.

PROF GRAFTON: Yes, ultimately that's how a market will operate. So you will sell - - -

THE COMMISSIONER: I stress in theory.

PROF GRAFTON: Yes. Yes.

THE COMMISSIONER: Not all markets are perfect, thank goodness.

PROF GRAFTON: The market works pretty well. Certainly the water allocation market in the Murray-Darling and the southern Basin works pretty well. It's a competitive market. So you have a bunch of buyers and a bunch of sellers and they determine this price depending on the amount of water that is allocation to the entitlements. And you actually sell or buy based on whether it's profitable or not.

THE COMMISSIONER: A selling farmer - - -

PROF GRAFTON: Yes, exactly.

THE COMMISSIONER: - - - says to himself or herself, "What's it worth to me to give up the right to use this water in return for money which will compensate for me not being able to use it in specie?"

PROF GRAFTON: That is correct.

THE COMMISSIONER: In the case of a farmer who sells water in that sense, he or she is doing what we, as a society, through our various governmental decisions, have thought is a good idea about making property rights in water and producing a market in which there is more or less free trade. Isn't that correct?

PROF GRAFTON: That is correct.

THE COMMISSIONER: That's regarded as a social good by a series of very serious water reform initiatives since World War II. Isn't that right?

PROF GRAFTON: Yes and it's added to the gross regional product of the Murray-Darling Basin substantially by multiples of billions.

THE COMMISSIONER: When a farmer decides to sell, rather than use, it may be a consequence that that farmer will not be contracting for labour on the farm of the irrigated crop that doesn't go in that season. Isn't that right?

PROF GRAFTON: That's certainly a possibility.

THE COMMISSIONER: And that's regarded as part and parcel or entailed by that which is regarded as a social good.

PROF GRAFTON: That's correct. That the market in this context, the water allocation, water... markets allow water to go to its highest value use in irrigation and that provides a higher net value in the context of economic production within the Basin, which then provides benefits for not only the farmers themselves, but for society as a whole. So that's the gist of it.

THE COMMISSIONER: And it would be fatuous, surely, for somebody to say of the farmer who sells, "You've destroyed jobs", because the first question that will be asked is, "Yes, but how many have been created elsewhere by the person who bought the water?"

PROF GRAFTON: That is correct. You've got to make - - -

THE COMMISSIONER: In other words, you can never stop your analysis at what I might call the immediate outcome of a decision not to farm.

PROF GRAFTON: Yes, you can't stop it at the farm gate and you can't stop it at the district or regional level. You have to take it up to the scale issue. And there's a whole lot of scale issues and misinterpretations of scale issues, not only in this context but in other contexts in relation to - - -

THE COMMISSIONER: Maybe the scale is very broad because the money that's being spent on the plan is money raised from consolidated revenue, which notoriously isn't mostly generated by the area of the Basin.

PROF GRAFTON: That's correct. So it's coming out of taxation revenue and it has a cost.

THE COMMISSIONER: Which, if I may say so, clings to the coast.

PROF GRAFTON: Yes. So – yes. There's, essentially, a transfer from taxpayers.

THE COMMISSIONER: And none for the worse for that. Indeed, a splendid idea, I think. But it does rather suggest, doesn't it, that you have to look at an overall effect.

PROF GRAFTON: Absolutely you have to look at an overall effect.

THE COMMISSIONER: Well, now, one of the overall effects relevant under the Act is to promote the wise use of all the Basin water resources and to observe sustainability, which are, fairly obviously, a nationwide, not to mention potentially global, good. Is that not right?

PROF GRAFTON: Absolutely. I would agree with you. I think the words in the Act are quite appropriate ..... wise use .....

THE COMMISSIONER: So if we're talking socio-economic impacts, you can't actually say they are divorced from enhancement of sustainability and wise use of resources.

PROF GRAFTON: Absolutely not. Indeed, I published papers and others have published other papers that show that there is a very real value, economic value, associated with increased environmental flows. That's a non-market value. It's not like there's a market in a direct sense that we can participate in, only to the extent we can purchase water entitlements. But certainly the non-market value with the improved aesthetic values, improved water quality, improved water bird breeding events, those sorts of things have value and you can measure that in a variety of ways, and those values are very substantial. There's in the multiples of billions of dollars.

So when you talk about wise use and sustainable use, then you not only need to just look at employment issues, important as they are, but you need to look at the broader picture of a whole series of values associated with water, the landscape within the Murray-Darling Basin, and then, of course, relate it back to the taxpayers, because the taxpayers are presumably paying these funds to generate a series of values, not just in terms of the irrigation sector, but also generally from the Basin as a whole.

So that's how I would see it. That's the nature of this arrangement to end up with a better set of outcomes that are, by most Australians would say is, an improvement in terms of the sustainability, but also at the same time providing compensation for individuals who have made adjustments in the necessary course of actions to achieve those objectives.

THE COMMISSIONER: Now, sustainability looks to continuation, more or less, into the future of a more or less indefinite duration, I think. Is that right?

PROF GRAFTON: That's how I would interpret it.

THE COMMISSIONER: And it includes – a sustainable industry is not a contradiction in terms; rather, it's an industry that, as it were, doesn't use more resources than can remain available for its use, for that indefinite future; is that correct?

PROF GRAFTON: Yes.

THE COMMISSIONER: And so sustainable levels of employment also might be less than you could here and now achieve because a limit is imposed by the need to husband or steward the resources so that they may remain available at more or less the same level for a more or less indefinite period.

PROF GRAFTON: Yes.

THE COMMISSIONER: In other words the sustainable approach to an industry may well – probably does, in the nature of things, produce less employment than unsustainable resourcing of that industry would achieve.

PROF GRAFTON: It's possible, Commissioner. So there are certainly - - -

THE COMMISSIONER: But that is over a short-term.

PROF GRAFTON: Yes.

THE COMMISSIONER: So you may employ more people over the next five years by, as it were, letting it rip, than if you husbanded the resources so that it may continue well beyond the five years.

PROF GRAFTON: Absolutely. So if you bring about collapse of a resource or an environment, then you can't sustain the industry, the sector, then of course that's not sustainable.

THE COMMISSIONER: Well, in a sense, this country – you go to any ghost mining town and you can see the signs of previous very high levels of employment, mostly in hotels as far as I can see, all of which has been abandoned now because the resource ran out. Now, I'm not suggesting that irrigated agriculture is anything like the boom and bust of 19th century gold mining, but it does seem to me that this is an Act which explicitly requires attention to sustainability which seems to have in its train, necessarily, that you may well calibrate irrigated agriculture in such a way that will reduce immediate levels of employment below that which you could do if there was no limit on the amount of water that could be taken.

PROF GRAFTON: It's certainly possible that reductions in water diversions will reduce employment, but it may not.

THE COMMISSIONER: I understand. But let me assume that no limits on irrigation water would increase jobs. Breaking new ground.

PROF GRAFTON: Yes.

THE COMMISSIONER: And putting new fences in, simply in order to put your crops in.

PROF GRAFTON: Yes.

THE COMMISSIONER: If you are doing that, at levels of take which are not environmentally sustainable, it seems odd to me that you would characterise that increase of employment as a good.

PROF GRAFTON: Yes, I would agree with you. In fact there are two sets of issues there. So one is the private and one is the public. So on the private side even from the irrigation sector as a whole in that case, and this is a hypothetical, but suppose there were no restrictions in terms of water diversions. Irrigated area increased, employment increased, and that wasn't sustainable in the sense there was a build-up of salts, the build-up – a reduction of water quality, etcetera, etcetera that that level of production could not be sustained in the future, would decline and would ultimately decline employment etcetera. That would be the private sector side.

But there's also the public sector side. The public sector side to it is that irrigation water diversions impose external costs. Those are costs external to the irrigation sector itself, and reductions in flows, bird breeding events, etcetera, and aesthetic values that we attach to the riparian environment. So that itself would need to be accounted for in that discussion debate in the context of how water was being used. So I would say they were both, and both would incorporate the idea of the sustainability: the sustainability of the sector itself and sustainability of the capital, the natural capital, the inputs of the environment that allows the sector to exist, yes, but also allows a range of the values that are important to Australians.

THE COMMISSIONER: Thank you.

MR BEASLEY: Could the professor be shown a copy of exhibit RCE55. I think the Northern Basin Review folder.

PROF GRAFTON: May I just add - - -

MR BEASLEY: Yes.

PROF GRAFTON: Just one point I wanted to add here.

MR BEASLEY: Yes, sure.

PROF GRAFTON: It's very important when you do these analyses, and it's really – I think I need to stress this: you cannot say that a reduction in water diversion, let's say it's 50 per cent associated with a drought is the same as a reduction water diversions of say 50 per cent if it's about the buyback of water entitlements. They are not the same. In the drought case there's no one giving you any additional funds, you have to incur the costs associated with the drought with that reduction of 50 per cent. In the context of buyback of water entitlements, the farmer, the irrigator makes the decision his or herself to sell. They get those funds and they can use it in their

enterprise. So they're not the same thing, and to conflate them and make them the same is just – it's not good science, it's just – it doesn't make any sense.

MR BEASLEY: Sounds like a fundamental error.

PROF GRAFTON: It's a fundamental error. And if you don't account for that, then your results are worthless.

MR BEASLEY: So what I've shown you, this is a report prepared by KPMG commissioned by the Basin Authority, it's called "Northern Basin Community Modelling: Economic Assessment of Water Recovery Scenarios", November 2016. RCE55. Again, looking at socio-economic analysis regarding the Northern Basin. If I could take you to page 4 where the authors describe what they call the econometric model, middle of the page:

> *Our employment database has cross-sectional and time series dimension. That is, we have observations of employment in eight sectors in each of the 21 communities at three non-contiguous points in time. For estimation purposes we use regression techniques appropriate for cross-section data pooled across time. For the irrigation dependent communities listed in the first column of table 2.1 the explanatory variables for the sectoral employment were the following:*
>
> *1. Number of hectares of cotton production for each community.*
>
> *2. A community-specific index of grazing production.*
>
> *3. A community-specific index of copping production.*
>
> *4. Employment in all sectors except other private businesses.*

So again, with the exception of four, the modelling is looking at ultimately the link between jobs and, in this case, it looks like hectares of land being irrigated.

THE COMMISSIONER: Can I ask, Professor, what is a non-contiguous point?

PROF GRAFTON: Non-contiguous, sorry, that would be breaks in terms of the data set. So, you know, it might be 2008, 2012 or 2014. They wouldn't be contiguous years in between. That would be my - - -

THE COMMISSIONER: I know what the words non-contiguous mean, but I'm just wondering what is the point of calling them non-contiguous? They're three different points.

PROF GRAFTON: That's correct. So - - -

THE COMMISSIONER: You still need to know the intervals between them.

PROF GRAFTON: That's correct.

THE COMMISSIONER: Non-contiguous doesn't tell me anything.

PROF GRAFTON: Well, I suppose you could have three data points, which could be 2008, 2009, 1010.

THE COMMISSIONER: They are non-contiguous.

PROF GRAFTON: Well, on an annual – if you only have - - -

THE COMMISSIONER: Well, unless the word "point" is not being given any meaning.

PROF GRAFTON: Yes.

THE COMMISSIONER: Yes.

PROF GRAFTON: Yes.

THE COMMISSIONER: Thanks.

PROF GRAFTON: Yes.

MR BEASLEY: And then we have the simulation model described on page 5:

> *In this section we explain how the sectoral employment models selected for each community are used to simulate the impacts of employment of alternative water recovery policies. In general form the simulation model consistencies of six functional relationships and two identities. The two identities aggregate the number of jobs as follows:*
>
> *Employment in the farm and farm-related sectors is defined as the sum of jobs and irrigated farms, non-irrigated farms, agricultural supply and in ginning production.*
>
> *Employment in all sectors other than in other private businesses is defined as the sum of jobs in farm and farming related activities, manufacturing, mining and in government services.*

Over the page, you will see middle of the page:

> *Eight scenarios of recovering water for the environment were simulated and compared to a historic baseline so that percentage deviations of variables from their baseline values captures the only impact of water recovery. The key exogenous value –*

is that independent?

PROF GRAFTON: Yes. That's – yes.

MR BEASLEY: The key independent:

> …*variable in the simulation model through which changes in water recovery policies are modelled is the number of hectares of irrigated cotton production.*

So the modelling here for economic impact seems to be limited to this main independent variable of hectares of irrigated cotton production reduced through a reduction in water.

PROF GRAFTON: That's right. So they are creating scenarios where there's – so it is an explanatory and independent variable in their estimation, but when they go and do the simulations they're taking that area of cotton production and then they're using that adjusting at different directions presumably – one would hope they would – to be able to get some measure of the impact on the employment. That's my understanding of what they've done, yes.

MR BEASLEY: Now, at page 11 they talk about developing the initial modelling. I want to make sure I've understood this correctly. 3.1, initial modelling:

> …*developed models for 21 communities in the Northern Basin that would be used to simulate the impact of water recovery policies on employment, wages, and population for each community. A key model input for each community is the number of hectares of irrigated farmland that would be supported by different water recovery scenarios. Ideally, simulations using this baseline would be designed to answer the following question: how different would the outcomes for wages, jobs and population had been for a particular community over the period 2000/01 to 2013/14 if recovery of water for the environment led to change in irrigated agricultural production in the context of underlying climate variability, underlying productivity improvements, and other factors affecting each community.*

Is that – do I read that as, "We have put into the model the number of hectares of irrigated farmland that's supported by different water recovery scenarios, but ideally we should have factored in these other matters"?

PROF GRAFTON: Absolutely. So equation 2.1 on page 11 is miss specified. So there's a whole range of variables that should have been included that weren't. So therefore the estimated, parameter beta JC, for example, is not going to be a valid parameter because the series of – series of variables that should have been included. So then they're using that – I – my understanding, you would have to seek the guidance from the authors, but my understanding is then to use that parameter, adjusted with the changes in different hectares, to be able to determine FTE, or full-time employment. But that doesn't make sense. If you started with a miss specified

model, which this is, then you can't get any meaningful simulation results that will tell you anything.

THE COMMISSIONER: I don't want to be crude, but on this page the authors are saying, "This is what we would have done, if we could have done it, but we couldn't." Is that right?

PROF GRAFTON: I – I can't say, Commissioner. I would have to read this more carefully in the time available to know exactly what they said they're doing, but ideally, in the terms of that terminology, they would seek to ask those questions. But the way you would answer that question that they pose is not the way that they've done it. So the question posed may be reasonable, but the way they've done it is not reasonable. So it doesn't help - - -

THE COMMISSIONER: To be fair to the authors, the middle of page 11.

PROF GRAFTON: Yes.

THE COMMISSIONER: They say that:

> *A cursory examination at the outset established two key guidelines.*

They – in my words, "We could see immediately that the available data wouldn't support the development of the ideal structural model," etcetera, and that:

> *Data limitations also rendered as unviable a reduced form econometric approach.*

And:

> *The initial econometric approach that we proposed –*

in the past tense –

> *to use relied on basic time series econometric techniques –*

a formula that they then couldn't employ. The top of page 12. And the top of page 12, lo and behold:

> *In light of these limitations, we recognise the economic work would need to be –*

I like this expression, and I might use it myself in my work in other cases, it:

> *… would need to be heavily supplemented with significant inputs of judgment.*

MR BEASLEY: Yes. Like what?

THE COMMISSIONER: That's talking about the role of intuition substituting for empirical demonstration, isn't it?

PROF GRAFTON: I think that's a reasonable interpretation, Commissioner.

THE COMMISSIONER: We use the word judgment, but it's a bit of self-praise to say judgment. It means what I might call intelligently formed guesswork.

PROF GRAFTON: Yes. So any piece of work that would be scientifically valid has to be replicated. So, in other words, someone should be able to take the data that you have and then replicate your results.

MR BEASLEY: For it to be science.

PROF GRAFTON: For it to be science. If you can't replicate the results - - -

THE COMMISSIONER: Difficult to replicate what might be called the temperamental inclination of one person to be optimistic and the other person to be pessimistic, but they are parts of those individuals' respective judgments.

PROF GRAFTON: That's correct. It's not science; it's something else.

THE COMMISSIONER: It may be very intelligent, but it's not science.

PROF GRAFTON: It's not science. It can't be replicated, it can't be falsified in that sense. It's not science.

MR BEASLEY: To be fair to KPMG, and I might get the Professor over the coffee break to read pages 19 and 20 because they – sorry, yes, 19 and 20, because they do identify the limitations in their approach. So it's not as though they - - -

THE COMMISSIONER: No, they are pretty clear about it.

MR BEASLEY: I think they've been at pains to do that.

THE COMMISSIONER: I've got my red ink on the bottom of page 19.

MR BEASLEY: Yes. So I don't know if it's a convenient time now, or - - -

THE COMMISSIONER: Yes, sure.

MR BEASLEY: What I might ask you to do, Professor, is just read pages 19 and 20 while we have a 15 minute break.

PROF GRAFTON: Certainly. Happy to do so.

MR BEASLEY: And we will try and work out what's being said there.

THE COMMISSIONER: Thank you. We will resume at 20 to 12.

ADJOURNED [11.25 am]

RESUMED [11.42 am]

THE COMMISSIONER: When you're ready.

MR BEASLEY: Yes. So I asked you to look at pages 19 to 20 of this report, which seems to indicate – the Commissioner mentioned he put in red the bottom paragraph at page 19 – seemed to be a concession of the real limitations of this modelling approach. And, similarly, the bottom paragraph of page 20:

> *…that the model captures only a very small fracture of the economic relationships within the local communities and impacts on water recovery on employment.*

Thus gives:

> *…only a partial representation of the full economic impact on the community.*

In other words, it seems to be a concession that what we're doing – that is, production on hectares down equals certain jobs is a very limited method of estimating or providing a report in relation to economic impacts.

PROF GRAFTON: That's my interpretation. They set out quite clearly on pages 19 and 20 what they would like to have done, or should have done, and then they outline in that figure 3.4 what in fact they did do.

MR BEASLEY: Yes.

PROF GRAFTON: And you can see there's a huge difference between the two. And so, yes, that is correct. They've – I mean, I think they made it clear to the reader the limitations and they're very, very real limitations, and we have certainly made it clear in the submission to the Royal Commission that was led by Professor Wheeler what those limitations are. I could also raise an issue, just quickly looking quickly in the break, so in appendix C, just for an example – I'm not claiming this is throughout the report, but in appendix C it is worth looking at page C34 and the fourth dot point, just to see the nature of this relationship they've been assuming without accounting for a whole range of other variables. So the fourth dot point there says:

> *The observations that are most challenging in the sample –*

and they give particulars –

…the number of irrigated hectares –

which is their key variable –

increased to 12,000 from 50 in the previous year, whilst farm employment increased to 55 from 45.

So - - -

THE COMMISSIONER: Let me get this right. I think we're talking almost wholly about annual crops here.

PROF GRAFTON: Yes.

THE COMMISSIONER: So these are what are called by the authors "challenging observations". I'm going to ask you what that means, "challenging," but they're saying in 2008 to 2009 there were 50 irrigated hectares and in 2009 to 2010 – I'm so sorry, no, I will start that again. In 2007 to 2008 there were 50 irrigated hectares. In 2008 to 2009 there were 12,210 irrigated hectares. I know they talk about two years in their first sentence, but they're in fact talking about three years, aren't they?

PROF GRAFTON: That's my understanding, yes.

THE COMMISSIONER: I don't know why, but anyhow. And so they're saying in 2007 to 2008, with 50 irrigated hectares, there were 45 farm employment jobs. Is that how I should read that?

PROF GRAFTON: Yes. So - - -

THE COMMISSIONER: And then 55 farm employment jobs in 2008 to 2009 when there were 12,210 hectares. Now, then they confuse me, I have to say, in the very next sentence they drop to another year altogether, 2004 to 2005.

PROF GRAFTON: Yes. So that's a year when - - -

THE COMMISSIONER: So this is – as you say, this is a dot point that blows out of the water, if you will forgive the expression, any notion of linear relation.

PROF GRAFTON: Correct.

THE COMMISSIONER: In fact to a degree which is challenging, I think they say. What do they mean? Challenging is a euphemism. What does it mean – or a cliché? Anomalous, or is not explained by a theory or what?

PROF GRAFTON: I can only give my interpretation. I don't know what the authors mean.

THE COMMISSIONER: Please do, yes.

PROF GRAFTON: But my interpretation in this case "challenging" means that this is work that is of questionable value.

MR BEASLEY: Well, it's - - -

THE COMMISSIONER: Because the last sentence of that dot point shows that a reduction by a very considerable amount, namely over 10,000 hectares of irrigation, was accompanied by an increase in jobs and yet, if you will forgive me, intuitively, I would hardly be saying that in order to increase work in cotton growing districts the first thing to do is hugely to reduce the number of hectares being cropped. So what that shows is that the empirical data will not permit a serious use of any linear relation.

PROF GRAFTON: That's my interpretation, and the reason is that there are a whole range of other factors – cotton prices for example, water prices for example, and a whole range of things in terms of climate variables, weather variables, that are missing in the model. So that's why you can't get that relationship that's being assumed.

MR BEASLEY: We can all only speculate as to what the authors mean by "most challenging" but I would read it as, "The actual, real data challenges what we're suggesting in the report is a means of assessing economic impact."

PROF GRAFTON: Data is always an issue but I would add, however, that there is data available on prices. So – so why weren't those data considered? Furthermore, when you do a piece of analysis, you don't consider it in isolation. You consider about what other work has been done. And if other work has different models and different sets of results then you want to alert the reader to that and explain why your results are different and why what you've done is different, and that doesn't appear to be the case here. And there again – so that would again underline my statement previously that this is of questionable value, and certainly in terms of using it in a policy context, it has no value. I don't believe you can use the information that comes out of this report to make well-informed policy decisions.

THE COMMISSIONER: Professor, how do you understand within the Act and Plan one uses, however flawed they may be, conclusions from work like this? How – what is the Authority meant to do with – let me assume the proposition is that if you reduce irrigated hectares, you will reduce jobs? What do you understand is the permitted or required response?

PROF GRAFTON: Well, I can only surmise, Commissioner, that the reason these reports have been generated with the approaches that they've done is that there seems to be an underlying premise that we need to get negative impacts associated with reductions and water diversions. I mean, it seems to me - - -

THE COMMISSIONER: What do you do with that proposition? Does that mean that you don't make the reductions in diversions?

PROF GRAFTON: Not at all.

THE COMMISSIONER: What does it mean, then?

PROF GRAFTON: Well, what I – if I were to sort of recommend how this should have been done, then I would say the approach taken would be to review the existing literature, published literature and look at those findings first, based on that literature identify gaps of understanding, and then commission with a proper Terms of Reference, a piece of work that actually would be consistent and the best available science. Then that information would come in and then presumably there's a decision-making process as to what that leads to.

THE COMMISSIONER: What's the decision-making process in which the loss of jobs by reduction in irrigation is taken into account, as you understand it? What's the decision that is affected by that matter?

PROF GRAFTON: It shouldn't make any difference, in my view, in terms of the Water Act and interpretations of the Water Act and the Basin Plan.

THE COMMISSIONER: So what are they doing this for then? I'm sure KPMG didn't donate their services. So there's - - -

MR BEASLEY: There's no letter of instruction, or Terms of References. That's something missing from the report, so we - - -

THE COMMISSIONER: What does this – I mean, I can see how it may inform compensation packages or structural adjustment measures, but the MDBA has no legal responsibility for any of that.

PROF GRAFTON: That's right. So – and even then it can't inform structural adjustment packages because the analysis is fundamentally flawed.

THE COMMISSIONER: Let me assume that they weren't flawed.

PROF GRAFTON: Yes.

THE COMMISSIONER: And you had something that you thought was admirable work and it came up with, let's say, an appreciable reduction in the amount of full-time equivalent work in a vicinity. A vicinity that is meaningful for something that is properly called a community, so of social and political importance. I'm just wondering, at the Authority level, what decision does that influence?

PROF GRAFTON: In my view, it shouldn't influence the decision-making in the context of the Water Act has the primacy in this context and the Murray-Darling

Authority should presumably be undertaking its activities in relation to the Water Act and the Basin Plan.

THE COMMISSIONER: One possibility has occurred to me – I've never seen it written about – as follows, prompted by discussion with staff, the ESLT could not be affected by consideration of job losses but the SDL might be, in this sense: that though an SDL must reflect the ESLT, that could be interpreted as meaning that it must not be greater than that indicated by an ESLT. But I suppose, bearing in mind precautionary principle and prudence, conservatism, it could be significantly greater than that indicated by an ESLT. Now, query whether in law that would still reflect in section 23 terms, but let me assume. Then I can see there might be a decision taken, "No, no, no, we will make SDL coincide with the ESLT."

That is, "We will not make it higher than that indicated by ESLT, because we now know that material reductions in irrigation will cause social pain." I can understand that and if the statute permits an SDL to reflect an ESLT but by having, as it were, a buffer, so that it's a higher – when I say higher, a lower figure, that is a higher margin of error, then I can understand it. But apart from that, I'm really at a loss to understand what the Authority, with its limited remit, does with the information. I know Parliament is required to take into account the best socio-economic analysis and that's because Parliament is required to optimise, among other things, social and economic outcomes.

But if it's true that the environment's needs can't be affected by the job market and that – maybe that's contestable, but that's a legal question, then I'm still at a loss to know what does the poor old Authority do with the knowledge that a proposed SDL, translated into a region, will lower the number of jobs available for, say, cotton pickers. Do you know?

PROF GRAFTON: Well, obviously the Authority needs to be asked that. But if I were doing this, if I had scientifically valid information and evidence – which this is not, that was presented to me today – then you would be able to provide that information to the Department of Agricultural and Water Resources and there was a water recovery program, you know, the water for the future, and presumably that would then feed into a decision-making process about how you would spend the funds associated with water recovery to provide necessary structural adjustment to particular communities. But that would be separate to any determination - - -

THE COMMISSIONER: The Authority doesn't have the remit to do that.

PROF GRAFTON: No, it doesn't. So we would have to provide that information to the Department of Agricultural Resources and then the Department would make the determination of how it would adjust the water recovery program in terms of expenditures and what it would use the funds for.

THE COMMISSIONER: So this kind of work, if done well, could be immensely valuable to what I call the national response to the changes required by the Water Act.

PROF GRAFTON: It could be, yes. Certainly for the water recovery process, and there's billions of dollars in that kitty still to spend, so to the extent there's billions to spend – yet to spend, then this could be helpful for them.

MR BEASLEY: But that's not why this work hasn't been done, I don't think, Commissioner.

THE COMMISSIONER: No, I don't think it is either.

MR BEASLEY: I think it hasn't been done because, as we know from the Northern Basin Review, what the Authority has said is that, "We've done our modelling in relation to a proposed amendment to the water to be recovered from the Northern Basin and we've suggested these toolkit measures will – that that should be based on it, or that they help it or complement it." But then, as they've said a number of times in their report, that's exhibit RCE50, that they apply the triple bottom line approach. So, in some way, economic impacts are incorporated into the decision to amend the Plan. The KPMG report and their own work asserts what's the economic impacts are, and somehow that translates to a role - - -

THE COMMISSIONER: Less water for the environment.

MR BEASLEY: A role in a reduction of 70 gigalitres. How that's done, of course, is not disclosed.

THE COMMISSIONER: Now, Professor, you have heard what has passed between me and Mr Beasley. Could I ask you about this hypothetical: it may well be that there's a pattern of farming behaviour in a vicinity which shows that the farmers in that area have chosen, maybe for excellent reasons, not to make the investments in the latest super-duper machinery. And, therefore, their farming takes per unit of production more human labour than their colleagues in the next valley, who have taken up with alacrity all the latest products of the machinery manufacturers. Assuming that decent socio-economic work shows that a reduction in irrigated hectares has an effect which, subject to other matters, suppresses demand for paid work, contract or full-time, there will be a major difference in effect between those two valleys. One has already suppressed by mechanisation a lot of the demand for human workforce, and the other has yet to experience that.

If, as Mr Beasley suggests, this kind of work were to be used to assess the amount of water recovery for the environment, then it seems to me we have got some kind of weird – I think it is weird – exercise going on by which you say in the first valley the environment needs less water to be recovered than in the second valley, not because the snails, the trees, the fish, the banks are in different states of degradation needing recovery and protection, but because there will be a disparate job effect expected in

one valley compared to the other, which I have to say, I can find no footing for in the Water Act or the Basin Plan. Do you understand the weird effect that is troubling me underlying my questions to you? Well, what does the Authority do with this no doubt socially and politically very significant information? I don't want to be misunderstood. It is of surpassing significance to us as a people - - -

MR BEASLEY: If done properly.

THE COMMISSIONER: - - - what our expenditures on the Basin Plan may have as an effect on communities. Yes, if done properly.

PROF GRAFTON: Absolutely. So I agree with the points you're making, Commissioner, that I don't understand the decision-making process within the Murray-Darling Basin Authority in the context of this information even if it were to have been done in a scientifically valid way, which it hasn't. To me, it provides information in the context of the overall Government Department of Agriculture water resources and the water recovery processes and the structural adjustment programs, but it cannot, and, in my view, does not make sense in terms of the adjustments that will be made in the context of the SDLs. That's a separate issue. They have to be kept separate. Now - - -

THE COMMISSIONER: Neither does it seems to me to be part of the – what I will call the "just add water" criticism. As I understand the object of the Act, which requires simultaneous optimising of things that may be in tension with each other, it means that, having established the state of the environment and the states which ought to be achieved, so actual and desired, there may be a number of different ways in which the desired state can be achieved, and those different ways may require different hydrology, that is, different flows. And that may include different volumes, from which it follows that some ways may leave more water for irrigation than other ways. I think that's – is that your understanding as well?

PROF GRAFTON: Yes.

THE COMMISSIONER: But I don't see how the number of jobs affects your choice between those methods, although it may, and I hope does, inform your preference for a method that causes least social pain, if you've got a choice. And I suppose that's one area where that is a very important possible use of well-done socio-economic analysis including effects on jobs, that the Authority may have a choice between, say, three different ways of permitting a certain water bird to breed. And if those three different ways happen to involve different amounts of water to be recovered for the environment, then these data and conclusions could be used to inform their statutory duty to optimise the social and economic effect. Does that make sense to you?

PROF GRAFTON: Yes. So it's a lexicographic ordering. You have a first order priority, which is delivery in terms of delivery of environmentally sustainable level of take.

THE COMMISSIONER: It's not just add water, because you're talking about environmental outcomes - - -

PROF GRAFTON: Correct.

THE COMMISSIONER: - - - not just simply flow.

PROF GRAFTON: Yes. And then within the achievement of that priority, then you can then do some optimisation within that context - - -

THE COMMISSIONER: Thank you.

PROF GRAFTON: - - - as long as you've achieved the first order priority.

THE COMMISSIONER: So I think we have established that yes, there is a statutory role for this material, but it won't affect the environmental outcomes to be achieved. It might inform choices where the outcomes might be achieved by different levels of water, depending upon how you do it.

PROF GRAFTON: That's correct. And I would add what I said previously, and also the water recovery, as well, which is that, you know, the $13 billion that would allocate water for the future. And so that also should – it should inform that. And I would highlight that that's – they're different, they're separate, but they're, obviously, closely connected, because it's the water for the future package, the billions of dollars in that package, that determines how much you can get for your dollars expended. And that, I think, is critical in terms of affecting these issues about job losses and affecting a whole range of issues in terms of communities. And if you don't take the economics in that context into account, you won't get an optimisation in the context of the Basin Plan.

THE COMMISSIONER: Thank you.

PROF GRAFTON: So in that sense, they are connected.

THE COMMISSIONER: Yes. Thank you.

MR BEASLEY: That was all for that report. To save time, the Basin Authority did its own technical overview of social and economic analysis. Actually, I don't have – I'm not sure what exhibit number that is. I don't have a red dot on my copy of that. But that, again, used the same fundamentals of asserting – are you familiar with that report in the sense that it used the same fundamentals of a reduction in water causing reduction in hectares of – hang on. I will get the phrase right.

PROF GRAFTON: Yes, that's right.

MR BEASLEY: A reduction in area of irrigation, and leading directly, somehow, based on the modelling, to a reduction in jobs.

PROF GRAFTON: Yes. So they were looking at – they had a model, I think, with cotton production and hectares related to a range of variables, a lot of missing variables that need to be in there. So it's a miss specified model. And then relating that to sets of issues associated with the community. Yes. I'm familiar with that.

MR BEASLEY: In relation to that report, they go through various towns like Moree, Wee Waa, Warren and simply relate from a reduction – I'm just reading, for example, from Moree:

> *From the reduction in irrigated area associated with current water recovery, the estimated reduction in jobs for the farm and farm-related sector is around 2.4 per cent or 47 full-time jobs and 27 part-time jobs.*

So it's the same process that you have described as being flawed in the other reports.

PROF GRAFTON: Yes. And I would also highlight – so I mentioned that there's peer reviewed published publications in relation to the effect on employment and profitability and also revenues. But I also want to highlight that in 2010, for the Guide, the Guide to the – draft Guide to the Basin – the Guide to the Draft Basin Plan, ABARES did analysis for that Guide. And they also calculated the effect on employment on a range of scenarios. And it was very, very small. So I would ask – I would beg the question, since ABARES is part of the Australian Government, since they already have the model that was developed in 2010, why couldn't they go to ABARES and use ABARES' model, an updated version of the model, to get them some of these - - -

THE COMMISSIONER: The Australian Bureau of Agriculture and Resource Economics

PROF GRAFTON: Yes, correct. Yes. So I can't recall the details, but it's worth looking at it, because my recollection is those effects on employment were trivial, like, very, very small.

MR BEASLEY: Can I just clarify. When you said there's published work in this area, if you go to page 7 of your submission with Professor Williams.

PROF GRAFTON: Yes.

MR BEASLEY: I just want to see whether this is what you were referring to. Page 7 at 9(c), is it the Kirby et al - - -

PROF GRAFTON: Yes.

MR BEASLEY:

Compared actual farm outcomes in the MDB from 2000 to 2008 and found the real adjusted gross value of irrigator production fell by just 10 per cent, despite a 70 per cent decline in irrigated surface water use.

PROF GRAFTON: Now, that's certainly the evidence in the published literature. And why I like the Kirby et al paper, it's not a model result. You know, so there's lots of models and I contributed to that.

MR BEASLEY: This is real.

PROF GRAFTON: This is actual data.

MR BEASLEY: Data. Yes.

PROF GRAFTON: This is what actually happened. It's not some modelling. It's what actually happened.

MR BEASLEY: Yes.

PROF GRAFTON: And so to ignore what actually happened when you create these exercises or these reports, it beggars belief why you would not go to the actual data.

MR BEASLEY: In other words - - -

THE COMMISSIONER: Don't you test the cogency of a model by its comfortable or uncomfortable butting up against reality from time to time?

PROF GRAFTON: One would hope so, Commissioner. That's what you should do, yes. You should validate your model. And it's part of that testing process is to see, "Yes. Does it explain the sorts of things that we would explain? And does it explain it in the context of the data that we have available?"

THE COMMISSIONER: So you don't blame the world for failing to conform to the model; you see whether the model can better describe the world.

PROF GRAFTON: Correct.

MR BEASLEY: So, in other words, whether we call it an assumption or a hypothesis or the means by which – in these various reports analysis is being made on water reduction, production, loss and ultimately an asserted loss of jobs flies in the face of the actual data recorded by the authors of that report.

PROF GRAFTON: Yes.

MR BEASLEY: I wanted to – if I can go back to the submission you made with Professor Wheeler and the other economists. I wanted to just ask you about the recommendations you've made, you've suggested for the Commission on pages 1, 2

and 3, which I think – 1 and 3 I think are related in relation to wanting there to be a proper audit and stronger governments to ensure cost effectiveness. I assume that is in relation to efficiency measures in suggesting that what needs to be made publicly available and a proper independent audit done on is (a) where has the money gone; (b) who has it gone to, why has it gone to them, what was the integrity of the process by which decisions were made to give money to people for efficiency measures, and a proper water accounting as to what – in terms of it can be best availably done, how much water has been recovered from these efficiency measures?

PROF GRAFTON: That's exactly right. That's exactly what we're arguing for.

MR BEASLEY: And that is, on your understanding, missing at the moment.

PROF GRAFTON: It's absolutely missing and indeed it's not what we just called for. The parliamentary inquiry into water use efficiency that came out in December last year and had recommendation 1 and 2, consistent with our recommendations. I mean, if I - - -

MR BEASLEY: I mean, we're not talking small amounts of public money that are being spent, are we?

PROF GRAFTON: No. In fact, I find it amazing that you can spend billions of dollars without a cost benefit analysis, not that I've ever seen a cost benefit analysis on those expenditures – that you can spend billions of dollars when it has demonstrably been shown, and before even the expenditures were made, that the cost effectiveness of using subsidies to provide water infrastructure is going to cost you multiples of what an alternative is. So, I mean, all of that is – to me is amazing - - -

MR BEASLEY: The issue - - -

PROF GRAFTON: - - - that we can make those decisions with all that information even at the very start of the program.

MR BEASLEY: The issue you're raising there, I think – and this is important to moving forward, particularly in relation to the efficiency measures program to recover an additional 450 gigalitres of water mainly for enhanced environmental outcomes in South Australia, is, at best, that that water be recovered through efficiency measures or is it better to actually buy the real water? One thing we know, without, I think, any doubt, is that it's certainly cheaper to buy water. And I think the evidence is at least two and a half – it's two and a half times more expensive for efficiency measures over buybacks.

PROF GRAFTON: That's at least, because that assumes – that two and a half times, which is the number that's in Grafton and Wheeler. But that assumes that there has been no impact on return flows. We know there has been impact on return flows; we just don't flow how big that - - -

MR BEASLEY: I will come to return flows.

PROF GRAFTON: So it's at least two and a half. It has got to be more than two and a half, but how much I can't say.

MR BEASLEY: Another benefit of buyback, as we've discussed, is that it can have positive economic outcomes in local communities.

PROF GRAFTON: Correct.

MR BEASLEY: For the reasons we've already discussed.

PROF GRAFTON: Yes.

MR BEASLEY: Secondly, if you buy a reliable entitlement, you actually get – you've got the confidence of actually getting actual real water and not relying on an efficiency measure to somehow deliver water which might be harder to measure. You're nodding. Yes?

PROF GRAFTON: That is correct. And also the different time period, too. So that's 2024 vis-à-vis 1 July 2019. And, in fact, even if you take the numbers that are available coming from the government data – so which that's not disputed. So it's approximately $5,000 a megalitre in the context of these efficiency measures. That's what the expenditures are to date on average. Well, you're getting into a realm of territory where it's actually – and this sounds crazy to say this – you're getting to a realm of territory where it would have actually been better to build a desalination plant – desalinated water and pump that water into the Basin.

I mean, I haven't done the sums, but, I mean, around that – that's $5,000 a megalitre. You know, we're running at $5 a kilolitre. I mean, gee, at that point it's almost worthwhile to do desalination and pump. So that's the level of the extremity of the situation. It's not like it's a 10 or 20 per cent issue, which you could say, well, you know – but it's an enormity issue, because the extra costs associated with doing that are billions of dollars.

And it will be highlighted in the submission that Professor Williams and I made that if we – we would have already achieved that target and far exceeded it if we had simply done buybacks, rather than efficiency programs. So we would have easily been able to meet those targets with the total money that was available. That was required, I believe, in the determinations in terms of the sustainable diversion limits. So it's not a trivial issue. To me, it's a fundamental issue that affects not only the sustainability of the Basin, but affects the delivery of the Water Act. So it's core – central issue to me.

MR BEASLEY: All right. They were the questions I had on that first issues paper. I'm not sure whether you have any further, Commissioner.

THE COMMISSIONER: Yes, just a couple. It occurs to me that when I was asking you earlier about decisions to which a well-done socio-economic analysis may be important for the Authority, that there's an obvious one that perhaps I was wrongly simply assuming. Clearly enough, when one comes to the adjustment process of an SDL, there is an express requirement in relation to efficiency measures to, for example, be able to perceive the increase of environmental outcomes and the maintenance or improvement of social and economic outcomes. So I can see that.

It's just that I – it's not obvious to me that you do that by asking, for example, about job losses by reduction in irrigation, because an efficiency measure, after all, is a measure that derives its name, the character that its name suggests, by using less water for the same productive output. Isn't that correct, as you understand it? And efficiency measure is a measure that operates to decrease the quantity of water required for one or more consumptive uses in a set of surface water, SDL resource units, compared with the quantity required under the benchmark conditions of development.

PROF GRAFTON: Yes.

THE COMMISSIONER: Efficiency measure is an accurate label for it. It looks at the amount of water, say, to produce a tonne of cotton and says, "This is a measure which will require less water than the so-called benchmark conditions." And an efficiency measure can improve an environmental outcome by, as it were, leaving more water available for the environment, without harming the farmers. That is at its most simplistic. I'm just looking at the words of - - -

PROF GRAFTON: It's – it's possible.

THE COMMISSIONER: At least in theory. I'm just looking at the theory of - - -

PROF GRAFTON: In theory it's possible. It depends on how many entitlements – water entitlements are acquired through those efficiency measures.

THE COMMISSIONER: Quite.

PROF GRAFTON: Typically, it has been 50 per cent share in terms of the so-called water savings. That's not going to deliver it in terms of an overall benefit to the environment as far as the estimates that Professor Williams and I have come up with. But, yes, theoretically possible if the water entitlements handed over to the Commonwealth Environmental Water Holder are in - - -

THE COMMISSIONER: The SDL is – the SDL is reduced.

PROF GRAFTON: Yes. Equal to the amount of the supposed water savings or more, then that's possible, yes.

THE COMMISSIONER: But the idea of an efficiency contribution is that you have to be able to say, by reducing the amount of water that the farmer wants to use, ie, increase in environmental outcome, usually that will involve some knowledge, hence, in the return water analysis.

PROF GRAFTON: Yes.

THE COMMISSIONER: Some knowledge of what actually is actually occurring for the environment. That's your point, is it? Or one of the points.

PROF GRAFTON: That's the key point. So it's a before and after analysis. So before, how much water was being used, and is extracted and diverted; how much was being consumed – they're not the same thing; and then of course how much water was being evaporated, how much water was going in terms of what we call return flows either to recoverable purposes or non-recoverable purposes. That's what's called a water audit or water balance, or what's happening at a farm scale, and – this is the critical point – not just at the farm scale, but at the Basin scale, because the whole point of the Water Act wasn't about individual farms: it's about the Murray-Darling Basin. So we have to get the benefits in terms of the environmental benefits at a Basin scale.

And this is the key point that apparently a number of policy makers and decision-makers don't understand that when you talk about efficiency in the context of water, efficiency at a farm scale does not mean efficiency or improvement. So increasing the water consumption, as a proportion of the water used – which is essentially what we are talking about, which is the water irrigation or irrigation efficiency – does not translate into Basin scale increases in environmental water. That's the – that's a critical point and the whole point of the efficiency programs, as I understood them – I mean I've read the announcement from Prime Minister Howard in 2007, the whole plan that was called the National Plan for Water Security at the time, which turned into 'Water for the Future', the whole point was to have efficiency projects that would generate sustainable outcomes in the Basin which ultimately was translated into the Water Act.

THE COMMISSIONER: Well, that's why it seems to me – and with respect to those who drafted it - - -

PROF GRAFTON: Yes, yes.

THE COMMISSIONER: - - - 709A captures something in accordance with what you urge is the proper approach.

PROF GRAFTON: That's right.

THE COMMISSIONER: Namely, that they are measures that increase the supply of water, or the – sorry, efficiency measures, they are measures that increase the

efficiency of water use so that environmental outcomes are increased while maintaining or improving social outcomes.

PROF GRAFTON: Exactly.

THE COMMISSIONER: And a measure that doesn't have both these qualities is not an efficiency measure within the meaning of the Plan.

PROF GRAFTON: That would be my understanding.

THE COMMISSIONER: Well, now, could I ask you about on page 2, recommendation 3, in the first line you have, as a preliminary, this phrase:

> *As well as strengthening property rights across the Basin, current arrangements for accountability to objectives are limited.*

I wonder if you could just explain, because I don't yet understand what you mean by – when you're talking about the strengthening of property rights.

PROF GRAFTON: I think the – it's perhaps not well phrased, or phrased as well as it could be. So there's two issues. One is in the context of monitoring compliance, which we know has been deficient in New South Wales and in Queensland, and so we're highlighting that's an important issue. But it's also not just important from the context of the environment. It's also important in the context of other irrigators, because other irrigators of course are holders of water entitlements or they use water allocations. So if someone is taking more water than they are legally allowed to, then that has an implication therefore.

THE COMMISSIONER: Thank you.

PROF GRAFTON: Yes.

THE COMMISSIONER: If I read that as meaning the strengthening of monitoring and compliance will enhance the worth of property rights.

PROF GRAFTON: That's right. So it's not just an environmental issue. It's also an issue for irrigators. So they should also be concerned by it, those ones who are obeying the law, of course.

THE COMMISSIONER: Thanks.

MR BEASLEY: Just before we leave that submission, I should ask you this, which I forgot to: Professor Wheeler gave some evidence that she has, on more than – or at least one occasion, perhaps more, had discussions with relevant people at the Basin Authority, suggesting to them that this economic impact work has the deep flaws that we've been talking about and you've given evidence on. And she has had difficulty – I'm paraphrasing her evidence – but getting any satisfactory engagement from the

Basin Authority on her views. Have you had any similar discussions with the Basin Authority on that issue? I know you have on return flows, but - - -

PROF GRAFTON: Not in specifics, no. So I haven't said, "Look, there's a particular report here with flaws." No. So I haven't had any of those sort of discussions.

MR BEASLEY: Right. I now want to ask you a few things concerning the submission you put in with Professor Williams. One of the first points you make in that submission is that you are not – neither of you are aware of any scientific and credible justification for the change in the amounts of water said to have been needed for the – to be recovered for the environment to meet environmental watering requirements from the Guide, that range of around 4,000 to 7,000 gigalitres, whether it's a high level of uncertainty of achieving those watering requirements or a low uncertainty down to the 2,750. I think you have had some discussions with the Basin Authority asking how was 2,750 reached; is that right?

PROF GRAFTON: Yes.

MR BEASLEY: And I take it when you say you are still not aware of any scientifically credible justification, they haven't satisfied you that there is one?

PROF GRAFTON: Not that I can understand, no.

MR BEASLEY: All right. What has been – what was the nature of what has been explained to you by the Basin Authority people in relation to that change between the Guide and the SDL report?

PROF GRAFTON: Well, they've directed to me to some documents on their website which talks about, you know, the ecological ways that they can deliver, you know, dealing with constraints and pumping - - -

MR BEASLEY: So their own reports?

PROF GRAFTON: Yes. But that's – that to me is a separate issue. That's an issue of what you can do in terms of delivering water to a particular location – which is relevant, I'm not saying it's not relevant.

MR BEASLEY: To an indicator site.

PROF GRAFTON: Yes. To an indicator site. But that doesn't inform me about how you can determine an environmental sustainable level of take at a Basin scale. And so I don't see the aggregation to the Basin-wide scale. There again it's a scale issue to determine what we would consider to be a sustainable level of take and sustainable outcomes in the Basin. I can't – I can't see that translation. I'm not able to understand that translation.

MR BEASLEY: All right. I wanted to ask you about - - -

THE COMMISSIONER: Were you moving off the topic on page 2 of that submission?

MR BEASLEY: I was.

THE COMMISSIONER: Can I just ask something?

MR BEASLEY: Yes.

THE COMMISSIONER: Professor, on page 2 of that submission, which is here RCE27, you and Professor Williams, I direct your attention to paragraphs (b) and (c). You note at the beginning that the Basin Plan's SDL is, as you say, very similar. 10,873 compare 10,942 with the average long-term historical watercourse diversions.

PROF GRAFTON: Yes.

THE COMMISSIONER: And I think the point you're making is that, in terms of what's noted in section 21 of the Act, yes, that's a reduction, but it's not much.

PROF GRAFTON: Yes. Virtually no reduction, as far as I can tell, compared to the historical levels of diversions.

THE COMMISSIONER: Could you just elaborate for me, so I might get closer to understand what you mean by your parentheses there:

(importantly not including interceptions estimated at 2,735 gigalitres a year).

PROF GRAFTON: Okay. So the number might have been just 2,384, but I would have to check, but the issue there is the creation or the establishment of the base line diversion limit. So, essentially, you get your SDL from your baseline diversion limit. Okay. So you determine your BDL, your baseline diversion limit, which was from 2009, then you determine your environmental goal, okay, in terms of your reductions and diversions and then subtract that off essentially to get your sustainable diversion limit. So when you set your SDL, it's obviously determined by your BDL, your baseline diversion limit.

THE COMMISSIONER: When you say determined by, you mean - - -

PROF GRAFTON: As in how you calculate your baseline diversion limit to help – well, it does determine your sustainable diversion limit. So if you have a high baseline diversion limit for a given reduction, let's say it's 2,750 - - -

THE COMMISSIONER: It's not a baseline diversion limit; it's a baseline diversion.

PROF GRAFTON: Level, yes.

THE COMMISSIONER: It wasn't a limit, that was the problem.

PROF GRAFTON: Well, there was. There was a surface water cap imposed from '95. But yes, so it's – how you calculate that BDL determines what your SDL is, if you've got a – so if you've got a number A and you have got a number which is 2,750, A minus 2,750 determines your – essentially determines your SDL. So if your BDL is calculated in a way that is higher than I would expect it to be then you're going to get a higher than you would expect SDL. That's essentially my reasoning in the context – or our reasoning, I should say, in the context of - - -

THE COMMISSIONER: Doesn't it work the other way? That is, you don't start with a BDL, you start with what an ESLT is?

PROF GRAFTON: Yes. It – it - - -

THE COMMISSIONER: You actually start with, as it were, long-term average flows.

PROF GRAFTON: You should start with what you think is required to meet the requirements of the Act.

THE COMMISSIONER: Yes. And that - - -

PROF GRAFTON: Then that needs to be delivered. Okay.

THE COMMISSIONER: And that, by definition, can't be more than nature provides and also can't be more than the regulation that we are going to maintain of the rivers will provide.

PROF GRAFTON: Yes.

THE COMMISSIONER: Neither of those two observations has any practical effect here, but it is not more than that on any view. But once you've worked out what the environment needs, then the arithmetic that you talked about comes into operation because that gives you a limit of take. That is, you take from the baseline diversion figure that which you have determined ecologically to be necessary without compromising the environment and what is left over constitutes your SDL, doesn't it?

PROF GRAFTON: That's exactly how it should be done, but that's not how it was done.

THE COMMISSIONER: No.

PROF GRAFTON: So exactly, you determine what the flow regime should be. Then that flow regime is maintained. And then the SDL is – the diversions are adjusted to meet the flow regime.

THE COMMISSIONER: That is the SDL says to the world we – because we are all in this together.

PROF GRAFTON: Yes.

THE COMMISSIONER: "We can't take rather than X from this river which we understand to be 3X, because the environment needs 2X." That's the theory, isn't it?

PROF GRAFTON: That's right. So – but the environment is the residual here in the way this is calculated.

THE COMMISSIONER: But I don't – that's not what the Act says.

PROF GRAFTON: Well - - -

THE COMMISSIONER: Doesn't the Act start by saying work out what the environment needs, protect that by imposing an SDL – isn't that how it works – and therefore you must have, as you correctly pointed out, you must have the BDL because otherwise you can't quantify the SDL.

PROF GRAFTON: That's correct.

THE COMMISSIONER: You can conceptualise it, but you won't be able to put a figure to it.

PROF GRAFTON: Yes.

THE COMMISSIONER: If you want to know what's left over, you need to know what is the whole out of which - - -

PROF GRAFTON: That is correct.

THE COMMISSIONER: - - - the environment share is taken

PROF GRAFTON: That's right. Yes. So it really gets down to – so the issue is – so we can argue about whether the 2,750 is sufficient or not sufficient, but the issue is in terms of the calculation of the SDL it's simply the BDL minus the 2,750 equals the SDL.

THE COMMISSIONER: Right. So you have to have the BDL right.

PROF GRAFTON: So you have to get the BDL right. And so the question - - -

THE COMMISSIONER: Now, so what are you saying – what are you saying in (b) about that? That - - -

PROF GRAFTON: Well - - -

THE COMMISSIONER: The interceptions, parentheses, baffled me.

PROF GRAFTON: Yes. So farm – so yes, farm interceptions are – you know, whatever it is over 2,000 gigalitres, so this is a substantial amount of water.

THE COMMISSIONER: By interceptions you mean - - -

PROF GRAFTON: By farmers. Dams, etcetera.

THE COMMISSIONER: Yes. So it's surface water only?

PROF GRAFTON: Correct.

THE COMMISSIONER: Yes.

PROF GRAFTON: So – so that's a large amount of water. So the question is - - -

THE COMMISSIONER: Floodplain harvesting is in that.

PROF GRAFTON: Well, I'm not sure they properly measure that, so - - -

THE COMMISSIONER: I think we're – I think everyone is sure that we haven't been able to properly measure.

PROF GRAFTON: Yes. So whatever that number is, and you would have to ask the Authority how that's calculated, but whatever that number is it clearly is important in terms of whether you consider it in the BDL or whether you don't. And the point we are raising here, in the draft Guide in 2010, when they calculated in their scenarios – they had different scenarios in terms of reductions – it was not included. So - - -

MR BEASLEY: Can I help you on this?

PROF GRAFTON: Yes.

MR BEASLEY: If you go to your paper behind tab 12.

PROF GRAFTON: Yes.

MR BEASLEY: Which is an editorial you've done for the water economics and policy magazine.

PROF GRAFTON: Yes – yes – yes.

MR BEASLEY: And if you go to page, for example, page 14 and the paragraph commencing:

Another reason why water recovery has achieved so little.

PROF GRAFTON: Yes.

MR BEASLEY: You're picking up there the discussion you're having with the Commissioner now - - -

PROF GRAFTON: That's correct, yes.

MR BEASLEY: - - - about proper setting of the BDL.

PROF GRAFTON: Yes. So the question, of course, would need to be asked of the Authority because they made the determinations, not me. But the point I would raise – and that's what we're trying to raise in that submission is that – why, in 2010, it was not accounted for in the context of the calculation of scenarios in terms of diversions and yet in the final Basin Plan and the SDL associated with that, and the Basin Plan, it was added to the BDL? So that's a question that I think needs asking, and I don't have an answer for it. But the point I'm raising here in the submission is that it has a big impact. In fact, I've got some numbers here. I did a quick calculation. So if you use the same process in the draft Guide, okay, which they did not use in the Basin Plan, the SDL would in fact be 8,439. Okay? Whilst in fact in the Basin Plan, it's 10,873. So, I mean, that's a huge difference. So the question I would ask is, you know, did they get it wrong in the draft Guide? And they've revised it and modified it. So - - -

THE COMMISSIONER: You've not seen anything published to explain that?

PROF GRAFTON: No, I – no, I have not.

THE COMMISSIONER: Now, the next one is paragraph – thank you for that.

PROF GRAFTON: Yes.

THE COMMISSIONER: The next one is paragraph (c) on page 2 of the submission. This links up with the reference in the passage Mr Beasley has drawn to attention where you refer to the acquisition of water entitlements that are less than fully utilised collectively, meaning that the actual reduction will be much less, etcetera; is that right?

PROF GRAFTON: That's right. So it's a question of double counting. So the Australian Government has, in its websites, it has the amount of water that has been recovered and it treats that in terms of long-term average yields and it says it's X,

you know, it's approximately 2,100 gigalitres. Now, the point about it is you can't double count water that was never being used in the first place as part of your net contribution to environmental flows.

THE COMMISSIONER: This is – forgive me, I have a red ink note opposite this part of your submission from when I first read it, "obvious" question mark. And I wanted – and by which I wasn't being derogatory of your work, I was questioning for myself whether this was as obvious as I hoped it might be. There's no trap here, is it? It's as simple as saying if a farmer has been using 70 per cent of his or her entitlement, the environment, so to speak, has been enjoying that 30 per cent, and if the government on behalf of the environment acquires, just for ease of argument, the whole of that farmer's entitlement, the net increase in favour of the environment will obviously only be the 70 per cent maximum actual use.

PROF GRAFTON: Yes.

THE COMMISSIONER: The entitlement will be 100 per cent.

PROF GRAFTON: Yes.

THE COMMISSIONER: But the actual increase of water compared with pre-acquisition will just be the 70 per cent.

PROF GRAFTON: Yes, that's essentially what we're saying.

THE COMMISSIONER: It is as obvious as that?

PROF GRAFTON: It's as simple as that. There are complications you could add in terms of where that water is at any point of time, is it in storage, is it in stream flow? And, you know, you can get very complicated, but the simple point as you said, it needs to be accounted for and that's how we have accounted for in terms of our submission and it's certainly not accounted for in terms of the numbers that the Australian Government has. Sorry for interrupting you.

THE COMMISSIONER: No, not at all. No. Thanks.

MR BEASLEY: Over the page, on page 3, you mention your – another issue of concern for you and Professor Williams is the failure to include climate change in the determination of SDLs and you've co-authored or authored a number of papers on matters concerning climate change. I don't need to take you through them in detail, but I just identify them. Behind tab 7 there's an opinion piece published in September 2015, the "Murray-Darling Plan Fails to Deal Adequately with Climate Change" that you've co-authored with Professor Williams and Jamie Pittock. Jamie Pittock – Professor Pittock is another colleague of yours from ANU; correct?

PROF GRAFTON: That's correct, he's at the Australian National University.

MR BEASLEY: And also behind 8 is a paper from Nature Climate Change Perspective.

PROF GRAFTON: Yes.

THE COMMISSIONER: Co-authored by a huge number of other academics.

PROF GRAFTON: Yes.

THE COMMISSIONER: "Global Insight into Water Resources: Climate Change in Governance". Did you – you're mentioned first, did you take the lead in drafting this?

PROF GRAFTON: Yes, I did.

MR BEASLEY: And, behind tab 9, could you tell me how to pronounce the first author's name?

PROF GRAFTON: My Mandarin is not the best. Qiang Jian, he was a former student of mine.

MR BEASLEY: Right. That will do better than me, thank you. "Economic Effects of Climate Change in the Murray-Darling Basin". I take it, though, that over – as we know, the modelling that the Basin Authority has done to achieve – sorry, to determine the amount of SDLs and the amount of water required to be recovered for the environment does not include any climate change projections.

PROF GRAFTON: That's absolutely correct.

MR BEASLEY: And I take it, from – would I be right in assuming from your concern identified in (f) on page 3 of your submission and the work you've done, that I've just taken you through, that climate change projections in Australia are part of the best available science and should have been included in the modelling that the Basin Authority did?

PROF GRAFTON: In my opinion, yes, it should have been.

THE COMMISSIONER: How do you – can you just sketch for me, Professor, how you do that; how you would do that?

PROF GRAFTON: Well, I mean the draft - - -

THE COMMISSIONER: That's not a challenge.

PROF GRAFTON: No, the draft Guide 2010 had an allowance of three per cent associated with climate change.

THE COMMISSIONER: Now, that's arbitrary but perhaps none the worse for that. What's the reasoning by what you've called an allowance of three per cent?

PROF GRAFTON: Well, it's the idea that the inflows into the Basin, you know, whatever it is, 30,000-odd gigalitres a year coming into the Basin, that if that declines then there needs to be a commensurate decline in the levels of diversions because if you maintain the same level of diversions for the same level of inflows - - -

THE COMMISSIONER: Climate change is entirely at the risk of the residual environment.

PROF GRAFTON: That's exactly right. So we don't know the impact of climate change for sure. We know it's going to have an impact, but we don't know the precise impact and the precise location at a particular point in time. So the best you can do is really do an allowance that's associated with it.

THE COMMISSIONER: So why do you make an allowance up front by three per cent adjustment rather than devise what might be called the hand in hand reduction that may come with a drying Basin of the SDL and the environmental water?

PROF GRAFTON: Yes. I mean that's a good point, Commissioner. So that's what was done in the draft Guide, but an alternative would be to – rather than treat the flows in the streams and the rivers and the end of the Basin as the residual, you would say, "Well, that – we need to achieve, whatever that flow regime is, and we achieve it come hell or high water." Whether – you know, obviously it would vary according to whether there's a drought or not a drought, because there was natural variation anyway, even before we had irrigation in the Basin, but you would have whatever that regime is, and that would be what you manage for, and then if there were to be climate change, then the impact would therefore be on the diversions not on the flows. Okay? So that would be, if I were managing that, that's how I would do it. I would start at the objective first, achieve the objective, and then manage with the controls.

THE COMMISSIONER: What, if anything, is wrong then with an approach that says, "Look, an SDL operates by locally administered periodic enjoyment of a proportion, rarely 100 per cent, of nominal entitlement." And that institutional response to Australian climate variability in the Basin is enough over, say, the decade time scale of the Plan, to accommodate such drying as, if at all perceptible as such, might be attributable over that relatively short period to climate change. I do understand what I have just put to you is what the Authority has said in the Basin Plan is its response to the risk of climate change, which is required by the Act to be addressed by them.

And it may be I'm – I've been guilty of excessive deprecation of the brevity bordering on glibness of that approach, but I am really quite interested in an opposite view which would say, "Well, no, actually that's about as intelligent as you can

devise as an approach over a relatively short-term approach such as a 10 year plan." So what do you think about that?

PROF GRAFTON: Well, I would disagree, because it's about risk. Okay? So the reason we have undertaken these Basin Plan, the water recoveries to date and indeed why the Water Act was implemented in 2007, my understanding is about, you know, obviously wise use, sustainable use in terms of water and landscape in the context of the Murray-Darling Basin. So that means that there are a series of risks. One important risk is, of course, diversions and that's why we're reducing the level of diversions associated with the Basin Plan and of course – hence water recovery. But there are other risks as well and one of them is climate change.

So if you want to achieve a particular outcome which is a sustainable Basin and its resources and its communities, then you would need to account for all those risks. Now, the biggest risk is diversions, no question about that, and indeed the Nature climate change paper makes that clear, it's the diversions that are the biggest risk, so no question about that. But climate change is still a risk.

THE COMMISSIONER: I think your co-author told me about a rule of thumb of two-thirds.

PROF GRAFTON: Two-thirds, yes, in terms of natural – ensuring natural flows.

THE COMMISSIONER: So we're right on that cusp, aren't we?

PROF GRAFTON: We're right on that cusp, yes. And, of course, in some years it's more than that. We're taking – we're taking more than two-thirds. So we are not even getting to the 60 per cent of natural flows. So – so that's what I'm, I mean that's – if you were – to me, if I were implementing the Act, I would say, "What are these risks? The causal risk, here's the risk, how are we managing and mitigating those risks?" And the way we have done it in the context of the current Basin Plan we have decided that this risk is zero, because we have not managed for it and treated it as zero. Now that is not the way to manage risk.

THE COMMISSIONER: I'm sure that's right. I'm wondering whether we have been fair in proposing that they have – assessed it as zero, when what they have explained is such drying – and this is my words, not theirs, I hope I'm not misrepresenting them – such drying as may occur on account of climate change, assuming one could so identify it, over the period of the plan, can and should be dealt with by the ordinary, well-understood Australian institutional response to less water being available than people may desire, namely everyone suffers a cut in allocations.

PROF GRAFTON: But that's patently false, because the way the determinations of the allocations are done is that it goes to the entitlements. So you get a – there's only so much water in storage, if there's a drought for example, climate change induced or otherwise, and that that determines the allocations for the entitlements. But there's a

residual, okay, which is – you know, the flows. Okay? So that's not being accounted for.

THE COMMISSIONER: No. I understand. I do – thank you, I do understand.

PROF GRAFTON: Yes. So that's – so I would say that it's not managing the risk of climate change. So that would be my view and saying that they had got an historical record that includes droughts which it certainly does, the Millennium Drought, the federation drought, etcetera, that is insufficient because that assumes that whatever those – that 100-odd year period is, that that would continue within those variations. Now, climate change and indeed the projections from CSIRO – and we don't know what will happen, but they have multiple projections, suggest that will not continue. It would actually be different, and there would appear to be a drying trend in the southern part of the Basin, but we don't know what it would be. I don't know what it would be.

The point is that there is clearly a risk. There's no question there's a risk. That risk should be incorporated in the management in the context of the Basin Plan. That would be my point. I think that's the point – I don't want to speak for my co-authors, but I think that's the point we were trying to make in the paper: it needs to be accounted for in a real sense, and the way that it can only be accounted for in a real sense, in the context of the current Basin Plan, is in relationship to the SDLs. And that has not happened.

THE COMMISSIONER: So do you actually endorse a 3 per cent allowance? As – that is here and now 3 per cent allowance as an appropriate risk mitigation?

PROF GRAFTON: Look 3 per cent would be better than zero. At least in the sense of a 3 per cent, I don't know how that was – I don't know how that was - - -

THE COMMISSIONER: You don't sort of bank this water against long-term climate change, do you?

PROF GRAFTON: Yes. I – look, I would do it differently than that, but - - -

THE COMMISSIONER: How would you do it?

PROF GRAFTON: Well, as I said, I think it's back to front. I think the way to do this, to achieve the Water Act, is to ensure given levels of flows, okay, in the streams and at different locations and ensure that as what needs to be achieved. Okay? And then the adjustments occur in the level of diversions. So that seems to me the approach that I would be arguing for, whilst what we actually have is something different to that. Although their claim is that, what we actually have is different. So what we have is an SDL, okay, which has been adjusted from the previous average levels of extractions, to a water recovery process where the claim is it will be equivalent to 2,750 gigalitres a year which would then – the claim would be equivalent to an increased environmental or stream flows of 2,750. But that's not

true. For reasons we outline in the submission, it's not 2,750. It's not anything close to 2,750.

THE COMMISSIONER: These figures may in fact all just be nominal or conventional. That is they're a starting point to then a working out - - -

PROF GRAFTON: Yes.

THE COMMISSIONER: - - - at particular times of what it actually translates to both hydrologically and, as I was taught yesterday, hydraulically as well.

PROF GRAFTON: Yes.

THE COMMISSIONER: So I think we may agree that not too much weight should be given to what I might call the literalness of the figure 2,750?

PROF GRAFTON: Yes.

THE COMMISSIONER: Which is one of the reasons why, I take it, that in principle you would embrace, rather than reject, the notion of adjustment, up or down, because that is a, basically, scientific response: better information, better analysis, changed circumstances, to misquote John Maynard Keynes, "when the facts change, I change my mind, what do you do?." That, I take it, is your response?

PROF GRAFTON: It would be. And, indeed, to go back to the Water Act and the Basin Plan, so in there is an objective about that the Murray Mouth would be kept open without dredging 95 per cent of the time. So that's a flow objective, so to speak, but that's an objective that won't be achieved.

THE COMMISSIONER: Well, I think it's almost the opposite, isn't it? 95 per cent of the time... 100 per cent of time it is dredged.

PROF GRAFTON: That's right. So if that's an objective – and I think it's a key objective. It's not the only important objective. But that's a key objective. Then you want to have a Basin Plan and a method of delivering on that that actually delivers that.

THE COMMISSIONER: By the way – and I don't want to spend too much time on this. It may be outside your field of expertise. I'm not sure. The employment of dredges, surely that's a kind of a proxy for all sorts of things that are happening upstream?

PROF GRAFTON: It's outside of my expertise, Commissioner, but certainly there's a whole set of literature that you can consult experts here in Adelaide, but who can give you - - -

THE COMMISSIONER: We have.

PROF GRAFTON: - - - the details of what that means, but, obviously, you know, removal of salts, sufficient flows for fish, for bird breeding, all those sorts of things. And I think it has now become cliché, but it actually is true. You know, a river does die from its mouth, in the sense that you get the biggest impact at the end of the system. So there's a whole series of things you would want to consider. But I'm not the ecologist. That needs to be responded to by someone who is expert in that area.

THE COMMISSIONER: I'm not sure that everyone on the Lower Darling would agree that a river dies from its Mouth.

PROF GRAFTON: Yes. Yes. Yes. The confluence of the two rivers and upstream of that – yes, that's correct.

MR BEASLEY: Page 4 of your submission, you talk about 36 supply measure projects. I just wanted to ask you to explain what you mean by effective water accounting. You've said at 6(a):

> *As discussed, the detail... critical to increasing net water availability and delivering the key objects is the need to have full and transparent watering accounting in the Basin.*

And then you go on to quote an independent review panel from November '17:

> *Implementing SDLS requires effective water accounting.*

Is that, looking at 9(a), which you also direct the reader to - - -

PROF GRAFTON: Yes.

THE COMMISSIONER: Is that similar to – is by "effective water accounting" – are you talking something similar to the discussion we had about the recommendations in the first submission I took you to, recommendations 1 and 3 - - -

PROF GRAFTON: Yes.

MR BEASLEY: - - - about a proper audit and a proper - - -

PROF GRAFTON: That's right. So, to be clear, there's two sets of audits that would be collectively done. One is who got the money, what did they get, what did they deliver for. And that's a financial-type audit. But that financial-type audit can't be done without a water audit, which is actually what were the outcomes in the context of return flows and applications, consumption, etcetera. So they both so to be done conjunctively to be able to get the appropriate information. And so the point that we're making, Professor Williams and myself, in 6(b) is to simply say, "If you don't have the appropriate water accounting", which we don't have – we don't have it. I mean, that's what the independent review panel is saying. And I agree with them – then how can you make a reduction – okay – in the amount of water - - -

MR BEASLEY: Just to be clear - - -

PROF GRAFTON: Yes.

MR BEASLEY: - - - this is the independent review panel that actually looked at the Basin Authority's own response to allegations of water theft, I think.

PROF GRAFTON: That is correct, yes.

MR BEASLEY: Yes. Compliance issues. Sorry.

PROF GRAFTON: That's correct.

MR BEASLEY: Yes. All right. Sorry. Go ahead.

PROF GRAFTON: Yes. So, again, it gets back to this issue of risk. Okay. So if you're flying an aeroplane without knowing the velocity of the plane, you're flying in a very difficult, highly risky situation. You can make some adjustments, well, you know, I can see the birds going this way and whatever. But, you know, that's not how you fly an aeroplane. And, in the context of the Murray-Darling Basin, you can't make adjustments and you should not make adjustments to the overall SDLs unless you actually have appropriate information to know what's actually happening when you actually make a change. And we don't have that information. And so it's, therefore, high risk. And that's what we're highlighting. It's high risk.

And until and unless you actually have that water auditing and done at an appropriate scale and done in a comprehensive way, you shouldn't be making any changes, least not a reduction in terms of the amount of flows for – environmental flows. That doesn't make any sense. It's just adding to the risk of not delivering the Water Act 2007.

MR BEASLEY: Commissioner, I want to finish with the issue of return flows, which might take 20 to 30 minutes. I just want to raise this logistical issue. It's nearly 1 o'clock. Professor Grafton has got to catch a plane at 3.15. There's no danger in relation to that. But the staff have to be back at the office by - - -

THE COMMISSIONER: 3 o'clock Skype. Yes. Yes.

MR BEASLEY: - - - 2, I think, so that we can set up for the Skype hearing this afternoon. So if we took the lunch break now, would it be the most convenient thing to conclude Professor Grafton's evidence back at the office?

THE COMMISSIONER: I see, from 2 o'clock onwards.

MR BEASLEY: From 2 o'clock onwards.

THE COMMISSIONER: What time do you need to - - -

MR BEASLEY: Not till 3.15. And I will be finished by - - -

THE COMMISSIONER: No. No. No.

MR BEASLEY: Subject to your own questioning.

THE COMMISSIONER: No. What time - - -

MR BEASLEY: He leaves at 3.15. Yes. So that's not a problem.

THE COMMISSIONER: If the Professor leaves Grenfell Street at 3.15 - - -

MR BEASLEY: He will leave before that.

THE COMMISSIONER: - - - he will make the aeroplane.

MR BEASLEY: Yes, but he will leave before then.

THE COMMISSIONER: His velocity, by the way, will be able to be detected.

MR BEASLEY: He will leave before that. But in terms of what we do - - -

THE COMMISSIONER: No. I understand.

MR BEASLEY: - - - to finish his evidence, it might be the easiest thing to finish – because if we break now until 2 o'clock - - -

THE COMMISSIONER: Yes.

MR BEASLEY: - - - and continue the evidence here, the staff haven't got time to get everything back. Yes.

THE COMMISSIONER: No. I understand. So what you're proposing is that we adjourn now - - -

MR BEASLEY: Yes.

THE COMMISSIONER: - - - to resume at the - - -

MR BEASLEY: At 2 back at the office.

THE COMMISSIONER: - - - Commission's offices at - - -

MR BEASLEY: That's right.

THE COMMISSIONER: - - - 50 Grenfell Street at 2 pm - - -

MR BEASLEY: Yes.

THE COMMISSIONER: - - - with Professor Grafton.

MR BEASLEY: Yes.

THE COMMISSIONER: So the three or four hours left of my interrogation and your 20 minutes.

MR BEASLEY: Yes. I will cut it down if you're going to be three or four hours.

THE COMMISSIONER: I will cut mine down, as well. And so that what time do I have to have - - -

MR BEASLEY: I think that makes it – we've been going a long time.

THE COMMISSIONER: That's right. No. What time do I have to bear in mind that Professor Grafton has to leave our premises?

MR BEASLEY: He has to leave by 3.15.

THE COMMISSIONER: Thank you. And the Skype is scheduled for - - -

MR BEASLEY: I might have to cut you off if - - -

THE COMMISSIONER: That's right.

MR BEASLEY: We have two other witnesses at 3 o'clock.

THE COMMISSIONER: I understand. No. That's all right.

MR BEASLEY: So – yes.

THE COMMISSIONER: Professor, I'm sorry about that jumble. Does that make sense to you? We will adjourn from here now.

PROF GRAFTON: Yes.

THE COMMISSIONER: And the Commission's premises are at 50 Grenfell Street on level 9. And we will - - -

MR BEASLEY: Someone will take the Professor - - -

THE COMMISSIONER: And we will resume there at 2 pm.

PROF GRAFTON: Yes.

THE COMMISSIONER: If there's anything that you want taken there that you don't want to schlep around over lunchtime, I'm sure somebody here will help you.

PROF GRAFTON: Okay.

THE COMMISSIONER: Thank you very much.

PROF GRAFTON: Thank you.

MR BEASLEY: All right.

THE COMMISSIONER: See you at 2.

MR BEASLEY: So 2 o'clock at the office.

THE COMMISSIONER: Thanks.

MR BEASLEY: All right. Thanks.

ADJOURNED **[1.00 pm]**

RESUMED **[2.02 pm]**

MR BEASLEY: So if you just grab your submission.

PROF GRAFTON: Yes.

MR BEASLEY: The submission with Professor Williams, thanks, Professor Grafton.

PROF GRAFTON: Yes.

MR BEASLEY: And page 8.

PROF GRAFTON: Page 8. Yes.

MR BEASLEY: Yes. So that's where you direct us to the matters you want to say in your submission concerning return flows.

PROF GRAFTON: Yes.

MR BEASLEY: You refer to a number of papers. You've also written extensively on this topic. Just go to a couple of those papers and other submissions you've

prepared, behind tab 4 is first of all a submission to the House Standing Committee on Agricultural Water Resources, 20 March 2017.

PROF GRAFTON: Yes.

MR BEASLEY: That you did jointly with Professor Williams. That has become RCE34. I'm not sure, I just want to know whether in my volume at the end of that seven page submission, there's another submission just by you, which looks like a submission in reply to evidence given by Mr Murray.

PROF GRAFTON: That's correct.

MR BEASLEY: The Standing Committee on Agricultural Water Resources 21 April 2017.

PROF GRAFTON: Yes.

MR BEASLEY: And here, you've got a simple diagram explaining, I think in basic terms, the concept of return flows at the bottom of the page there.

THE COMMISSIONER: Sorry, which page?

MR BEASLEY: If you're at tab 4 – I'm sorry, there's a seven page submission.

THE COMMISSIONER: Yes.

MR BEASLEY: I didn't want to go to that, but there's a second submission behind it, but in the same tab. So that's – the concept of return flows is shown through a farmer, for example, having 100 megalitre licence with applying 60 megalitres to his crop, 10 evaporates, 10 flows off into the watercourse, 20 goes into the groundwater leaving a return of 30 megalitres to the streams and groundwater. And then an efficiency measure is put in place, the farmer sells 15 megalitres of water to the Commonwealth and gets some sort of, it might be drip irrigation or whatever it is.

PROF GRAFTON: Yes.

MR BEASLEY: He now applies 80 to the plants of the 85 he's got left. Five are lost in evaporation, but none go into the water courses and none go back into the groundwater because the increased efficiency meaning only 15, meaning a net loss of 15 megalitres for environmental flows.

PROF GRAFTON: Yes, that's correct. So it was an illustrative example.

MR BEASLEY: Simplistic discussion.

PROF GRAFTON: Yes.

MR BEASLEY: It's more complex and I will come to that. Also - - -

THE COMMISSIONER: So why, in that after thing – the streams and groundwater have 30 minus 15?

PROF GRAFTON: Because 50 per cent of the savings is allocated back to the Commonwealth in the context of the water entitlements.

THE COMMISSIONER: That's the 15.

PROF GRAFTON: That's the 15 yes.

THE COMMISSIONER: On the middle left that says 100 minus 15 is 75. So the 15 is sold, Mr Beasley said, but the efficiency is such there are no return flows.

PROF GRAFTON: Yes.

THE COMMISSIONER: So why shouldn't that read zero minus 15 equals minus 15?

MR BEASLEY: Isn't the 30 a reference to the 30 megalitres that have gone into streams and groundwater?

THE COMMISSIONER: No. That formerly went into streams and groundwater.

PROF GRAFTON: Yes.

MR BEASLEY: Yes. In the before.

THE COMMISSIONER: But now won't.

PROF GRAFTON: That's right. So the – so although there's no return flows in the after case, the farmer has allocated 15 of the previous volume to the Commonwealth in the form of entitlements, which the Commonwealth can then use for flows. So the net impact is in fact – as you say, it's minus 15.

THE COMMISSIONER: I understand. Thanks.

PROF GRAFTON: Yes. Yes, that's right.

MR BEASLEY: Behind tab 10 is a paper of 'How to Increase the Cost Effectiveness of Water Reform and Environmental Flows in the Murray-Darling Basin.' There's not – there is some ..... return flows are dealt with a little bit in this, but I note also on page 29 of this paper there's a discussion about the cost effectiveness of water buybacks in contrast to an efficiency measure or infrastructure subsidy you've called, and some of the benefits we discussed about buyback as distinct from water efficiency, and you say there:

Water efficiency improvements may also have a rebound effect in, in effecting reduced return flows, and economically disadvantaged irrigators and irrigation districts at their own expense have already installed efficient irrigation systems.

Behind tab 12 - - -

PROF GRAFTON: Yes.

MR BEASLEY: - - - is an editorial you've written for Water Economics and Policy, and this paper deals extensively, I think, with the issue that we're discussing about return flows, in particular at page – let me find it – yes, page 10. On this page you're discussing, first of all, the significant greater cost of an efficiency measure being a buyback. And then commencing at paragraph:

The challenge in terms of effectiveness of water recovery is it's highly likely that water saved from infrastructure subsidies will, at least in part, run counter to supply measures because they will reduce return flows.

PROF GRAFTON: Yes.

MR BEASLEY: And you quote papers by – how could I say that .....

PROF GRAFTON: ..... yes.

MR BEASLEY: ..... Dr Adamson and Dr Loch are giving evidence next week, I think.

PROF GRAFTON: Yes.

MR BEASLEY: Now, before I go, that prompted a response – this editorial prompted a response from the Australian Government - - -

PROF GRAFTON: That is correct.

MR BEASLEY: - - - to the editor of this particular publication, Water Economics and Policy, and that response is at tab 13.

PROF GRAFTON: Tab 13, yes.

MR BEASLEY: Somehow this has already been tendered, RCE32.

THE COMMISSIONER: RCE32.

MR BEASLEY: Yes. I don't remember reading it until this morning, but anyway, it has been tendered. Now, I think it's fair to say that nothing in this letter outside of an assertion gets to the level of challenging the theory behind return flow.

PROF GRAFTON: Not at all.

MR BEASLEY: I mean, it says the Basin Plan is on track, whatever that means, and delivering results.

THE COMMISSIONER: Well it's a political slogan. I don't want to spend too much time on this, because I wasn't aware the Australian Government through Mr Maurice was engaged in science or economics.

MR BEASLEY: .....

THE COMMISSIONER: I will hold my tongue on that. But I did want to inquire from you, Professor, has there been, apart from this, in my view, rather unseemly correspondence – has there been any substantiated economic or scientific response to the matters you raise ..... editorial from anyone at the Authority?

PROF GRAFTON: No.

MR BEASLEY: You have spoken to them, though .....

PROF GRAFTON: Yes, I've spoken to them. And, in fact, in terms of this editorial, I sent the paper to Phillip Glyde, the CEO, and informed him that a media release is coming out, which is not untypical when I have a publication. I will have a media release with it. So I sent him that information ahead of time. And so he was well aware of it. And I sent him a copy of the page. And I subsequently had discussions with Phillip Glyde and others at the Authority going through in detail about return flows. So I can tell you what they said to me. But, in my view, they haven't given me a response that deals with the issues that we raised.

MR BEASLEY: Can we just stop there. I mean, the concept of return irrigation efficiency measures and returns flow isn't a concept that has come up in the last couple of years. This has been the subject of peer reviewed scientific articles for many, many years, perhaps decades. Would I be right? Back in the 90s or - - -

PROF GRAFTON: Correct. These issues ..... fact were raised in the United States. The earliest date I can point to is 1964. The US Supreme Court had an instruction in the context of the calculation of water consumption to account for return flows. So that's, you know, 50 plus years ago. There was work done in the 1970s, but I think the work that you could point to the most would be in the 1990s, 1992, 1993, 1994. And there has been work done since that point and I've been one of the contributors to some work. And, indeed, we have a paper coming out in the journal Science in the next two to three weeks exactly on this issue of irrigation efficiency related to, not just return flows, but how you undertake proper water accounting and the sorts of things that you need to do to be able to get good outcomes associated with policy objectives.

MR BEASLEY: And can you remind me, because I don't have the paper in front of me, but there was recently a United Nations publication by the food and - - -

PROF GRAFTON: Food and Agricultural Organisation, correct.

MR BEASLEY: Which covered a large range of countries - - -

PROF GRAFTON: Yes.

MR BEASLEY: - - - that have installed – have had programs of irrigation efficiencies of one type or another with a consistent opinion expressed that return flow is real and is something that needs to be accounted for if you're going to accurately measure whether water is actually being saved or whether you're actually costing water, if I can put it that way. Correct?

PROF GRAFTON: Absolutely. So - - -

MR BEASLEY: And there was a chapter – sorry, not a chapter, a section of that particular report I'm referring to dealing with Australia in a draft that was removed, at the request of the Australian Government officials, I think.

PROF GRAFTON: That's my understanding, yes.

MR BEASLEY: But – and did you ever see that draft?

PROF GRAFTON: Yes. Yes, I have a copy of it myself.

MR BEASLEY: And it outlined, from memory, the concern that these efficiency measures may not be recovering the amounts of water that they're said to be because of – primarily because of the issue of return flow.

PROF GRAFTON: That's correct. So the issue that was highlighted in the context of Australia was water accounting, or the lack of comprehensive water accounting, so the point they were raising is you can't treat return flows as zero, you actually have to measure them, and only by measuring it can you determine whether in fact you have had an increase or decrease in stream flows.

THE COMMISSIONER: Am I correct, Professor, that this to and fro doesn't a dispute as to the conceptual plausibility of the phenomenon of return of water being differentially affected pre and post efficiency measure but, rather, has those, with your view pointing out there has not been an accounting, probably because there hasn't been any measurement. Is that right?

PROF GRAFTON: That's correct.

THE COMMISSIONER: Or, to put it another way, such modelling as might take place doesn't seem to have occurred, and that may be explained by a lack of an empirical basis for acceptably realistic assumptions. Is that right?

PROF GRAFTON: Yes. And I would add to that the response that I received from the Authority and also from the Department of Agriculture and Water Resources when I discussed it with people is that the view is, and I'm paraphrasing ..... return flows are negligible. And if there are return flows, they're dirty water, highly saline, and they're .....

THE COMMISSIONER: Those are two quite separate - - -

PROF GRAFTON: They're quite separate issues.

THE COMMISSIONER: Quite separate propositions.

PROF GRAFTON: They're absolutely separate propositions, but .....

THE COMMISSIONER: But it may not be entirely worthy for somebody arguing something in the absence of data to raise them both. That can be a meant by me. And as to the - - -

MR BEASLEY: .....

THE COMMISSIONER: That's right. As to the former, negligible - - -

PROF GRAFTON: They don't. They don't. They – no. The only information that I've ever received from the Murray-Darling Basin Authority are measurements of return flows at an irrigation level, in terms of what has happened as you've – you know, changes over time, there's a report that was done by URS, 2010, which was for just two years and it was a consultant's report which actually had some numbers wrong in terms of its – it got megalitres and gigalitres confused in a few places. So that's the only report that I've ever seen and that's the only report that the Murray-Darling Basin Authority has given me on return flows.

I have actually requested information some years ago from the Department of Environment about what has happened in terms of these water efficiency subsidies and grants for water infrastructure, as in what has been the impact on the flow regime. And there has been no information provided to me. So that's the best I've got, was this report that was on the website of Murray-Darling Basin Authority November 2017. And it was a 2010 consultant's report. So that's all I've got from the Australian Government in terms of my request to get information.

THE COMMISSIONER: Well, am I right in understanding that one of the justifications or purposes of so-called efficiency measures on the farm, as well as off-farm, but I'm just concentrating on on-farm at the moment, is to avoid what some people sometimes have called the waste of more water than the crop needs or that,

including in light of expected evaporation, so that, as it were, it runs away back into the stream? That's return water, isn't it?

PROF GRAFTON: That's correct. That's stream flows. And - - -

THE COMMISSIONER: As I understand it, some people have justified or sought to devise efficiency measures quite overtly in order to reduce the amount of that so-called waste otherwise known as return water. Am I right?

PROF GRAFTON: It's possible, because I don't know the details of what the - - -

THE COMMISSIONER: The idea being that thereby you would reduce the amount of water that that farmer needs for the same agricultural input.

PROF GRAFTON: That's correct. So the justification – so this is not me. This is the justification for these water use efficiency projects and infrastructure – is that the farmer will increase the – the amount of water that's being diverted is going to be increased in the context of transpiration. It goes into crop yield, etcetera. And the idea is, in the best of all possible worlds, is that you would reduce non-beneficial consumption.

THE COMMISSIONER: When you say non-beneficial, we mean consumption that doesn't produce the agricultural product.

PROF GRAFTON: Correct. Yes. So evaporation.

THE COMMISSIONER: To call it non-beneficial, really, is entirely tendentious, is it not?

PROF GRAFTON: It can be, because some evaporation is useful, as well, in the context of - - -

THE COMMISSIONER: But it may be beneficial for there to be groundwater movement.

PROF GRAFTON: Well, that's – so that would be – that would not be consumed water. So the surface flows and the deep water drainage, that would be non-consumed water.

THE COMMISSIONER: Yes.

PROF GRAFTON: And that - - -

THE COMMISSIONER: That's return water.

PROF GRAFTON: And that's exactly right, Commissioner. That's the return flows.

THE COMMISSIONER: So the very purpose of the measure is to reduce them - - -

PROF GRAFTON: I believe that - - -

THE COMMISSIONER: - - - in the case that you've just illustrated.

PROF GRAFTON: I believe the purpose in the context of the Australian Government was to increase water use efficiency, as they describe it – it's actually irrigation efficiency is the term that's the international - - -

THE COMMISSIONER: Quite.

PROF GRAFTON: - - - scientific term is irrigation ..... but the purpose of it was to increase irrigation efficiency so that they would get these water savings, which would then be paid back.

THE COMMISSIONER: Yes. I understand that. What I'm saying is the - - -

PROF GRAFTON: Yes.

THE COMMISSIONER: - - - irrigation efficiency itself seems to include, perhaps even largely to constitute, a reduction in the amount of the irrigation of water not used consumptively, that is - - -

PROF GRAFTON: Correct.

THE COMMISSIONER: - - - for the growing of the plant with the unavoidable evaporation.

PROF GRAFTON: That's – that's correct, Commissioner.

THE COMMISSIONER: Doesn't that mean by definition, if it's working as devised, a paradigm efficiency measure, that is, irrigation efficiency measure, will reduce so-called return water?

PROF GRAFTON: It's likely to.

THE COMMISSIONER: Indeed, it seems devised in order to achieve that.

PROF GRAFTON: Well, the thing is there are five components. So there's the beneficial water consumes, non-beneficial consumption – that's the growing weed. Okay? And a non-beneficial consumption in the context of let's say evaporation. Then you have the return flows, which would be recovered and non-recovered. You know, so - - -

THE COMMISSIONER: So if they're non-recovered, they're going back so to speak to the environment.

PROF GRAFTON: Non-recovered is – that means they're, basically, lost to the catchment or basin ..... let's say they go into, you know, some sort of saline area.

THE COMMISSIONER: They might, but they might also go back to the stream.

PROF GRAFTON: Correct. So - - -

THE COMMISSIONER: And you won't know that unless you study the locations. Is that right?

PROF GRAFTON: Exactly. But there's a huge amount of data out there in the international literature showing that as you increase irrigation efficiency you actually do get reductions in return flows.

THE COMMISSIONER: Very well. I want to draw to your attention the second paragraph of - - -

PROF GRAFTON: Yes.

THE COMMISSIONER: - - - Mr Maurice' letter.

PROF GRAFTON: Yes.

THE COMMISSIONER: It says to this American editor - - -

PROF GRAFTON: Yes.

THE COMMISSIONER: - - - that:

> *The Australian Government Department of Agriculture and Water Resources is responsible for implementing the Australian Government's rule of policy reform agenda.*

And you may take it that I don't find any problem with that sentence. The next sentence I would like your help on:

> *This includes administering programs to return water to the environment by upgrading irrigation infrastructure in the Murray-Darling Basin.*

Now, I may have missed some important publications by the Australian Government, but isn't that the responsibility cooperatively of the Murray-Darling Basin Authority and the Basin states, that is, emphatically not the Commonwealth Government?

PROF GRAFTON: I mean, it's certainly a shared responsibility. I suppose, if I'm interpreting the letter, my understanding – I mean, obviously, you would have to speak to Paul Maurice, but my interpretation is because the Australian Government is providing the funds for water recovery - - -

THE COMMISSIONER: Well, no. In which case Mr Maurice's English is deficient, because - - -

PROF GRAFTON: Yes.

THE COMMISSIONER: - - - administering programs is distinctly different from funding programs.

PROF GRAFTON: Yes. Yes. Well, that would – yes.

THE COMMISSIONER: And then the federation – that distinction is real.

PROF GRAFTON: Yes. Well, I'm being generous. I just – yes.

THE COMMISSIONER: Well, don't be.

PROF GRAFTON: Okay.

THE COMMISSIONER: I'm asking you to just give your best evidence. What I'm suggesting is that this was a misleading statement to be made to a foreign editor about a Federal arrangement in which there is a supposedly independent subjective ministerial direction authority to administer the program at a Commonwealth level. Now, having got that off my chest, if that were a correct second paragraph, then this is the very source of information concerning real data, primary data and quantitative analysis, to pick up a phrase from his third paragraph in his criticism of you, concerning return water, among all the other things covered in the editorial.

PROF GRAFTON: Yes.

THE COMMISSIONER: Have you ever seen any publication of the Australian Government which provides primary data or quantitative analysis of, among other things, the return water issue raised in your editorial?

PROF GRAFTON: No, with the exception of the consultant report that was done in 2010. And that only looked at end of drainage flows and some irrigation locations. That's the only thing that I've ever seen.

THE COMMISSIONER: Well now, in the fifth paragraph commencing with the enticing phrase "contrary to Professor Grafton's claim", Mr Maurice – assuming he is the author, Mr Maurice, in answer to your proposition that he summarises as being there is little to show for the government's investment, talks about 700 gigalitres or more of environmental water entitlement having been sourced. Have you ever seen anywhere emanating from the Australian Government – not from the Authority, the government, have you ever seen anything showing what, if any, improved environmental outcomes can be related to what is described there as over 700 gigalitres of environmental water entitlement?

PROF GRAFTON: Yes. So what I believe Mr Maurice is referring to is the 703 gigalitres in terms of water entitlements held by the Commonwealth Environment Water Holder.

THE COMMISSIONER: Yes. That's right.

PROF GRAFTON: Which were acquired through these – through all this infrastructure type programs. That's what he is referring to.

THE COMMISSIONER: Yes.

PROF GRAFTON: Which, of course, does not account for return flows. So - - -

THE COMMISSIONER: But what about – I've asked questions about the environmental, improved environmental outcomes as a result of those 700 gigalitres of entitlement having been obtained from the program. It's one thing to get a so-called entitlement.

PROF GRAFTON: Yes.

THE COMMISSIONER: The object of the Act and the Plan is to achieve environmental improvements.

PROF GRAFTON: Yes.

THE COMMISSIONER: Have you ever seen any Australian Government research or publication about it?

PROF GRAFTON: Well, the material that I would refer to in terms of connecting the water entitlements held by the Commonwealth Environment Water Holder and environmental outcomes, comes from, I think, the Commonwealth Environment Water Holder. I believe that they have some evidence in terms of where particular icon sites or sites that they've done watering, which they purport to generate some environmental benefit. So I think – I mean, obviously you need to consult with them, but I believe there are some documents that relate to releases from the Commonwealth Environmental Water Holder to environmental outcomes. I don't think it necessarily relates to the 705 gigalitres but there are some – I believe there is some discussion on that, out there.

THE COMMISSIONER: Well, as at May 2017 - - -

PROF GRAFTON: Yes.

THE COMMISSIONER: - - - it was still a question of looking forward to the reporting that would ensue from July 2019; isn't that right?

PROF GRAFTON: Certainly, from the - - -

THE COMMISSIONER: Mr Glyde has been quoted as saying one needs to be patient.

PROF GRAFTON: Well, you know, we can be patient until we drop dead but the point I've raised, and it's – and related to this work, is that – you know, the – the Australian Government claims now to have over 2,100 gigalitres of water for the environment through the water entitlements held by the Commonwealth Environment Water Holder. The fact is most of that water was acquired by 2015. So I think they've acquired about 250 in the last two years, or something like that, so in essence they've got all the water they're going to get because of the SDL adjustments in the Northern Basin Review and they have had most of that water – 90 per cent of that water, approximately – since 2015.

Yet in 2018 we are getting a whole set of issues and measurements on the environmental Basin scale indicating that it's not delivering the sort of things we would expect it to deliver, and I don't believe it will deliver for the reasons I've outlined in the submission because the 2,750 is a phantom number. It's – nothing close to that will be delivered in terms of increased stream flows.

THE COMMISSIONER: Well, then should I understand correctly that if I'm concerned with material for the best available science, you're not aware of anything of that nature that is being presented by this bureaucrat's letter of 19 May?

PROF GRAFTON: Certainly not in his letter. And he doesn't refer to any of that information, not at all.

THE COMMISSIONER: Well, that's what is remarkable. There's a criticism about little being provided by you in an editorial, the very name of which I would have thought indicated its nature, in the way of primary data or quantitative analysis and yet this letter, if I may say so, even more obviously doesn't do so.

PROF GRAFTON: That is correct. There's nothing in there that I cannot refute.

THE COMMISSIONER: Now, have I gathered correctly from some correspondence that you are an acquaintance of Mr Maurice?

PROF GRAFTON: I do know Mr Maurice, yes. So - - -

THE COMMISSIONER: And do you know enough about him to know what his professional or educational qualifications are?

PROF GRAFTON: My understanding is he does not have a PhD, but I – that – so he is not Dr Maurice, but beyond that - - -

THE COMMISSIONER: So that divides the world into two, yes.

PROF GRAFTON: So beyond that I wouldn't like to comment what his qualifications are, because I do not know.

THE COMMISSIONER: He may just be a lawyer.

PROF GRAFTON: I do not know. I've always assumed he was an economist, but I don't know what his qualifications are, and he has never revealed that to me, and I do not know, so I can only speculate. But he's not a PhD. That – I'm pretty certain of that.

THE COMMISSIONER: Thank you.

MR BEASLEY: When you say the Basin Authority has said to you in response to the issues of return flow when you've raised them that return flows are negligible, what have they said, if anything, to support that claim?

PROF GRAFTON: The only thing they provided is this consultant's report from 2010. So – and that consultant report shows that there has been a decline – in fact, interesting enough the report shows there has been a substantial decline in return flows at the end of drainage system, but you have to account for differences in the weather and storage, etcetera, etcetera, to do this properly. But that's the report. That's the only thing that I've ever received from them in terms of any evidence that they've – they can provide in terms that they're negligible. I've got anecdotal evidence that they've said, "Well, farmers getting water, it's valuable to them, why would they let any water go back into the system? So return flows must therefore be really low." You can see that there's - - -

MR BEASLEY: That's not based on science.

PROF GRAFTON: No, it's not. But you can see there's a problem with logic here, as well, because if you accept that – which I don't – but if you accept the premise that farmers are already so irrigation efficient that they have no return flows - - -

MR BEASLEY: Why would they need efficiency measures?

PROF GRAFTON: Then, well, why do they need $4 billion to increase irrigation efficiency? So either way it doesn't make any sense. So either they – they're so efficient they don't need – there are no return flows, in which case why did they get $4 billion and who got it and why did they get it? Or there is some issue here, but of course we won't know until there's an audit of what actually has gone on in terms of who received the money and what did they get. What are the savings, and did – did they – are they demonstrated?

MR BEASLEY: What we get.

PROF GRAFTON: And what the impact – what did we get as taxpayers? Yes.

MR BEASLEY: Can I ask you, outside of Mr Glyde. who have these discussions been with at the Basin Authority.

PROF GRAFTON: Colin Mues. I've had conversations with Colin Mues. So in terms of conversations - - -

MR BEASLEY: That's M-u-e-s, isn't it?

PROF GRAFTON: M-u-e-s.

MR BEASLEY: And what's his position?

PROF GRAFTON: I don't know.

MR BEASLEY: Has he got similar qualification? Is he a hydrologist or is he just a manager or a policy person?

PROF GRAFTON: No. Again, I wouldn't want to speculate.

MR BEASLEY: ..... if you don't know, you don't know.

PROF GRAFTON: He doesn't have a PhD but my assumption is that he's an economist but I don't know his qualifications.

MR BEASLEY: I'm starting to get an inferiority complex; I don't have a PhD either.

PROF GRAFTON: No, I'm just saying in the context.

MR BEASLEY: Yes, I understand.

PROF GRAFTON: That's the only thing I would be able to say.

MR BEASLEY: I just want to ask you to consider a submission and some evidence given by a representative of Cotton Australia critical of the concept of return flow and your views about it. If you can just listen carefully to this.

PROF GRAFTON: Yes, of course.

MR BEASLEY: Which is part of their submission, which is exhibit RCE75, page 18:

> *Cotton Australia is aware of significant but ill-informed commentary around the effectiveness of on and off-farm irrigation efficiency programs. On and off-farm irrigation efficiency projects have been an effective way of acquiring water for the environment while minimising, but not eliminating, negative social and economic impacts. There have been arguments made that these*

efficiencies mean there are less return flows to rivers. This argument is laughable when applied to the modern Australian irrigation industry. It may have had some currency 20 or 30 years ago, but with so much emphasis on not wasting water the days the Basin's rivers being used as a drain for wasted irrigation water has long passed. The water that these programs is saving is being saved by reducing losses via evaporation or deep drainage into the soil, greatly reducing the risk of salinity build-up, not water that would have passed back to the river.

Is that clear enough - - -

PROF GRAFTON: Yes.

MR BEASLEY: - - - as to what his concern is?

PROF GRAFTON: Yes.

MR BEASLEY: Sorry, Cotton Australia's concern is; do you have a response to that?

PROF GRAFTON: Well, I can refute pretty much all that he said. Obviously, to quantify the details requires a proper water audit, which I don't have and that requires – you know, I argue needs to be done. So the first statement is, "has been effective to providing water for the environment", well, you can't make that statement unless you've done a water audit.

MR BEASLEY: Just assume there's nothing to back that up other than assertion.

PROF GRAFTON: That's an assertion. So there's – but I can refer to literature, if you wish, which is actually here and done in Australia on cotton farms, and so I could highlight them to you.

MR BEASLEY: Please do.

PROF GRAFTON: So – and they actually show that in fact he's incorrect. That there was a substantial return flow from cotton farms. So you know, it would be useful for him to actually – to read the literature. So there's a paper by Roth et al, published in 2013, in Crop and Pasture Science and that actually refers to the nature of the – the amount of water being used on the farm for consumptive purposes and for other purposes. There's another paper that I refer to in the Journal of Irrigation and Drainage Engineering from 2002, and then there's another paper in Crop and Pasture Science from 2013 by ..... that also looks at these issues and they, in my view, my interpretation of them, is that there are substantial amounts of return flows on cotton farms in the Murray-Darling Basin.

MR BEASLEY: All right. Are you able to give us copies of those papers?

PROF GRAFTON: Yes, I'm happy to.

MR BEASLEY: Can I ask you, in relation to materials like the material you are referring to, when you have your discussions with the Basin Authority, do you say, "What about this research and what about this research"? Do you raise, in the way you've just raised with the Commissioner – how detailed is it?

PROF GRAFTON: It's detailed. So the conversation that I recall the best was a conversation that Professor Williams and I had at the Murray-Darling Authority. In the room, I think, were six individuals, maybe seven – I didn't take notes, I should have done but I didn't – but certainly Phillip Glyde was there and certainly Colin Mues was there.

MR BEASLEY: Yes.

PROF GRAFTON: And several others. But those are the two people I can remember for sure who were there.

MR BEASLEY: Yes.

PROF GRAFTON: And we were there for an hour and a half, I think. It might have been two hours but certainly more than an hour, and there was a whiteboard, and I remember Professor Williams going up on the whiteboard going through various details. We talked details. We didn't refer directly to the papers that I referred to here, but it was a detailed discussion.

MR BEASLEY: The concepts from - - -

PROF GRAFTON: Concepts. "Where does this go, what's the nature of this?"

MR BEASLEY: ..... yes.

PROF GRAFTON: You know – and the point of the conversation, from our perspective was to say, "Look, this – this – we think this is a big issue. What are you doing? What information do you have? And what do you know that we don't know?" And all we got from that meeting was that – that consultant's report which, far from allaying our concerns, have magnified our concerns that the Authority apparently doesn't have information, and neither does the Australian Government apparently, because I've requested it, information on what has actually happened for these individual projects in relation to return flows.

MR BEASLEY: Because it's not unimportant, isn't it, that one – as we have discussed, and as a matter of obviousness, first of all, a lot of money is being spent on these programs; correct?

PROF GRAFTON: Correct.

MR BEASLEY: And secondly, they're designed so that there is a true return of water for the environment.

PROF GRAFTON: Correct.

MR BEASLEY: Correct. And if that's not happening, it's a gigantic waste of billions of dollars.

PROF GRAFTON: That is absolutely correct and - - -

MR BEASLEY: And I assume that's why you're raising this issue with the Basin Authority, because you've got a concern that money is being wasted.

THE COMMISSIONER: That could be spent on other things.

PROF GRAFTON: Absolutely. I believe $4 billion has been wasted, in the context of delivering public benefits. Private benefits have been delivered from the individual farmers who receive these subsidies, but the public benefits were supposed to be increased stream flows and if the – we're correct, and we have done modelling on this, and we made assumptions but we are very transparent on what we've assumed and why we've assumed it, because we don't have adequate data, we've concluded that instead of being 703 gigalitres extra for the environment, in the context of the entitlements acquired through these water infrastructure subsidies, that it could be minus 140 to zero.

And if it is that and we could be wrong – that's why we need an audit – if it is that, then yes, that has been a complete and total – if that's true, then it's a complete and utter, total waste of money for delivery of public benefits to the Australian taxpayers. And to put it in context there's about 10 million Australian households – we're talking about $400 per household. That's equal to $4 billion. This is not – non-trivial sums to an individual household, and if you look at the indirect and direct expenditures on water use efficiency, $4 billion translates as 10,000 irrigators, not all of them have received direct payments, so take half. You know, you're talking – you know, talking about $1 million on average.

THE COMMISSIONER: Professor, this subsidies – this subsidy program is, as it were, outside the Act and the Basin Plan itself, isn't it?

PROF GRAFTON: That is correct.

THE COMMISSIONER: So it's a program by which the so-called recovery for the environment can be contributed to voluntarily – that's the word I want to emphasise, voluntarily - - -

PROF GRAFTON: Yes.

THE COMMISSIONER: - - - by a farmer accepting a subsidy on terms that involve not only participation in the planning and execution of the efficiency measure on a farm, but also a choice to be agreed by – mostly, the Commonwealth – of the amount of the farmer's pre-existing entitlement which would be given up and returned to Commonwealth Environmental Water Holder; is that correct?

PROF GRAFTON: That's correct.

THE COMMISSIONER: Now, in its essentials, that's a buyback, isn't it?

PROF GRAFTON: Yes. Essentially, you – it's a different way of doing it but - - -

THE COMMISSIONER: You get money or money's worth.

PROF GRAFTON: That's right. I mean, the buyback obviously gets the entitlement directly without – and leaving the farmer to make the call about how they're going to use those funds.

THE COMMISSIONER: But this program, the Commonwealth gets it directly as well.

PROF GRAFTON: That's right but it's the expenditures to get it are focused on - - -

THE COMMISSIONER: Much more laborious, no doubt.

PROF GRAFTON: Yes.

THE COMMISSIONER: But it's still money from, ultimately, the Commonwealth, to the farmer.

PROF GRAFTON: Yes.

THE COMMISSIONER: Or money's worth to the farmer.

PROF GRAFTON: Yes.

THE COMMISSIONER: So buyback, as it's called, and these efficiency programs, so money on the first, money's worth under the second, but in both cases a voluntarily agreed – that's a tautology, I know, but I want to emphasise the fact that the farmer agrees and the Commonwealth agrees – on how much of that farmer's entitlement will be transferred to the Environmental Water Holder. That's right, isn't it?

PROF GRAFTON: That's exactly right. It's a voluntary - - -

THE COMMISSIONER: Well, I am at a loss to understand what the big difference is that means that buybacks are now anathema, but these efficiency programs are not.

MR BEASLEY: Especially in the context of most buybacks did involve purchasing an entire entitlement .....

THE COMMISSIONER: That's what I mean. It's always a matter of choice.

PROF GRAFTON: Correct.

THE COMMISSIONER: So could you – you've got much more background than I have in this; can you explain to me why that might be so, that difference?

PROF GRAFTON: Well, you would have to obviously ask the irrigators why they prefer one over the other - - -

THE COMMISSIONER: Irrigators, to give them credit, are not a monolith group.

PROF GRAFTON: Correct. But there have certainly been irrigator groups that have argued of efficiency rather than entitlements and part of the reason - - -

THE COMMISSIONER: Why is that?

PROF GRAFTON: Well, the stated reason is that entitlements reduce the amount of water that will be used in a particular district and, therefore, that will have an impact to production, employment, etcetera, etcetera, that would be deleterious on the community as a whole which putting aside whether that's true or not, that's the argument - - -

THE COMMISSIONER: That's the so-called Swiss cheese effect.

PROF GRAFTON: It is partly related to the Swiss cheese effect, in the sense that you get entitlements being sold in different parts of the irrigation district, and then that - - -

THE COMMISSIONER: The Commonwealth could always have chosen to do things strategically, rather than - - -

PROF GRAFTON: It could have done, yes.

THE COMMISSIONER: - - - as it happens.

PROF GRAFTON: It could have, yes. Whilst the efficiency improvements, the idea about ..... that you will maintain your level of production because you have increased your irrigation efficiency, you've got the same level of water consumption or - - -

THE COMMISSIONER: Well, it doesn't have to maintain anything, though. It's a matter of choice as to how much you give up for what efficiency.

PROF GRAFTON: Correct, but that's the argument some irrigation groups have argued for, is that because you're maintaining your level of production, therefore, the impact is less pronounced than on the direct purchase of water ..... that's their - - -

THE COMMISSIONER: Thank you.

PROF GRAFTON: I mean, that's not an argument I agree with, but

THE COMMISSIONER: No. No. No. I understand. Thank you.

PROF GRAFTON: - - - that's my understanding of their argument, yes.

THE COMMISSIONER: I'm obliged. Thank you.

MR BEASLEY: Just before I come back to Cotton Australia's evidence, I've just reminded myself, when we were talking about the ..... food - - -

PROF GRAFTON: Yes, Food and Agricultural Organisation.

MR BEASLEY: That paper was co-authored by – one author was Dr Perry.

PROF GRAFTON: Yes.

MR BEASLEY: Who is, I think, a water economist.

PROF GRAFTON: Yes, he is an agricultural economist.

MR BEASLEY: Agricultural economist. Is he someone you know?

PROF GRAFTON: Yes, I have met Chris Perry. I met him for the first time in March of this year in Oxford.

MR BEASLEY: All right. And he might be retired now, is he?

PROF GRAFTON: Correct. He is retired.

MR BEASLEY: But still a consultant.

PROF GRAFTON: He does consult. He worked at the World Bank and other locations – places, as well.

MR BEASLEY: Yes. And the other author was – is it Dr Steduto?

PROF GRAFTON: That's right. Pasquale Steduto.

MR BEASLEY: And what's his field of science?

PROF GRAFTON: I don't believe he is an economist.

MR BEASLEY: No ..... something to do with .....

PROF GRAFTON: I think he is an engineer, actually. Yes. But - - -

MR BEASLEY: An engineer with specialty in flow of water, I think - - -

PROF GRAFTON: Yes.

MR BEASLEY: - - - might be right.

PROF GRAFTON: That would be my understanding. Yes.

MR BEASLEY: Do you know him?

PROF GRAFTON: I haven't personally met him, but I've certainly corresponded with him, yes.

MR BEASLEY: And including over the removal of the Australian section of their report?

PROF GRAFTON: I don't believe I've corresponded with - - -

MR BEASLEY: No. Okay.

PROF GRAFTON: - - - Pasquale Steduto about that.

MR BEASLEY: All right. Now, I just want to come back to the evidence of Cotton Australia that they actually gave as sworn evidence. This is Mr Murray, who was the general manager of Cotton Australia. I raised with him – I gave him an opportunity to say what he wanted to say about considering the return flows arguments to be laughable. So I drew that to his attention. And this was his evidence:

> *Yes. Okay. Firstly, if there has been a failure or certainly if there has been failures of irrigation schemes for hundreds and thousands of years – that can't be right. The failure is normally due to the fact that too much water gets into the deep drainage, you raise the salt level and you cause salt.*

Then there were a few questions from the Commissioner. And then Mr Murray:

> *Yes. You know, we've had dry rivers for a long, long time.*

"Adam", who is someone else from Cotton Australia:

…and I were discussing this morning. I grew up in the riverine around Griffith in the 80s, which was rather wet, you know. It was all doom and gloom that rising salt level would destroy the MIA.

I don't know what that is .....

THE COMMISSIONER: Murrumbidgee Irrigation Area.

MR BEASLEY: .....

And a lot of work was done there (a) to improve drainage and (b) improve water application, land and the like to minimise that. And it appears to have been successful. But if we follow through the argument, as I understand it, put forward by the Wentworth Group members and others, this water would have been otherwise applied, would have gone into deep drainage and would have then eventually returned to the river system. That's the argument they've placed in simple terms, I understand. Let's just follow that through and say that was the case. And then if you look at your map, there has got 18 salt interception schemes which literally intercept that flow before it enters the river, pumps it into evaporation basins and evaporates it off. So I just feel that they're wanting their cake and eating it in this particular argument. They're somehow saying that this would be extra water into the system. So, from a theoretical point of view, yes, I suppose that if we continue to just loosely splash water on, allowing it to go into deep drainage, there may be increased return flows into the river system, but they would be highly saline and those interception stations would have to work hard and would probably destroy farming environment, as well. If you look at another example of return flows, was water that may have been otherwise wasted and directly flowed back into rivers and what efficiencies may have done that. Certainly, from a cotton perspective, it is only in the largest floods that people would let water that was held on their property under – you know, from irrigation from their legal extractions and from irrigation would allow it to exit their property. So they will reuse it. They will have recycling schemes.

Do you have a response to those matters, particularly in relation to what he is saying about salt and salt extraction?

PROF GRAFTON: Well, I think it's a rather confused series of statements. But so let's address the issue of salt. So the important point of these interceptions schemes, the 18 interceptions schemes, as far as I understand it, is that they have saline water. So you put them into these particular locations and then it evaporates and the soil is then – the salt is then left there. So it's still in the Basin. It hasn't gone to Mars. It's still there. So it could potentially, and will eventually, be mobilised to the detriment of irrigation and the environment. But the point about it is that there needs to be sufficient water flows to transport the salt out of the Basin and into the southern ocean, because that's how we get rid of the salt out of the Basin. So you've got to have sufficient flows to be able to get that salt out of the system. And, if you don't,

the salt will accumulate. So that seems to be the point that I and Professor Williams and others would be raising. If you've got sufficient flow, then the salt will get out of the system and won't cause a problem. But if you don't have sufficient flows, then you get into these salt interception schemes. The salt still remains in the Basin, will be mobilised at some point in time. And you haven't dealt with the problem. You've just sort of pushed it down the road, so to speak.

THE COMMISSIONER: Professor, in relation to return water, what I am meant to focus on, I think, is the question whether in ascertaining environmental benefit from this voluntary program of subsidised on-farm efficiency measures in return for transfer of entitlement to the Commonwealth, whether there is a phenomenon that we call return water that must be accounted for in expressing, in volume terms, a benefit to the environment. It's a question as to whether the phenomenon exists, first, and, second, if it exists, do we have any data permitting an accounting? Is that right?

PROF GRAFTON: That's exactly right. So we know the phenomenon exists. Okay. So it's not something that can be pushed away or asserted away. It exists.

THE COMMISSIONER: And if it be the case that with modern schemes – it's a bit confronting for me to be told that a mere 20 years ago it's not modern ..... with modern schemes, in effect, there won't be any return water. If that can be a reserve and measurement confirm that, well that goes into the accounting as, effectively, zero. It won't have effect.

PROF GRAFTON: That's exactly right. So – but we need to - - -

THE COMMISSIONER: But the point is that's not something that can be assumed from comparing boyhood and manhood memories of irrigation techniques by individuals, that is, anecdotally. It needs to be demonstrated by science. Is that the point I should take from this?

PROF GRAFTON: That's exactly the point, Commissioner. In fact, I can refer to some papers here we referred to in our submission. One is by Jägermehr et al, which came out recently. I'm just trying to find it. The hydrological – I've got a copy of it, but the bottom line on that paper is they look at global issues in the context of, you know, irrigation. In fact, here it is, right here. So it's Jägermehr and six other authors, I believe – five other authors. And that was published in Hydrological Earth System Science in 2015. And I refer you to table 3. Okay. So this is global numbers. Okay. So this is not the Murray-Darling Basin, but global numbers showing exactly what I've just been saying, that return flows are substantially less with drip irrigation than they are with all surface or furrow irrigation. I mean, that's demonstrably showing much, much less.

THE COMMISSIONER: That's why I was asking.

PROF GRAFTON: Yes. So it's - - -

THE COMMISSIONER: It just seemed to me that the technology actually had as one of its informing elements a reduction in the amount of return water.

PROF GRAFTON: An unintended consequence, I would say, or a - - -

THE COMMISSIONER: Or just simply entailed as a matter of its design.

PROF GRAFTON: It's almost likely. The reason I'm hesitant is not because I'm disagreeing. It's just that it is possible to increase irrigation efficiency and to have that happen from a reduction in evaporation only.

THE COMMISSIONER: I understand that. I understand.

PROF GRAFTON: So in which case it wouldn't affect return flows. But, you know, the cases shown in the FFA report, Jägermehr shows the prima facie case, the evidence, the empirical evidence, the modelling is it does affect return flows. So you can't assume it doesn't. The assumption would be yes, it does and, therefore, you – as you point out, Commissioner, it needs to be measured. And until and unless you measure it, you cannot say that you've got 703 gigalitres of increased stream flows which is what the claim made by Paul Maurice in his letter to ..... and by the Australian Government. That's patently false. And it can only be determined after - - -

THE COMMISSIONER: Well, it's unsubstantiated.

PROF GRAFTON: Yes. It's - - -

THE COMMISSIONER: If it's true, it would be by guesswork.

PROF GRAFTON: Well, even in the basic numbers that we've looked at, it has to be less than 703. So in that case, yes, it is patently false. How less it is, that, of course, we don't know until this water accounting – but it has got to be less than 703.

MR BEASLEY: 700-odd gigalitres is what the - - -

PROF GRAFTON: Yes.

MR BEASLEY: - - - Basin Authority claims of the 2100 - - -

PROF GRAFTON: Yes.

MR BEASLEY: - - - and seven that they claim has been recovered is attributed to what they say has been recovered from efficiency measures.

PROF GRAFTON: Yes.

THE COMMISSIONER: Now, all groundwater that eventually reaches an aquifer, a stream, will, in the Basin, be, relatively speaking, saline in nature.

PROF GRAFTON: You need to speak to a hydrologist. It depends where you are on the Basin. Some parts of the Basin, yes, are quite saline, and others are not. And it depends where the extraction is taking place.

THE COMMISSIONER: That's all right. No.

MR BEASLEY: ..... fresh aquifer .....

THE COMMISSIONER: It depends on which aquifer you're talking about.

PROF GRAFTON: Yes. Yes.

THE COMMISSIONER: Thank you.

MR BEASLEY: The last thing I just wanted to ask you about was behind tab 3.

PROF GRAFTON: Yes.

MR BEASLEY: This bundle, I think you've supplied us with a joint submission that Professor Williams, yourself and Dr Colloff made to the Productivity Commission - - -

PROF GRAFTON: Yes.

MR BEASLEY: - - - on their five-year assessment. I just wanted to draw your attention to pages 5 and 6 where you discuss - - -

PROF GRAFTON: Yes.

MR BEASLEY: - - - floodplain water harvesting.

PROF GRAFTON: Yes.

MR BEASLEY: And at the bottom of page 6 you've urged the MDBA to make publicly available its estimates and methods of calculation to the extent of floodplain water harvesting. You said that that information is urgently needed to improve our understanding of water balance and water accounting in the Basin, including, of course, setting the baseline diversion limit. That, I take it, is something you would recommend to the Commissioner, as well.

PROF GRAFTON: Absolutely, yes.

MR BEASLEY: Yes.

THE COMMISSIONER: Has anything happened since, say, the date of this submission to anticipate that recommendation? Has the Authority - - -

MR BEASLEY: Did you ..... address the Productivity Commission?

PROF GRAFTON: No, I didn't. I was overseas, I have to say, at the time, so it may not have - - -

MR BEASLEY: I think Professor Williams did.

PROF GRAFTON: Yes.

THE COMMISSIONER: So are you aware of anything having been made available – publicly available by the Authority since then in that regard?

PROF GRAFTON: No, I'm not aware of it. Obviously, the Authority should be asked, but I'm not aware of it.

THE COMMISSIONER: But when you talk about its estimates and methods of calculation, I take it that may well include the relevant Basin state.

PROF GRAFTON: It could well be right.

THE COMMISSIONER: The Authority has powers to seek data from states, including monitoring and measuring.

PROF GRAFTON: Yes.

THE COMMISSIONER: Yes. And it may be that one view is that it's New South Wales' primary responsibility governmentally to measure and monitor floodplain harvesting.

PROF GRAFTON: That may be the case, but, either way, it needs to be recorded and measured, so we know how much it is, whether New South Wales does it or the Authority or they do it jointly.

THE COMMISSIONER: Since April 2018, things haven't to your knowledge got better in terms of the availability of data, from whomever?

PROF GRAFTON: From my understanding, but, again, I would ask - - -

THE COMMISSIONER: Just your understanding.

PROF GRAFTON: My understanding, correct.

MR BEASLEY: I don't have any further questions of Professor Grafton. I am going to tender the various reports that I took him to, but despite the Post-It notes I have just been handed, I will do that in a leisurely fashion tomorrow - - -

THE COMMISSIONER: Thank you.

MR BEASLEY: - - - and not hold the witness up.

THE COMMISSIONER: Professor, is there something that you would like to tell me that you don't have either in writing or in response to our questions?

PROF GRAFTON: The only thing I would say, Commissioner, is just to highlight two I think very simple or fundamental points. And the first one is to follow the water, as in, you know, measure what's happening in the water in the Basin. That's the whole point of the Water Act. If we don't do that, then we're clearly not able to make determinations of whether we're achieving the Act or not. So it's an obvious point, but it seems to be neglected. The second one is follow the money. A lot of money has been spent. So who got the money? Why did they get it? And what did they give back in return and whether we got a benefit from it. Again, it relates to the Water Act. Follow the money, follow the water. So that's how I would - - -

THE COMMISSIONER: Thank you.

PROF GRAFTON: - - - conclude it. It's fairly straightforward to me. That's needed to be done.

MR BEASLEY: Can I just invite Professor Grafton to provide us with any of the literature that he thinks is relevant and invite him, if he comes across anything else of relevance, that - - -

THE COMMISSIONER: Yes, of course.

MR BEASLEY: - - - he can always contact us and supply it. We would be very grateful.

THE COMMISSIONER: Yes. And can I express my considerable gratitude for the time and effort you've put in with colleagues and on your own in a way that has helped me a great deal. Thank you very much.

PROF GRAFTON: Thank you.

MR BEASLEY: Thank you.

PROF GRAFTON: Thank you.

<THE WITNESS WITHDREW [3.01 pm]

THE COMMISSIONER: Now, as I understand it, arrangements have to be made for a Skype connection now.

MR BEASLEY: That's right. Yes.

THE COMMISSIONER: Should we adjourn for however many minutes that will take.

MR BEASLEY: Yes.

THE COMMISSIONER: Just let me know.

ADJOURNED **[3.01 pm]**

RESUMED **[3.12 pm]**

THE COMMISSIONER: Afternoon, gentlemen.

MR BEASLEY: All right. Now, we have to swear them both.

THE COMMISSIONER: Just do them together. Let them swear together.

<TONY THOMPSON, SWORN **[3.13 pm]**

<IAN COLE, SWORN **[3.13 pm]**

THE COMMISSIONER: Thank you.

MR BEASLEY: All right. Now, Mr Cole, you are currently the Executive Officer of Barwon-Darling Water.

MR THOMPSON: That's correct.

MR BEASLEY: And can you tell us what Barwon-Darling Water does.

MR COLE: Okay. So Barwon-Darling Water – it's outlined in our submission in detail, but we are a representative body of water users on the Barwon-Darling River. We have as our members irrigators, town water suppliers – which are the main local government bodies along the river, like ..... council, Brewarrina, and Bourke, Cobar, Central Darling Shire Councils. We also have other water users who use the river for ..... domestic purposes, and other purposes as well. And we generally are

representative of that group of stakeholders who divert water for use when it comes to government policy negotiation advocacy, if you like.

MR BEASLEY: All right. And you're also the Chair of the Barwon-Darling Customer Advisory Group?

MR COLE: That's right, yes.

MR BEASLEY: And what's that group?

MR COLE: The Customer Advisory Group, or CAG is a new body. Up until last year all rivers, all inland regulated rivers in New South Wales had a Customer Services Committee, CSC which gave advice to Water New South Wales, which is the main provider of water to water users in New South Wales, or is the provider. Barwon-Darling is an unregulated river, and so we weren't included in that, but when the new CAGs were set up to replace the CSCs we were asked to come to board. Previously to that, Barwon-Darling Water would sort of act in that role, if you like, as the CSC.

MR BEASLEY: All right. And prior, you had previously been Managing Director and part owner of Darling Downs, a cotton property.

MR COLE: Darling Farm.

MR BEASLEY: Darling Farms, I'm sorry.

MR COLE: Yes. Darling Farms. That's right, yes.

MR BEASLEY: Until it was sold in 2014.

MR COLE: Correct.

MR THOMPSON: All right. And, Mr Thompson, you are the Chair of Barwon-Darling Water.

MR THOMPSON: Correct, yes.

MR BEASLEY: And I think you've been – you've been an irrigator at Bourke for a large number of years?

MR THOMPSON: 25.

MR BEASLEY: 25. All right. And you're also – you're also the Chair of Darling River Food and Fibre.

MR THOMPSON: Okay, yes.

MR BEASLEY: And you're its delegate to attend Cotton Australia's general meetings?

MR THOMPSON: Yes.

MR BEASLEY: All right. Very good. Now, Barwon-Darling has supplied a submission to the Commission dated May 2018; correct?

MR THOMPSON: Who has?

MR COLE: Yes, that's correct.

MR BEASLEY: You have supplied a submission to the Royal Commission dated May 2018.

MR THOMPSON: Correct.

MR BEASLEY: Yes. Can I ask who was the drafter or drafters of that submission?

MR COLE: I was the main one, Ian Cole, yes.

MR BEASLEY: With the assistance of anyone else?

MR COLE: Well, once I had got a first draft, I sent it around to our members or our executive who helped me out with a few changes and a few spelling errors.

MR BEASLEY: All right. I will tender that submission.

THE COMMISSIONER: Thank you.

MR BEASLEY: So that's submission to South Australian Murray-Darling Basin Royal Commission May 2018 Barwon-Darling Water. You've also supplied us with a document headed 'Barwon-Darling 101 Understanding the Unregulated Barwon-Darling River and its Water Users.'

MR COLE: Correct.

MR BEASLEY: And is that a document that you drafted too, Mr Cole?

MR COLE: Yes.

MR BEASLEY: All right I will tender that document which is dated 9 January 2018. What was that document drafted for? What was the purpose, because it predates the Royal Commission? It was drafted for another purpose.

MR COLE: Yes, it was. It's a document that I use generically to attach to other submissions, because it has got a lot of information in it that is good background material for ..... that don't understand the Barwon-Darling.

MR BEASLEY: So it's a ready reckoner to the Barwon-Darling and the Water Sharing Plan.

MR COLE: That's correct.

MR BEASLEY: Yes. And you've also supplied the Commission with a submission made by a number of groups, including Cotton Australia, Namoi Water, GBIA, MRMF, MRFF. What's MRFF?

MR COLE: I didn't supply that one. I'm sorry, I meant to get in contact with Michael. I don't know where that came from. That's not meant to be on our list.

MR BEASLEY: All right. I will leave it alone then. That's all right.

MR COLE: That was – that was a submission – MRFF is Macquarie River Food and Fibre.

MR BEASLEY: Yes. It was a submission to the product – was it – no, to the MDBA on the Northern Basin Review.

MR COLE: Yes.

MR BEASLEY: All right.

MR COLE: We made our own separate individual submission to that as well, and I didn't think that it was worthwhile tendering ours, because most of the material in it was – that is relevant to this Royal Commission is in our submission anyway.

MR BEASLEY: All right. That's fine. I've just got a note here that it was supplied by you, but that must be someone's error here that they will pay for later. I asked you – when we spoke informally the other day, we had a discussion about a water shepherding project, and you've supplied the Commission with some documents concerning that.

MR COLE: Yes. Yes, I just wanted to place that in history. I couldn't remember when – when that particular trial took place. It was something that was conducted by a lady called Anna Bailey what's now called the Department of Industry and Water in New South Wales.

MR BEASLEY: Yes. She was at the New South Wales Office of Water.

MR COLE: That's correct, yes. Which is a predecessor, yes.

MR BEASLEY: And she obviously came and gave a presentation, and you've given us a photocopy of what looks like overhead slides.

MR COLE: We were involved in discussions with Anna and other people within the Department about the concepts around shepherding environmental water through the Barwon-Darling.

MR BEASLEY: All right. And I also invited you – in part of your submission, you've said that the issue of metering is one that you've taken up with the relevant New South Wales Government Department for many years, and you said you had a considerable amount of correspondence in relation to it. You've now supplied us with a bundle of correspondence concerning, in broad terms, requests for support from the Government to install metering technology; correct?

MR COLE: Correct.

MR BEASLEY: In the Barwon-Darling.

MR COLE: In the Barwon-Darling and there was more – see, there was more I could have given you, but I thought that was sufficient to make my point.

MR BEASLEY: You won't believe this, but we actually have enough to read. All right. And you've – I've also been given a document you've given us, that is a letter from the New South Wales Government from David Harris, when he was Deputy General Director to Fort Bourke Pty Ltd 25 June 2007. What's the relevance of that?

MR COLE: The relevance of that was that it sort of gives a bit of a background as to Barwon-Darling Water's – or our organisation's – and individuals amongst the irrigators on the Barwon-Darling, and our involvement in the construction of management strategy for the Barwon-Darling. We had been involved not just in the management strategy, but in the – in the framing of environmental flow packages for the Barwon-Darling to lift the heights, the threshold heights, cease to pump heights if you like, on the Barwon-Darling. Plus this cap management strategy and the Barwon-Darling Water Sharing Plan, amongst a whole lot of other things.

They were the main instruments that we were involved in. But I guess when you look at – and I'm just looking for my notes – when you look at the, you know, why the Royal Commission came about, and all these inquiries into the Murray-Darling and the Barwon-Darling, it started – what started this process was the media report that we call Four Corners, and we – I guess we just want to set the record straight. There has been a few things said about – and I would say that a fair bit of hyperbole and exaggeration has been used about our actions, or the actions of people in the Barwon-Darling, and that was – and some of that was actually reported in The Guardian last week – or was it this week – where Mr Harris was quoted to have told the Royal Commission that there were longstanding cultural issues in the north in relation to licensing and compliance.

MR BEASLEY: Right.

MR COLE: And that cotton interests in the Barwon-Darling were determining water policy in New South Wales. Well – and that he struggled to get New South Wales Water Ministers to take steps to protect environmental flows. Well, we actually were involved in the framing of these things to protect environmental flows, and some of these things were - - -

MR BEASLEY: Sorry, when you say "we were", are you talking about Barwon-Darling Water?

MR COLE: Barwon-Darling Irrigators, yes.

MR BEASLEY: Yes, go on.

MR COLE: And so if you go to Mr Harris' letter when he wasn't a former employee, but he was actually doing the work, you will see that he was very pleased with the way this cap management strategy to cut back access in the Barwon-Darling and protect environmental flows and so on had worked out. And at the end of it he says:

> *I genuinely would like to thank all licence holders for their patience over many years that it's taken to develop and implement a robust cap management strategy for the Barwon-Darling and in particular for the open and cooperative way in which irrigators and staff of the department have worked together to bring this complex issue to this point.*

So the point I would make is that I believe, as we've gone along, we've done what we can to cooperate with water reform in the Barwon-Darling.

MR BEASLEY: Yes.

MR COLE: And some of the statements that have been made about us not being constructive or whatever, are just plainly wrong, if you look at the record.

MR BEASLEY: All right. Well, I'm happy to tender all that bundle of material you've supplied.

THE COMMISSIONER: Thanks.

MR BEASLEY: I just want to ask you some questions about your submission, if you don't mind. Now, no criticism of you, but on page 4 and 5 of the submission you talk about the Northern Basin Review and the SDL adjustment, and you've drafted the submission prior to the SDL adjustment not being disallowed, and prior to what looks like a deal between the two main political parties concerning the Northern Basin Review. Would I be correct in saying that the SDL adjustment,

because it relates to the southern connected Basin, isn't a matter that you particularly wish to say much about?

MR COLE: Don't really want to add any more than what we've said.

MR BEASLEY: Right. Okay. And in relation to the Northern Basin Review, do I take it that you support the reduction of recovery of water for the environment from 390 to 320 gigalitres or do you have a different view about that review?

MR COLE: Well – well, I think as I've said before, if you were to have a look, and maybe I should send our submission to that Review. We had a two-handed approach to it. The reduction of 70 gigs from 390 to 320 is a little bit of a problem for us, because in the initial cut backs to a sustainable diversion limit in each valley in the north, we were originally planned to have a reduction six gigalitres from 189.

MR BEASLEY: Right.

MR COLE: What we ended up with was 32 gigalitres. So more than five times the original reduction. So, in a sense, we took our medicine and we took it five times over. And, you know, that's also acknowledging that there was a shared component in there as well. So we would have had more than six gigalitres, but certainly not – we didn't expect 32 when you looked at it on a pro rata basis. So we felt that, if we had the reductions, that maybe everyone should have the reductions as well. There are people amongst our group that feel like that. Given the fact that we are at the bottom of the system, so an extra 70 gigalitres flowing down those other rivers which are tributaries to the Darling, contribute to our – our flow in the Barwon-Darling from Mungindi down to the Menindee Lakes.

So, in a sense, we're missing out on the water, but we've also had cut backs way beyond what we expected as well. We got a double whammy, if you like. However, on the other hand, we did see the fairly persuasive social and economic impact information that was made available through, by the MDBA through the Northern Basin Review, and we wouldn't want to see more damage done to northern Basin communities because we well know what sort of impact water cuts have and we've seen the impacts of those water cuts along the Barwon-Darling, especially here in Bourke where Tony and I are, but also in towns like ..... and Walgett, which have also suffered from cutbacks over the years, not just the Basin Plan cuts but others as well.

MR BEASLEY: When you say others as well, do you mean there has been impacts on employment due to technological change or - - -

MR COLE: No. What I mean is other cut backs, like the cut backs we suffered underneath the cap management strategy.

MR BEASLEY: All right.

MR COLE: The cut backs we suffered under the environmental flow package. You know there's always got to be a balance here, doesn't there? There always has to be a give and take. I mean, if you want to improve the environment of a river that is over allocation, there – you know, you are going to have some impacts on the social and economic to improve the environment. That's just the way things work.

MR BEASLEY: The social and economic impacts you are talking about, the – you place reliance on what the Basin Authority's own report into social and economic impacts as a result of the Northern Basin Review, do you, or part of the Northern Basin Review?

MR COLE: We partially do, but we've also seen it ourselves. We have seen the impact, but I can talk about it personally. You know, the businesses that I ran suffered greatly from loss of 60, you know, over 60 per cent of our water in our annual allocation in the cap cut backs. Tony's did too. So we know what that does to your bottom line, what that does to your equity, what that does to your reliability.

MR BEASLEY: Sorry, the cap cut backs though predate the Plan; correct?

MR COLE: That's correct, yes. So – but I just picked that out as an example. I could go with the cut backs in the Plan as well. I mean the reduction of 32 gigalitres on the Barwon-Darling has included all the Colly water from Collarenebri. Now, the Colly enterprise there was a huge employer in Collarenebri, in relative terms. I mean, you know, there might not be huge numbers involved, like say the Adelaide car factories, but certainly as a proportion, Colly farms employed, through their farms and their cotton gin, a very large percentage of a workforce of Collarenebri. Now, if you go to Collarenebri today – I don't know if you've been there, but it has become a ghost town, because it just doesn't have the amount of employment that it did when irrigation was very strong then.

MR BEASLEY: Right.

MR COLE: And that's as a result of the Basin Plan.

MR BEASLEY: All right.

MR COLE: Same thing at Bourke where Toorale was purchased when Minister Penny Wong was – Senator Penny Wong was Minister. That hurt the Bourke community and, you know, the Bourke Council and the community complained long and hard about that because of the reduction in employment numbers in the Bourke community, reduction of contract work, reduction of rates in the Shire and so on and so forth.

MR BEASLEY: All right.

MR THOMPSON: There's absolute devastation here in Bourke from, I guess a – from a business sense. We, at one stage – this is just a small list, and we have

drafted a much – you list of businesses that have closed since, you know, in around 2000, 2010, somewhere in that sort of zone.

MR BEASLEY: Yes.

MR THOMPSON: You know, machinery dealerships, we had two in Bourke, we have now got none. Mechanics, agronomists, the number of people that work in the industry, right, it's just – it has just been devastation. We have had schools closed.

MR COLE: ..... we don't have any.

MR THOMPSON: Yes.

MR COLE: We used to have a full-time business here. We have seen the school, on the farm that I owned and ran, with over 70 children completely closed. You know, reduced from 70 kids down to seven and then closed, and all the buildings carted away. So now we've seen these things. And we acknowledge, you know, that it's not totally due to the Basin Plan or water reductions; there are other factors. But certainly reductions in productive water does hurt irrigation dependent communities like Bourke, Walgett, Collarenebri, and Mungindi.

MR BEASLEY: I didn't quite hear what – part of what Mr Thompson said, were you talking about impacts you said had occurred between 2000 and 2010? Is that what you said?

MR THOMPSON: Yes. That's – that would be roughly within that timeframe that most of those businesses closed.

MR BEASLEY: Right. Okay. Right. And what was – that was the result, was it, of the previous reductions when the cap came in and, I assume, also impacted of the drought, was it?

MR THOMPSON: Yes. There's more than one aspect to the problem.

MR BEASLEY: Sure.

MR THOMPSON: There's no doubt that losing 70-odd – you know, best part of 70 per cent of our water licence was a huge part of that impact.

MR BEASLEY: All right.

MR THOMPSON: My business once employed seven full time people. I now run an operation with one or two.

MR BEASLEY: All right. What is your business?

MR THOMPSON: I'm a farmer, irrigator, cotton grower and grazing.

MR BEASLEY: Right. All right.

MR COLE: And on top of that, I guess we should mention population as well, you know, the population of Bourke Shire in that time from the Millennium Drought through to now has been reduced by at least 25 per cent.

MR BEASLEY: All right. Page 5 of your submission, I just want to ask you about the fourth paragraph where you say the northern Basin amendment has increased environmental outcomes due to the toolkit or complementary measures. I appreciate your optimism, I don't want to be too picky, but the Northern Basin amendment has only just come in. I assume that's – what you're really trying to tell the Commissioner is that it's the hope that it will increase environmental outcomes. It hasn't done that yet.

MR COLE: Yes, I grant you that.

MR BEASLEY: That's all right. I also wanted to ask you about, page 8 of the submission where you say:

> *Some of the recent allegations of water theft have already been shown to be wrong. From information provided we believe that at least one of the high profile water theft allegations is simply untrue –*

etcetera. I read those three paragraphs, and you tell me if I'm wrong, you're not intending in those three paragraphs to in any way prejudge a matter that is either currently under investigation by an authority and certainly not intending to prejudge the outcome of any matter before a court?

MR COLE: No, that's correct.

MR BEASLEY: In relation to the matters that you've – the letter – correspondence you've provided to us concerning metering, at page 11 of your submission, in about the middle of the page, you say this:

> *We hope that the various inquiries will recommend returning to robust metering and monitoring services (with hands on meter readers) that were on the Barwon-Darling prior to 2007.*

And you say there's – you set out some history below. But do I take from that, or should the Commissioner take from that, that there used to be a much more – from government, a much more robust monitoring program with more people involved as compliance officers than after 2007?

MR COLE: What it means there is that we had a full-time officer. I won't say there were many of them, but there was a full-time officer who was dedicated to the Barwon-Darling.

MR BEASLEY: Yes.

MR COLE: And it was his job to regularly read the meters along the Barwon-Darling at least four times per year and to provide information to, you know, the compliance arm of the Department and also to us as irrigators about where we were up to as far as our pumping was concerned.

MR BEASLEY: Yes.

MR COLE: Now, as I've said, I think in this submission and previously to you, the – we believe that 90 per cent of compliance is good metering and good monitoring. So if you've got someone who regularly comes and looks, and – you know, boots on the ground can give confidence. You've got someone who regularly comes and looks at each of the meters, you have a firsthand eyewitness account of all pumping events. You know, the status of all the meters. You are able to be given notice of maintenance requirements, which is what happened before.

There was some sort of historical context of all meter operations and there was community confidence that an independent person was monitoring the pumps at all times and providing the right information to the authorities and to the water users themselves. If you don't have those boots on the ground, or some alternative way of giving robust metering and monitoring, well, you know, people ask questions.

MR BEASLEY: Yes.

MR COLE: There are just too many gaps.

THE COMMISSIONER: Can you tell me what has been the response, say, by your local member to your representations for that position to be restored?

MR COLE: Well, we haven't made representations to the local member. We have made representations to the organisation that's meant to, you know, provide that person.

THE COMMISSIONER: And what has been the response?

MR COLE: Well, we still haven't got anyone.

THE COMMISSIONER: No, sorry. I realise they haven't responded by giving – by making the position but have they explained why they haven't given the position?

MR COLE: Well, they say they want to do it another way.

THE COMMISSIONER: Is – what is that – is that something .....

MR COLE: ..... I guess a lot of other – well, we have got a part-time person but you know what's really, I suppose, brings out the truth in it all is that as soon as there was

an issue that was flagged in the media, the first thing that Water New South Wales did was send out two meter readers and went up and down the river to establish what was actually going on at that particular time.

THE COMMISSIONER: I understand the force of what you are saying, which is why I'm interested to know has there been any explanation of why your hands on and boots on the ground suggestion is being rejected by government? Have they told you why they won't do it?

MR THOMPSON: I think cost has been, you know, one of the arguments they've put up, put a full-time person on to monitor the Barwon-Darling has been too expensive given the budget that they've got.

THE COMMISSIONER: I see. So it's the old – it's the resources answer, is it? "We don't have the resources?"

MR COLE: Well, certainly that has been spoken about but since – you know, since all these inquiries and since the Matthews inquiry in particular, New South Wales has set up now the ..... organisation and they've been out here quite often.

MR BEASLEY: They have also amended the Water Management Act, haven't they, so it's now a mandatory condition that the water supply work approval – that metering equipment is installed.

MR COLE: That's correct .....

MR BEASLEY: Subject to the regulations, whatever that will be.

MR COLE: Yes. Yes. Metering has always been installed on these pumps, but what we're concerned about is the monitoring aspect of it, or have been concerned, but now that ..... has been set up we are just hoping for some big improvements, and I've got to say I've seen more of them lately than I've seen people for a long time.

THE COMMISSIONER: It's nice to have something optimistic.

MR COLE: Yes.

MR BEASLEY: I don't have any .....

THE COMMISSIONER: No. You've covered everything.

MR BEASLEY: Is there anything further? I don't have any further questions concerning your submission, which is all clear enough, but is there anything further that either of you wish to raise with the Commissioner that you don't think either has been – that you would like to expand upon from your submission, or that you don't think – or even something new that is relevant to the Terms of Reference, or you don't think we have covered adequately today?

MR THOMPSON: Well, I think from – personally, from an irrigator's perspective, I personal feel that we at the Barwon-Darling have been treated pretty harshly in regard to you – you know, when I first moved to Bourke 25 years ago and the licence that I had in comparison to the licence I have today is very, very different, and I guess it has come at great expense to my business. You know, we saw the best part of, you know, 60 to 70 per cent reduction in our overall licence quota, we have seen the commence ..... pumps from my operation increased four to fivefold, from 300-odd megs to over 1200 megs before we can commence to pump. There has been a lot – there has been a lot of changes and that has come – you know, my business has had to wear that. There has been no compensation, no – no nothing. So it's had a big impact and, as I mentioned earlier, we have gone from seven full-time employees back to one or two, depending on just what's happening. And, you know, depending on river flows, really.

You know, the opportunities that I've had to grow a cotton crop now in Bourke in the last 15 years, you know, we've only had a handful of opportunities to grow successful crops in that period. There has been a lot of very dry, very dry spells and with the increase in access, to commence the pump access, there has been a big reduction to my operation. So I don't think that has really been acknowledged and I understand that that all happened before the Basin Plan but, you know, we've seen following the Basin Plan an additional 32 gigalitres removed out of the Barwon-Darling. So all this is having a pretty negative impact on our documents and our ability to do business here.

The business support ..... dealerships, the spray operators, the agronomists, the ..... all these types of things, now, we have had to outsource from three or 400 kilometres away. So it's very difficult. The other thing I wanted to mention is, you know, we as irrigators here on the Barwon-Darling are now the – I guess, the lowest of ..... you know, we are – I've had family members abused by the community now as a result of all these – all the allegations that have been made on Four Corners. You know, everyone here, every irrigator on the Barwon-Darling is feeling like, you know, we're being accused of water theft and underhanded – underhanded business. I can assure you that I have never stolen any water, never intend to steal any water, and I just feel that it's – that our – you know, our entire industry has been very poorly accused of – of underhanded actions and very few, if any of those are correct.

MR BEASLEY: All right. Mr Cole – sorry, did you want to ask.

THE COMMISSIONER: Yes. Could I ask one thing. At page 24 of your submission, you refer to the – an imperfect trading system – this is the second last paragraph – as one of the reasons the Barwon-Darling irrigators can never exceed cap. Could you just explain briefly what you mean by the imperfect trading system producing a result you can't exceed cap?

MR THOMPSON: So when the cap management plan was put into place, everyone received, basically, the same cutback of around the 64 per cent of water, whether you were active as an irrigator or not. And we were told by the State Department at the

time that if we wanted to rebuild our water as active irrigators or rebuild our licence as active irrigators we would have the chance to buy back some of that water from the people who weren't active irrigators. In other words, sleepers or dozers, I think they were called in those days. So we were cut back to 189, which was the active component of the 524 at the time, I think the numbers were.

Now, for us to use the total 189 we would have to have all the water trade from the inactive components into active every year, because our average use was, under cap conditions, 93/94 levels of development, 189 gigalitres. It's impossible for us to do that now because, as I said, we have to have that perfect trade of all the inactive components to active, and we would have also have to ask the Commonwealth Environment Water Holder to give us back our 32 gigs, and we don't expect that to happen.

THE COMMISSIONER: I understand. Thank you very much. That explains it.

MR COLE: And just, I guess, on top of what Tony has said, I mean, a bit of a closing thing – if that's what we are doing, we are closing at the moment, are we, or - - -

MR BEASLEY: Yes. If you .....

MR COLE: I think Tony has already touched on it, but part of the reason we wanted to be involved in the South Australian Royal Commission was to dispel some wrongful allegations and we feel that, you know, over the last year or so a lot of them have been made in the media and other places, but the fact is we don't use unsustainable amounts of water on the Barwon-Darling. There's some argument about whether we use six per cent or something more, but we certainly don't use anything like the 30 per cent that is allowed under the Basin Plan. And when it comes to averages, you know, people who made submissions, and you mentioned the Maryanne Slattery paper about the 1956 floods being included in our – in our calculation.

Well, the fact is that was a pretty interesting decade for the Barwon-Darling. I think the Barwon-Darling was just showing off its variability, because we had two big floods but we also had some of the driest years ever in the 1950s. And, as I said some time ago, when you have a look at averages, that's what they are. You take the biggest and the smallest, you put them all together and divide by a certain number and you get an average. Now, if you wanted to take out the high floods, we don't get anywhere near the 30 per cent of the plan. We're probably, if you took that, you might get to 15 per cent of use. So we're not a big unsustainable user on the Barwon-Darling.

We do understand, however, in lighter flows we can have an impact. As Tony said, we don't steal water. I've been involved now for decades in the irrigation industry on the Barwon-Darling. I've never seen anyone steal water or conspire to steal water. We don't have a longstanding cultural issues regarding licensing and

compliance. That's just not sustainable to make that allegation. We don't pump environmental water. In fact, we have been the ones who have been involved in setting up a situation where the CEWH's water can be shepherded through the Barwon-Darling. We have not resisted the metering program. We actually supported the metering program on the Barwon-Darling. And that's an established fact by the correspondence I sent to you.

MR BEASLEY: Yes.

MR COLE: We have always had a good relationship with the regulators as far as setting up reforms and we support the balance of the triple line approach we have talked about before, even though there might be some argument constitutionally that there is no such thing, but we do support the triple bottom line approach to try and get that balance where you can have healthy working communities along the Barwon-Darling and a healthy river.

MR BEASLEY: All right. Thank you very much for your submission and your time today.

THE COMMISSIONER: Yes. Gentlemen, I'm much obliged for you making yourselves available and for the trouble you have taken. Thank you very much.

MR COLE: Thank you.

MR COLE: Thanks.

<THE WITNESSES WITHDREW [3.53 pm]

THE COMMISSIONER: We will adjourn to Monday at 10 o'clock at the Town Hall.

MATTER ADJOURNED at 3.53 pm UNTIL MONDAY, 30 JULY 2018

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