# Transcript

# A conversation with the Commonwealth Environmental Water Holder (CEWH)

(Webinar)

**March 7, 2022 – evening session**

**Siwan Lovett:** Good evening, everyone. It's lovely to have you joining us this evening for our conversation with the Commonwealth Environmental Water Holder and friends. So joining me this evening, I have Hilton Taylor, who is the Environmental Water Holder led by Hilton, Jason, who works with the Commonwealth Environmental Water Office as a locally engaged officer, and we also have Skye Wassens joining us, who is doing research, looking at some of the ways in which water for the environment can assist our birds and frogs and a whole range of other creatures involved in our wetlands. So my name is Siwan Lovett. I work at the Australian River Restoration Centre and as I said before, it's a real pleasure to be here this evening and we're looking forward to getting all your questions and comments, but those of you who haven’t used Zoom before, if you go to the one of your screen, you'll see a little bubble which says chat and if you click on that, that enables you to put comments and questions in the chat bar which will pop up on the file, right-hand side of your screen. Anyone most welcome to put comments and questions in throughout our presentation and discussion this afternoon. We'll be moderating all the questions and anything that we don’t get to answer this evening we'll get back to you depending on how many questions and comments you send us through, so please keep us busy. So to start, I would like to get Jason to come forward and acknowledge country for us and I'll just get you to change to the next slide please, Pat. Thanks, Jason.

**Jason Wilson:** Thank you, Siwan. This has been a traditional welcome up in my country that was handed down to me by my great uncle and when I say the word Yuwwalaraay, that means all Aboriginal people, so please – here we go. Yaama ganu. hello everyone. Giir Yuwaalaraay nhalay maran nguwalayy winangaylanha. I acknowledge the Yuwwalaraay people who are the traditional custodians of the land on which we meet. Girr wayamaa winangaylanha ngiyani maran. And pay our respects to elders, both past and present. Ngindaayluu yilaadha winangaylanha ngiyani. And further extend that respect to all others here today. Yilaalu yalagiyu dhugay MurriYuwaalaraay dhaymarr nhalay. This was and always will be Yuwaalaraay land: long ago, now and always. Thank you. Hilton, I might go to you.

**Hilton Taylor:** Okay. Thanks, Jays. Look, first of all, good evening everyone and thank you for giving up your precious time to come and spend some time and listen to what we've got to say but as Siwan said at the beginning, this is really about your opportunity to ask us questions. The presentation will be quite short and is really about our conversation and the discussion. Just before I get started, there's a couple of things I'd like to mention. First of all, thank you, Jays, for the Acknowledgement of Country and of the First Nations people and it's a really important thing to us in the Commonwealth Environmental Water Office. We work right across the basin on First Nations land and that’s land that we acknowledge has never been ceded by those First Nations so we got to be pretty respectful as we work in the rivers, on the wetlands and across the communities, right across the basin. Just before we go on, the other thing I'd like to point out is the background of, if we can get back to the last slide, the background artwork here behind that first slide has been done by one of our staff members or was started by one of our staff members, a proud Wiradjuri lady, and this artwork was a canvas that she drew the base pattern on and all the dots and the colours and the things that have been added in have all been done by staff of the Commonwealth Environmental Water Office, and it was done as in the background, just as people had breaks during a planning day and then has sat in the office here for a long time and people just gradually added to it and this is the final product and we're so proud of it. We hang it here in the office with another piece of art that Rebecca has done and it's a really good reminder to us about the work we're doing and the importance of coordination and cooperation with the First Nations people at the basin. So if we can move on to the next slide please, Pat. So the theme of tonight, as you saw probably in a promotional material for the webinar, was from droughts to flood and rains, and I guess when we first started advertising this, we hadn't experienced the recent flood and rains that some of our friends and colleagues along the East Coast have experienced trauma that comes with that. It really just highlights the extremes that this country can go through in a matter of years, and our thoughts are with those people who have lost everything in the floods recently in South East Queensland and Northern New South Wales, in particular and our family and friends live in that part of the world and I'm very familiar with that part of the world and pretty concerned for some of those people. But what I'd like to do is think about the basin, so west of the great providing range and the changes that have occurred there over the last couple of years. And if you look at those two photos on your screen, that’s a pretty good metaphor for the changes that have occurred across the basin. The Narran River was parched [Dust Bowl] and in that part of the world, so the Narran River comes out of Southern Queensland out of the bottom of the Balonne River, crosses the border in the Northern New South Wales and runs out of this to Narran wetlands, and Jason will tell us a whole lot more about that later. It's a really important country to his people from that part of the world. But this metaphor of droughts, boom and bust, droughts and floods is a real thing across the Murray–Darling Basin and what's really important to realise is that the Commonwealth Environmental Water Holder and the office works so hard during drought. There were other streams in the Northern Basin that looked a bit like the Narran River during the worst of the drought in 2019 and 2020, that we were able to get some flows into and just keep some key waterholes alive, some refuge here for fish to survive in and when the good times came, those fish were still hanging in there just in some cases but they’ve been able to breed if there's storms and there's young, tiny fish floating down with this floodwater and they're making their way all the way down the Darling River and we've been monitoring in Lake Menindee and places. And if we go to the next slide, we can start to see what happened as the seasons changed. We've got birds starting to breed in parts of the basin from right up near the Queensland border, Gwydir wetlands, Narran Lakes right down through the middle of New South Wales and the Macquarie Marshes. There's so much bird life at around the Menindee Lakes and Western New South Wales. Further down into the Lachlan and Murrumbidgee catchments, we've seen great response to the water that’s come down those rivers, and Skye will talk about some of the results of the water or the impacts of the water and some of the results I mention. And these positive responses to water have been seen right down through the Barmah-Millewa forest on the Murray, and down even into the Coorong, in South Australia. So the season really has changed and it's been fantastic to see. So in the dry times, we were able to add a little bit of environmental water where we had it and where we could get it to, to keep refugia alive, keep birds alive, keep vegetation and fish populations just ticking over. They hang in there and when the good times have come, they’ve actually really been able to expand. So then people say, well what are you using environmental water for in these flood times? I think there's one or two stats in this that I really like people just to think about, so from when all the dams were empty when it started raining through to now and they're all full, lot of them are overflowing, there's been about 10,000 gigalitres of water caught in those dams to fill all the dams up and that’s a really important to thing that these dams provide water security for communities, for irrigation, for the rivers. It’s a really important part of the economy and this modified landscape. But if you think about 10,000 gigalitres of water that’s now stored up in those dams and the headwaters of these rivers, that’s equivalent to roughly 20 Sydney harbours. Start thinking about that, that’s the water that would have gone down the river in addition to what has gone down the river and people say, “Well, why do you need environmental water in wet times?” Because these rivers are so modified, so these birds they might start nesting, the rain stops and, you know, in a natural system the rivers would have kept running and gradually receded but with the dams and trying to maximise the resources capturing those dams, when it stops raining, the dams hold that water back instead of it just running down the rivers so the birds can start nesting and then, all of a sudden, be left behind dry because the dam is just starting to catch-up water. So as having this water in wet times to be able to gradually have a recession in the rivers and hold the water in the wetlands long enough for the birds, fish, frogs and vegetation to finish their breeding cycles is a really critical part of the work that occurs with the Commonwealth Environmental Water in wet times. So the other thing that is, I think, really important to realise is that the Murray–Darling Basin is a pretty dry place, or a lot of it is out in the western part, and you can see that photo in the bottom right-hand corner. Even in a great season like this, those rivers and creeks are such an oasis through a dry landscape and that photo there is the outlet from the bottom end of the Menindee Lakes where there's a canal being dug down to where the timber is in the background there in that photograph where that canal joins into the Great Darling Anabranch and then makes its way hundreds of kilometres through the old paleo streams and the old original Darling runs parallel to the Darling, west of the Darling and joins the Murray River down in the Wentworth. Now, that becomes an oasis in a natural flood. At the beginning of this season, we were able to use Environmental Water to ensure that that was connected all the way through and then the natural floods come on the back of that and allowed that to continue to flow, now we're back in there with some environmental water as a system, really just to keep it ticking over and keep that system really healthy and keep that oasis through that dry country out in the western part of New South Wales. So as you can see, there's a lot that’s going on across our river system, fish are breeding and there’ve been two good seasons now. So places like lower Darling where in the worst of the drought, we saw those horrific fish deaths where water quality got bad, pools got separated, fish were really struggling and there were some situations there where water quality changed really quickly with changing weather conditions and heaps of fish died, big Murray cod and thousands, hundreds of thousands of fish died. So in those rivers, there are now populations of these Golden perch, and Murray cod, and Silver perch starting to swarm and breed and spread through that system again. So this is a really good new story on the back of what has been a pretty horrific drought. So what we need though is to have a few of these seasons so that this fish make it through to an age where they can breed, and that’s a really important part of our work, trying to keep some refuges, trying to keep some good spots in the river, allowing this fish to survive and grow and thrive and breed themselves and that’s what we're really looking forward to in the future. I might just pull up there and allow Skye Wassens to just go into a bit more detail in some of the actual measurements and research and stuff that’s going on to see how we can manage our water and how we can improve what we do with it. Thanks, Skye.

**Skye Wassens:** Thanks, Hilton. And it's great to be here, and I can't see everyone but I'll do my best. So I'm gonna take you through a few years in the Murrumbidgee and these pictures actually the lower Murrumbidgee that includes Gayini, which is Nari Nari country, the Redbank system, the north and south Redbank, and down towards the junction wetlands which show another really important asset. In actually seeing in 2020, you can see the Lachlan heading down towards the Murrumbidgee too and the Great Cumbung Swamp. So what we're looking at here is a series of four years and it's interesting how the landscape changes, but I just want to run-through the types of watering that are done under those different low water available within through to high-water availability. So in 2018-2019, we had a relatively dry year, we had a low-to-moderate allocation and in those types of years, the focus of water in this on maintaining refuge habitats and that’s permanent wetlands or permanent creek systems and what we call this grassy, all these aquatic meadows which are those incredibly diverse, really open aquatic habitats that we see and they are really unique to different wetlands and a key feature of these systems is that it's too wet for river red gums to establish. So the way we can maintain these systems is quite frequent watering and historically they were watered, I think it's 97 out of 100 years, so they have really high inundation frequency and maintaining that inundation frequency is really critical for stopping encroachment from river red gums because once they start to encroach it's really challenging. In 2020, we had very dry conditions and very hot conditions and it was a challenging year right across the basin. The watering in that year really focused on our critical refuges to maintaining them in a good condition, and Hilton touched on this as well, that these keep all cost systems, they are really important for things like total populations on native fish. They are fantastic for some of our endangered species like grey snakes and large group of myotis, and southern bell frogs, of course. So the watering again contracted down to these critical refuges where we have threatened species and areas that we had to maintain. In January 2021, we had a high to moderate. It's starting to get a little wet and you can see there's a greater area of inundation in that year. And as if the water availability increases, we can scale up from the refuges, the aquatic meadows, up into the larger red gum forest which tolerates drying a little better and up into lignum and black box systems. And so these lignum systems, in particular through Gayini are really important for waterbird rockeries. They are a really critical asset that we have. So we're also thinking in those years of how we might support some waterbird breeding and we did have a good waterbird breeding event up in Gayini in 2021. And then this year, it's obviously very wet conditions, we have arm-length flows inundating most of the river red gum system forest. So instead of doing that job and, as Hilton mentioned again, we're now having waterbird breeding in lignum systems and through some of the red gum. And now we're using environmental water very strategically to manage those waterbird breeding events to ensure that the birds have water to get them through to fledging stage but also for those juveniles so that they have foraging habitats, so we need to be quite careful about ensuring those juveniles were in good condition and they're fit and healthy and they will take on the world as well. So there's a hierarchy of how we manage the system to try to hit the watering environment for the whole system. So if you'll notice, we jumped to the next slide. So what that means is we're managing to support the whole floodplain and biodiversity across multiple species as well as these aquatic communities, so ensuring those dry years, ensuring we manage our threatened species, and things like southern bell frog, ensuring some low-level breeding so that we can keep those populations going in. And after you joked that frog is a commitment for life, so there's not a lot of value in getting a breeding event if we’re then gonna strand them for a year, and those individuals are going to die. So if we'll produce a frog, as soon as we've produced that tadpole, we need to be thinking about getting that tadpole through metamorphosis, making sure that tadpole has got foraging habitat – well, the metamorph’s had foraging habitat, so it can grow in refuges in the following states and we can build up populations of threatened species by being very careful with how we manage those animals right through their lifecycle. And similarly with bitterns, we've seen big increases in oscillation bitterns through the Lowbidgee as we've created this habitat that supports them. They can stay through the whole year, they don’t have to move away and look for new habitat, so we're getting probable amount of breeding success and seeing a lot of juveniles hanging around in winter which we haven’t seen so much previously. And then obviously in these bigger years where we're getting thousands of pelicans and 30,000 ibis and glossy ibis and a huge diversity of birds breeding, that’s when we can use that water to sustain those events and to make sure that those juvenile birds have all the habitat they need. We can also manage some of those in channel responses to get connectivity through the systems. So that’s what where a good time for me to go and introduce Jason Wilson who’ll be talking about Dharriwaa, the Narran Lakes and give you a real insight into waterbird breeding there.

**Jason Wilson:** Thank you, Skye. It's wonderful to be able to talk about Narran and I'll go through the slides that I've got here in front of you probably from left to right. So I want to talk about Dharriwaa. Dharriwaa means a meeting place. So Narran Lake, once that water comes there and the birds come there, the people come there, and there's a whole suite of cultural and ecological things going on in the one place, the JMC or the Joint Management Committee for Narran had been set up about 12 years ago but we've been working with National Park over a longer period than that and the park is about 30-years old, probably 31 years old, so we had our 30 and our ten-year celebrations about a year-and-a-half ago, so that was one of the great opportunities to celebrate the park. Even though it was still dry, we still managed to get a party happening in that dust and kicking it up. So Narran Lakes has been extremely dry over the last – I think the last time we had bird breeding out there was around 2012 and it's 2022 now and there's some beautiful water. As you can see there in the bottom, middle picture, in that 2019-2020 water period, we had the start of some really solid inundation. Now, all our entitlements had been triggered and they’ve been let loose to get only a way down the lower Balonne system, and not even recharging the Balonne-Darling system, but replenishing the beautiful lignum expanse which Narran is quite renown for its lignum and they have two shots there, the 2019 at Back Lake and the 2022, really shows the difference between how dry it was, that most lignum was pretty dead but it does look magnificent now and it's holding the birds up. I want to get into some of those birds that are breeding out there but just coming back to the 2019-2020 period, we did a priming exercise there where we had a grant for an EBM, events based mechanism, and we did top up the lake on the back of all our entitlements being triggered in that event to try the lignum for this 2022 events. So it comes back to some of our planning in our sites that I'll touch on a little bit later. But I'll get in to some of the birds right now. In 2022, we've got two rockeries setting up out there at Narran, one in the middle of Back Lake, just to the right of that photograph, and there's about 5,000 straw-necked ibis in there and that’s the main rockery, it's the best spot on the lake. And then in the southern arms, we've got a mixture of straw-necked glossies and white ibis and we got spoonbills, egrets and cormorants. There's been noticeably little dots nesting on this time but what we can safely say is that it's been over 20 years since the Macquarie Marshes, the Narran Lakes system and the Gwydir have all registered bird breeding at the one time, so it's quite incredible. I think the ducks are blessed where they can nest. It's not just in those wetlands, it's all those rivers that provide the same habitat opportunities for them to do their things but we do get some special ducks out there. Our two-way plans work. We have prepared these events based mechanisms and we also prepared another one for 2022. We didn’t activate that because of the fact that there was a rain event in the Condamine system on that eastern side of the Condamine and it's coming down and hopefully that’s gonna connect and replenish the Narran Lake system and finish off some of that beautiful bird breeding that’s occurring out there. It shows that our water management plans work and I've got to tip my hat to my team, Mike Peat and the team that’s underneath him, work extremely hard, not only to get the events based mechanism going but the relationships that we have, not even with the Narran Lakes Joint Management Committee, but also with some of those operators both in Queensland and New South Wales to make sure that these events are timed perfectly, all the sciences coming in and they underpin the direction that we're going in. Lastly, I just want to touch on some of the engagement activities. We're pretty proud and we provide a lot of detail in our updates. Our updates are an A4-sized two-side page information and we got wonderful pictures in there and again, the pictures not only tell the story like that little bird that’s on there. That’s Kate Brandis in 2008, a beautiful photo of a straw-necked ibis and what we call those straw-necked ibis up in our country, we call them murrgumurrgu. We love taking these photographs but we also love working with the science team, explaining how important our environmental water works up there and apart of that is working directly with some of those networks that we have and we pass that information out to the floodplain associations. We took the Lower Balonne working group, broader communities. We love working in the schools. The last Narran Joint Management meeting that we had up there, we couldn’t have the open day, it actually was the south, but what we did there was, we set up in school, we had five or six scientists there with a SMART board behind them and we rotated school kids through the classroom. It was a most enjoyable day. We talked about fish, we talked about veg, we talked about a whole suite of science things that we're doing out there. I got to slow down a bit. I'm getting a bit excited. Lastly, being in the ground and some of that science work grant through things, the bird and vegetation surveys, and being involved in the open days with the Joint Management Committee. I think the Commonwealth Environmental Water Office has had a wonderful relationships with the local Aboriginal community up there, getting them involved in a lot of the work that we do, so that includes, even in our updates for instance, we're starting to use a fair bit of Aboriginal language, so that’s a fair-dinkum go at of participation and involvement. Lastly, I just want to say thanks for talking about Narran. So if you don’t know Narran, you got to come up and we'll tell you about the traditional story of the creation of Narran, of a great crocodile that’s been speared there by the great creator and his thrashing emotion had made the lake system. Thank you very much. And we've been through the dry and now, let's celebrate the flood and rains and see what that brings. Thanks, Hilton.

**Siwan Lovett:** Thank you, Jason. And if we just go to the next slide, Jason works with the team of local engagement officers across the basin and here are all their lovely smiling faces. I'm sure some of them are actually here joining us this evening with this presentation but we can send you those details and you can find them on the website as well. So let's now get some questions from you and one of the things I wanted to start with and Jason, I might actually go back to you here. It's from Terry Corn, but I'm just wondering if you can respond to him. He's asking about which cooperative and participatory management models do you think are most appropriate on government-owned or community-owned water with Aboriginal people.

Jason Wilson: I think the model that we had now with National Parks and Wildlife Service, it's a truly joint-managed type of process. There are operation plans that the park has to subscribe to but the best thing about it, we sit there with the area managers, the regional manager and there ops teams and we deliver, not only Commonwealth Environmental Water scientific work out on Country, we do pests and animals and there are all complementary measures, some fencing if it's required to protect some of these places, and Narran being a nature reserve, there is a caveat that you can't just generally turn up and think that you can get on to that national parks. You need to come through the National Parks and Wildlife Service but the Joint Management Committee also facilitates tagalong tools and we're trying to trial how we get people to be more involved out there at Narran in a closed system. But certainly I think the National Parks has paved the way in regards to getting us opportunities to put a hand on the steering wheel and drive the management of some of these places. There are better models but we'll take what we can get.

**Siwan Lovett:** I love the idea of the hand on the steering wheel. Skye, what experience do you have as a scientist working at Charles Sturt University in terms of working with Indigenous people?

**Skye Wassens:** I mean we’re fortunate in Murrumbidgee to work on some great Indigenous country, particularly Gayini, Nimmie-Caira and actually I notice that Jamie is in the chats. So I guess we've been fortunate to develop those relationships, and particularly now with Gayini, Jamie and his team are really critical in terms of delivering water and having eyes on the ground and monitoring what's happening in their systems, so it's really valuable to have people with such an incredible knowledge of the system being able to actively engage in and being able to support the management decision. So I think it's a huge asset in terms of having that incredible knowledge available and building that into the management that we do in those systems.

**Siwan Lovett:** And Hilton, what about your perspective as someone in your role as the Holder, integrating First Nations or actually honouring First Nations work?

**Hilton Taylor:** As I said at the beginning, working with First Nations is a critical part of our work. These rivers, they really belong to the communities and whether they're First Nations communities or people who live and work along those rivers. So being involved and integrated, and thinking about how people wanna use their waters or river is an important thing. There's some fascinating stuff going on in the background at a higher level around environmental water versus cultural water, who owns that water, who has the rights to determine how, where and when that water is used, and I think that’s really important things people to understand. The governments, collectively, state and federal, have different policies around cultural water and environmental water. The water that we manage is actually the environmental water and it is really tightly bound under legislation about what we can do with that water, and what we try to do with that water is – well, we have to get environmental outcomes, first and foremost, we can't use it for commercial purposes and things like that, whereas cultural water, if it were truly cultural water and owned by First Nations people, they could trade it, they can get comfortable outcomes, they can get environmental outcomes, they could use it to grown their own culture or whatever, it should be completely there to measure what the water is used for. What we do though with the environmental water is work really closely with First Nations people, Aboriginal people right across the basin to get their input to what environmental aspects or the work that we do are important to them and build that into our planning. And if you look at the plans for the 2021-2022 water year, the water year we're in, right up the front of those plans that are done by the Commonwealth Environmental Water Office, we've actually got a statement about our engagement, our process for engaging and some of the priorities that we'd like to get involved with First Nations people. So Cultural Water and Environmental Water, it's a Venn diagram. There's decent degree of overlap where the original environmental priorities overlap and counter side with ours and we can leverage that but there's also other parts of the Venn diagram where the cultural water could and should be used for other things that are completely at the determination of Aboriginal people.

**Siwan Lovett:** It's important to make that distinction. I'm thinking of where in that Venn diagram they overlap, particularly thinking about water quality in the Murray–Darling Basin, 'cause that’s something that affects everybody and all the animals and the birds, and fish as well as those that rely at the irrigation and urban supply. How does environmental water prioritise? Is water quality something that’s prioritised in terms of your work? Where does that sort of fit?

**Hilton Taylor:** So the water quality is something that we're very interested in because clearly it can have an environmental impact, but water quality is really the jurisdiction of the states. If you look at the state waters legislation, it's about keeping the rivers functioning for other water entitlement holders and that would be for town water supplies, or for irrigation purposes or whatever those other entitlements are, for environmental purposes, where the base legislation should have a functioning and healthy river that’s there and water is put aside for that first, then put aside for other uses beyond that. And the way the Commonwealth Environmental Water Holder has been established, we actually own entitlements that held the same as other irrigators and things like that. So we should be able to use our entitlements to get environmental outcomes as to where and how we need to get them and not really be just there to drive the functioning river. That should be underpinned by the water first and foremost.

**Siwan Lovett:** So the other question here which I think is a good one given that we have so much water around at the moment, why isn't environmental water lost when dam is filled? So isn't environmental water just filling at the banks? So how do you actually tell which is environmental water and which isn't?

**Hilton Taylor:** So I think it's really important to understand that the water that we hold as the Commonwealth Environmental Water Holder is entitlement-type water. It's the same water, the same conditions, the same rules applied to that water now that we hold it as were applied to that water when it was held by other irrigators or other entitlement holders before it was acquired back to help the rivers be more healthy. So when that water was acquired back, the rivers were in a pretty sad state and it was decided that more water had to be available for the environment. Now in a wet year like this, that water that’s currently on our accounts or other people’s accounts, that water sat there on people’s accounts and the rivers flooded. It didn’t get debited from irrigators then and it doesn’t get debited from this irrigating now, otherwise, it would change the baseline if would have to recover more water. So it's really about the baseline against which the base or the state of the base has made to be improved for long. So when they think about that, they should think about us as just being another irrigator. It didn’t spill when it was held by irrigator A and it doesn’t spill when it's spilled by irrigator B which is us now.

**Siwan Lovett:** It happens to be you.

**Hilton Taylor:** I’d have to have a go and pick that more of that confuses people but that’s probably about a simple way I can try to explain.

**Siwan Lovett:** We can see in the comments if people want to expand on that a bit further, but I'm interested in picking up that idea of a lot of what you do is you manage the water holding just like an irrigator or anyone else. And Skye, I'm just wondering, can you reflect a bit on how the science that you're undertaking through the flow monitoring evaluation in certain program is actually assisting water managers like the Commonwealth Environmental Water Office to manage their water so that it is getting if you like that term the best bang of the buck for the environment.

**Skye Wassens:** I mean there's multiple facets of what we do and I've been operating in Murrumbidgee for a long time now, so that was before there was Commonwealth Environmental Water available and we've played a role of helping to understand the system, helping to understand what types of responses were likely to get with given amounts of flow and providing that more robust quantitative evidence for – if we delivered water for the benefit of the southern bell frogs, for example, did they reproduce, did we get the outcomes we wanted and if not, why not, because water is really valuable and making sure that we're getting the outcomes that we're setting out to do is really critical. So we do play a bit of a role both in terms of working with partners and developing management options and working to develop management but also informally adaptive management approaches and helping to improve the science and helping to improve for way we manage the water going forward, so it's a fairly diverse role.

**Siwan Lovett:** And so in that work, you'd be actually talking directly to other managers, directly to First Nations refuge to local communities? Is there a whole range of people involved?

**Skye Wassens:** Yes. So we do talk across a range of stakeholders and really our role is to give the science and we don’t make the decisions as scientists. We'd provide evidence to water managers, to communities, to help them make an informed or evidence-based decision about how to use water and what's likely to get the best outcomes. So that information is all publicly available, it's online in reports, and we do really try to share that evidence as widely as we can so people can make good decisions.

**Siwan Lovett:** Thanks, Skye. And Jason, I have a question just for you on those beautiful photos from the Narran. So I've got a question here about where does the Narran River terminate and is it in the Narran Marshes or does the water go further on and re-join the Murray–Darling system again?

**Jason Wilson:** Yeah, very interesting question. It's interesting river system. It braids and it splits up around Dirranbandi, goes down the far western corridor which is the Culgoa River and there's a number of middle streams in the middle, so the Barwon River, the Birrie and the Bokhara River, and Narran is one of those most eastern stream along with the big Warrnambool. But the water comes down to Narran, and unlike those other streams I just mentioned don’t have any lake systems but the Narran has extensive lake system. So they’ve not only got the Bokhara Lake that’s over the border there very close to Hebel. They’ve got the Angledool Lake, just on the other side near the Angledool, so that the water has got the flow there, the water has got to fill there, and then these are fairly big lakes, and then you get down to the Narran complex. But just before that, you got the Narran wetlands. So they're all filled too but also didn’t go into Narran Lake Nature Reserve and that’s quite an incredible complex itself. It's got Back Lake, it's got Long Arm and it's got a number other smaller lakes that it all feeds down to a southern and the northern island that goes into the main lake which is what we call Burrul Guumin, Big Water, so that is an incredibly huge lake. And once that fills, oh my God, if it ever fills, it does go Roscommon, towards Brewarrina, it flows on a lake and then it joins the Barwon, not too far from the other side of Brewarrina but very rarely does it pushing out through that Black Box country, Coolibah country, over the back, but the main lake takes an incredible amount of water.

**Siwan Lovett:** Have you seen it from the air, Jason? It must look amazing from the air.

**Jason Wilson:** We had an opportunity and a big thank you for, not only the Department of Planning and Environment but New South Wales National Parks and Wildlife Service. We had a helicopter up there a couple of weeks ago and we brought some of the petrol in time of the helicopter to get James and their members up. Unfortunately, I was there and I had a big lift, I was dragging my lip on the ground because everybody else got a chance to jump up in the helicopter and there were buzz around. I have flown over the top of it with the minister about a year or two ago. We actually banked and circled around it before we went off to Murray. I have seen it very dry but I haven’t seen it very wet.

**Siwan Lovett:** Well, fingers crossed, maybe we'll get a helicopter for you again some time. It looks like it's a phenomenal system. So Hilton, I've got another question here and, again, it's about management but it's also about the damage that water can do as well. So in some parts of the Murray and the Goulburn we have seen some damage to riverbanks such as bank something and bank erosions and are these because of environmental flows going South Australia? What causes that sort of activity to occur along rivers?

**Hilton Taylor:** So I'm not sure that we really unpacked this too much at the beginning but if we think about the Murray–Darling Basin, it is so modified from how it was naturally. If you think from starting down on the Goulburn in Victoria, there's like Eildon and then it come around to Dartmouth Dam, Hume Dam, Blowering Dam, Burrinjuck Dam, there's just all of these rivers have got big dams on their headwaters, Wyangala Dam on the Lachlan, Burrendong Dam on the Macquarie, and goes up to the Keepit, and the other one is in Northern New South Wales. So on the western slopes of the great providing range, all the headwaters of these rivers are damed. So they run completely differently from how they run naturally and this is really important for agriculture and economic benefit and things like that. But what it means is that at certain times of the year when irrigation demand is high or there's other demands in the system that are high, the rivers run constantly at a high rate for long periods of time as these waters eat out the dams to meet very specific waters. And you get this flat, if you like, flat river, it just runs at one level for long periods of time and it can notch the bank or erode the bank at a certain level, whereas naturally, the water would have gone up and down a lot more with rainfall and natural flows and the bank would have been wet and dry and vegetation would have thrived on those banks and kept it stable and things, but if you have these banks with these rivers run hard to long periods of time delivering water, that can be real problem then, particularly if at the end of an irrigation season or something, they stop the delivery of water, there's a notch in the banks, so the bank comes down and it cuts back in and then goes down to the water level, and then there's a natural flow, there was something that comes over the top of it and wets up the topsoil above the notch, and it can just cause the whole thing to slump. And so this is some of the bank erosion that we’re seeing and it’s from modified streaming and I don't think it's right at all to buying environmental water. We’re about 15% of the held water that’s delivered, so that’s one thing, but it's also something that we'd put a lot of effort into is having variability. That’s one of the things we do. That should put our water on top of irrigation waters or when the rivers are low, put our water up and down a bit, trying to send some of the natural segments to the native fish and wildlife that are used to or have evolved with these variable flows. So this variability that we try to build into our flows probably helps counteract some of that notching and some of that bank instability that occurred but it's an artefact of a highly-modified river system that's developed delivering huge good for other communities and economies and things but that’s one of the costs that comes with that regulated with the system.

**Siwan Lovett:** So given that the system is so highly-regulated, does the Commonwealth Environmental Water Office actually work with you irrigators in terms of planning, where are you gonna put water or you just do your banking?

**Hilton Taylor:** Absolutely. It's become far more sophisticated thing. So if you think about it, irrigation has been around 100 years-ish, particularly in the Southern Basin, around the Murray, and the Murrumbidgee and some of these places. It's a well-oiled science. It has been around a long time. Serious management of held environmental waters 10 to 15 years in the making so far, and it's really just starting to mature. It's an adolescent but it's starting to get smart and it's actually starting to work with the other water that’s in the system. We're actually starting to use irrigation infrastructure to get water onto the areas of the flat plain then we couldn’t, otherwise, get environmental water too with that massive flows, and this is a fantastic outcome 'cause we get a win-win for the local environment, we're hitting targets that are really important on the flood plain for vegetation, fish, frogs or whatever, we're getting revenue through irrigation corporations, we're getting local employment if we are modifying those infrastructures to be able to deliver the water to the environmental assets that we're targeting. So these are really smart ways to use the water and the infrastructure and the system, to get this balance between both the economic agricultural community outcomes and the environmental outcomes. Just recently up above the Narran Lakes, we actually had a grant system that we put in place there to secure, like an insurance policy if you like. The birds started breeding in Narran Lakes. We didn’t have a crystal ball or it was a bit dirty, we couldn’t see how much more rain was coming, and so we actually entered into a grant arrangement with irrigators further upstream on the Narran River to be able to purchase water off them if the water levels in Narran Lakes started to fall away and it was gonna strand the birds that have started breeding there, and this is a really important bird breeding event and there hasn’t been breeding there for ten years, and we really want to see this bird breeding event to be successful. So we entered into this grant system, we are ready to press the trigger and get some water off these irrigators, and it would’ve been financially okay for them, fantastic environmental outcome, and really transparent way of doing business, anyway so the grant has put there and we didn’t need to use it this year but it was the idea of everybody working together as where the future is, not environmental water over here and irrigation water over there.

**Siwan Lovett:** So Jason, what does it mean to your community to have you so active working for the Narran and to be right in the middle of all these decisions, put your hand on the wheel, as you were saying?

**Jason Wilson:** I got to be careful sometimes, Siwan. I've got so many hats, sometimes I get confused which one I put on, but being the chair of the Narran Lakes Joint Management Committee, it's fantastic. We've worked extremely hard not only with the Commonwealth Environmental Water Office and some of the science work on the grant but we've led in the University of New England with their science faculty on some of the cultural heritage output there, not only the cultural heritage but there's some of the oldest middens in the interior at Narran. So the last glacial maximum, there's over 70,000 years old. These middens go through kilometres out at Narran, so there is a whole information and opportunity that we've been tapping into as the Joint Management Committee. My gig with the CEWO has only started five years ago and I think that’s been advantageous for my committee 'cause it articulated the conversation that we're having ten years ago with National Parks. Anybody that’s doing science on our country would want to have a relationship. We wanna jointly and co-manage any processes that occur here. So naturally we're gonna have that conversation with the Commonwealth Environmental Water Office at some point, and just advantageous and I can juggle balls, I suppose.

**Siwan Lovett:** Well, Skye, I wanted to ask you a little bit, ‘cause you’ve seen some photos about those beautiful birds. There were bitterns in the middle of your slide and also the southern bell frog 'cause there's actually been some really some positive news about the bell frog. Can you say a little bit more about how that species is actually recovering?

**Skye Wassens:** Yeah. So the southern bell frog is one of the most common frogs that you saw in the Murrumbidgee prior to the millennium drought, so it must have been the 1990s. We came very close to losing that population during that millennium drought and there were some very strategic watering actions that happened to just told a couple of populations and over the years, I guess over a ten-year period, we've slowly been building a population’s backup to getting much closer to where they were prior to the millennium drought that was taken by a long time, but we're now seeing a recolonising areas where we had reported them for a decade or more than a decade which is really good news. I guess the other great thing with bell frogs is, if you have bell frogs, you always hear bitterns whereas they tend to go together, and that’s mainly because bitterns really like eating bell frogs. But also things like the grey snake, it can be heard as an aquatic or wetland frog-eating species, that’s also very vulnerable, they tend to occur with bell frogs. So as we recover these populations, we're starting to recover a whole lot of other types of that really like eating frogs because they are perfect.

**Siwan Lovett:** I'm feeling really sorry for the frogs right now. And one of the great projects you’ve done, I'm just aware we're nearly to time now, but to let people know is that you’ve just recently shared a sound escape at that swamp as water went in actually, it was environmental water being delivered. Can you tell us a bit more about that? And we will put in the link into the chats so people can actually go and hear this wetland coming to life.

**Skye Wassens:** So that’s not a swamp, it's Nari Nari Country as well, and that’s a project we're working with ANU where we had an audio recorder in the wetland and it's been just quietly lagging away for five minutes every hour for quite a few years. Mitchell took that data and put it on a webpage so you can see the calls, you can listen, you can click on it and listen to the different calls, and it's really quite striking when you look at that audio data how it shifts from a system that's dominated by wetland birds and there's quite a lot of interesting things happening, and then it really hits a wall of sound within a couple of weeks of the water being delivered. And to us, it's a sign that the system’s functioning quite well because it means that there are resident frogs that have survived from the previous year that are there and ready to go straightaway. So we can use that from a science perspective to think about how healthy the system is but it's also just a great experience to really listen to the whole system.

**Siwan Lovett:** I remember I talked to both Skye and Mitchell who were responsible for this in a podcast episode, and Mitchell was saying that whenever he was listening to the frogs, he just had this smile on his face and the people in the office knew that he was listening to his frogs, which I thought was lovely to hear. Look, we are coming to time now. So we would love to hear from you, we’re going just popped a survey link so that we can hear more from you as to whether you’d like more of these conversations, which topics you might like us to explore, and any other comments or questions that you might have. We're really keen to get your feedback and to hear from you. So I would just like to say a huge thank you to Hilton, and to Jason, and to Skye for being here this evening and we'll look forward to hopefully having another conversation with you. If you would like another bite of the cherry, we are having a conversation tomorrow lunchtime as well. So if you can't wait to hear more, please come and join us then. So for now, thank you very much and I hope you have a lovely rest of your evening.

-END OF TRANSCRIPT-