

TRANSCRIPT

SELECT COMMITTEE ON VICTORIA'S RECREATIONAL NATIVE BIRD HUNTING ARRANGEMENTS

Inquiry into Victoria's Recreational Native Bird Hunting Arrangements

Melbourne – Friday 26 May 2023

MEMBERS

Ryan Batchelor – Chair

Michael Galea – Deputy Chair

Melina Bath

Jeff Bourman

Katherine Copsey

Bev McArthur

Evan Mulholland

Georgie Purcell

Sheena Watt

WITNESSES (*via videoconference*)

Professor Richard Kingsford, and

Professor Marcel Klaassen.

The CHAIR: I declare open the committee's public hearing for the Inquiry into Victoria's Recreational Native Bird Hunting Arrangements. Can everyone, including me, please ensure that mobile phones have been switched to silent and that background noise is minimised.

I begin the hearing by acknowledging the traditional owners of the lands we are meeting on here today and pay my respects to elders, past and present, and I also want to acknowledge any Aboriginal or Torres Strait Islander Australians who are joining us over the course of today's hearings. I welcome members of the public into the gallery – it is good to have members of the public back in the galleries of committee hearings, or those watching live on the live stream. I remind all of us in the room to please be respectful of the committee proceedings and to treat both committee members and witnesses and each other with respect and to remain silent at all times. Those who are unable to demonstrate that respect will be asked to leave the hearings.

All evidence taken at these hearings is protected by parliamentary privilege as provided by the *Constitution Act 1975* and the provisions of the Legislative Council standing orders. Therefore the information that witnesses provide during the hearing is protected by law. You are protected against any action for what you say during this hearing, but if you go elsewhere and repeat the same things, those comments may not be protected by privilege. Any deliberately false evidence or misleading of the committee may constitute a contempt of the Parliament.

All evidence is being recorded. You will be provided with a proof version of the transcript following the hearings. Transcripts will ultimately be made public and posted on the committee's website.

So for our witnesses, can you please state your name and any organisation that you are appearing on behalf of.

Richard KINGSFORD: I am Professor Richard Kingsford. I am the director of the Centre for Ecosystem Science at the University of New South Wales.

Marcel KLAASSEN: And I am Professor Marcel Klaassen from Deakin University.

The CHAIR: Thanks very much for joining us. What I will do, just for the course of the proceedings, is invite you in a moment to make an opening statement. We have got a good amount of time for your evidence today, because it is I think quite a foundational piece of evidence for this committee's inquiry. So I am hopeful that we will get some good time to get into the detail of your expertise. So the way we will work this is you will be able to make an opening statement of 5 to 10 minutes max so that then we can go around and engage in a discussion, and we will introduce committee members ahead of that questioning phase. I do not know if you two have decided who is going to go first or how you are going to do that, but I will leave that in your capable hands.

Richard KINGSFORD: Thank you very much, Chair. I am joining you from Bedegal country, and I pay my respects to elders past and present. I thank the committee for this invitation.

I have been working for more than four decades on waterbird research, including working on the game species of ducks. I was 18 years within the New South Wales conservation agency, and when I was there I was involved in collecting data on waterbirds, but I was also involved in studies on impacts of lead shot, which led me to chair a national task force which recommended the phase-out of lead shot for steel shot. I also led an independent inquiry into duck hunting in New South Wales in the 90s.

I have been doing and continue to do one of the longest wildlife surveys in the world, where we survey about a third of the continent and we count waterbirds – more than 50 species – including all game species of ducks. I guess one of the great advantages of these long-term surveys is that they provide you with an index over time of numbers of a whole range of different organisms and then it allows you to assess what happens to those numbers over time in relation to the very variable fluctuations we get in this continent during El Niño and La Niña phases, when there is widespread flooding or major droughts.

As well as counting more than 50 waterbird species, we also assess the distribution of wetlands, the habitats for these birds – so areas that are flooded and how much they have flooded over time. In 2017 we completed a comprehensive analysis where we looked at long-term changes in waterbird numbers and particularly the effects of changes to water management in the Murray–Darling basin over four decades – actually, it was over 30 years. And I guess the take-home message was that we have had a 72 per cent decline in waterbird abundances in the Murray–Darling, which was different to the northern Lake Eyre basin, where we have similarly been monitoring the birds. The fundamental issue here is that we have been losing waterbird habitat, wetland habitat, over decades as a result of increasing extractions and regulation of the rivers for the Murray–Darling, and we see that in the impacts on freshwater organisms that rely on those flows. At the same time, we also investigated whether there was any effect of hunting on those species, and we found a very small effect, which was considerably overridden by the loss of habitat effect.

I guess the other important thing is to remember that a lot of these changes that occur in waterbird numbers are in relation to the whole of eastern Australia, so the ducks of Victoria are not just the ducks of Victoria. The reason the aerial survey started with all the eastern states and the CSIRO in the early 80s was that there was a recognition that these ducks did not take any notice of state boundaries – so we know that they move up to thousands of kilometres and they respond to big rains and droughts. That also means that there are sometimes what we call lag effects, so you often do not see big breeding effects until the year later after a drought. Big declines that we detected and Victoria detected in the surveys in 2022 were confounded by the fact that there was a lot of water around and there were lots of ducks breeding. We would expect in the 2023 estimates of aerial surveys to start to see a bounce-back in numbers, but it does not deal with the overall long-term decline. I think I will leave it there and hand over to Professor Klaassen.

Marcel KLAASSEN: Thank you, Richard. If I may, I will follow up on that. In 2021 Richard and I were tasked to develop a model to guide the duck harvesting in Victoria, and as Richard just explained, such a model needs to take into consideration not only the numbers of ducks in Victoria but also outside of Victoria and also the breeding conditions, both in Victoria and outside Victoria, because ducks have wings and they do migrate over long distances. Based on those four principles we came up with five indices that are based on the aerial surveys that Richard is doing – so aerial surveys in Victoria but also throughout the whole of south-east Australia – and also water in the landscape, because water in the landscape very much determines the breeding conditions for the ducks. Again this is water in the landscape not only in Victoria but throughout the whole of south-eastern Australia. Also, because of lag effects, which Richard also alluded to, it is not only the water in the landscape in the present year but also in the two years before that. So over a period of three years it has all been taken into consideration. Based on the aerial surveys and the so-called priority wetland counts, which are in Victoria – these are counts, just before the hunting season, of a number of wetlands in Victoria – those counts, the aerial surveys, the priority wetland counts and water in the landscape over a three-year period throughout all of south-eastern Australia are being taken into consideration to end up with these five indices. We proposed this model, and it was accepted. So for the 2022 hunting season and this year's hunting season the model was used to advise, ultimately, the minister to make a decision on the hunting arrangements for 2022 and this year. That is it.

The CHAIR: Thanks very much. What I thought I would do now is introduce you to the committee, and then we are just going to take it in turns to ask questions. We have essentially divided up the remaining time in blocks so that we will have about 7 minutes each, assuming everything goes according to plan, to ask a series of questions, and we will take those in order. Hopefully the conversation will develop so that it is a bit interactive, and members can jump in with follow-up with questions. Presuming that all goes well, I think it will be a really interesting session. I am Ryan Batchelor, the Chair of the committee and Member for Southern Metropolitan. We might start down the end of the table and work our way up.

Jeff BOURMAN: I am Jeff Bourman, Member for Eastern Victoria Region.

Bev McARTHUR: I am Bev McArthur, Member for Western Victoria Region.

Melina BATH: I am Melina Barth, Member for Eastern Victoria Region.

Michael GALEA: I am Michael Galea, the Deputy Chair and Member for South-Eastern Metropolitan Region.

Sheena WATT: I am Sheena Watt, Northern Metropolitan Region member.

Georgie PURCELL: I am Georgie Purcell, Northern Victoria.

Katherine COPSEY: I am Katherine Copsey, Member for Southern Metro.

The CHAIR: I am going to use the Chair's privilege and go first. I just want to drill down a little bit, Richard, if I can into the components of the factors that are contributing to what you describe as the long-term decline in species. You have said – I think it was in the 2022 survey – that six of the eight game species are showing significant long-term declines, and in your introductory remarks you talked about 'What I categorise'. I am interested in your categorisation of land-use effects, climate effects and activity-based effects, like hunting. I was wondering if you could go into a bit more detail about how each of them is contributing and what, in your view, are the more or less significant elements of those.

Richard KINGSFORD: Sure. Thanks for that question. And just remembering, we are talking about 50-plus waterbird species that are all declining. It is that habitat issue that is serious. We have done lots of other work to show that essentially what is happening is we are getting a long-term decline in the amount of water that gets to the end of a river system. People will be aware of the discussions around the Murray–Darling Basin plan. A lot of that is centred on the Coorong and Lower Lakes. But in reality all through the Murray–Darling there are in fact major flood plains and wetlands that are dependent on the river systems. Particularly up in the Darling, there are the Macquarie, the Namoi, the Gwydir, the Border rivers and the Condamine–Balonne, all of which have massive flood plains. What we have seen in the last two or three decades is considerable development, particularly in New South Wales and Queensland, in terms of the building of off-river storages which are capturing the water that used to go into those wetlands. In reality for a waterbird that means their opportunities to breed are significantly reduced in frequency and extent. So we are not seeing the same sort of size of breeding events that we would have done in the past, we are not seeing them happen as often, and further, some of the crunch times are more severe in terms of those dry periods.

The issue about climate change is also a confounding factor. We know that these systems are drying. Our data seems to indicate that by far the biggest effect in terms of history is the effect of the building of dams and extraction of water from rivers. But climate change is certainly going to exacerbate the scarcity of water and mean that we will get less flooding in the future, and that will add another major threat to the ability of these birds to respond the way they would naturally in terms of breeding. Quite clearly, we have lots of data to show that in wet years you get good breeding of waterbirds right across the board, everything from pelicans to swans to grey teal, apart from those birds that come to us from the Northern Hemisphere – the migratory shorebirds.

The CHAIR: So it would be fair to say that agricultural practices in the upper Murray–Darling Basin are having a significant effect on the conditions downstream, which affect bird numbers?

Richard KINGSFORD: Yes, that is correct.

The CHAIR: And in your view are there compounding effects here? Is it capable of rebounding with a good year's rainfall, like we saw in 2022, or does it keep getting worse over time?

Richard KINGSFORD: These are baked-in effects. These are long-term declines. The analogy that I quite often use to explain what is going on is if you can imagine waterbirds, and actually lots of things, like fish as well, in our river systems having these bounce-backs, a bit like in the natural system – a superball would bounce back to the same level. Now, what we are seeing with these long-term agricultural practices is that those bounces are still happening, but they are more like a tennis ball. They are just not as high as they used to be, and therefore we are seeing that declining bounce over time.

The CHAIR: And in terms of the climate – so leaving aside the land use issues – climatic factors: how serious and significant are they, and how much of an effect do you think they have on population numbers?

Richard KINGSFORD: Well, many people will know that there are major changes to rainfall in the south-east of the continent that are predicted from climate change. We are experiencing perhaps a drying in the south-east and south-west of Australia. That means there is less water coming down the river systems. The other exacerbating factor is temperature, so when these rivers flood and the wetlands flood you get more evaporation. I guess one thing is clear: I think everybody understands that 2022 was a massive flood year. This is what we

get – we get these big highs and big lows. But it is really those middle floods that we are seeing that decline occur in. With climate change all the models are essentially pointing to a drier south-east, which means there will be less water in the rivers, less water going into the wetlands and less waterbird breeding on top of where we are.

The CHAIR: We have had a wet 2022, which those of us who are doing the inquiry into flooding are certainly getting into quite significantly. But if we are about to hit, and the forecast is for, a change to those patterns over the course of the next three years and particularly to have an opposite set of weather patterns, what effect is that going to have on bird numbers, do you expect?

Richard KINGSFORD: If you think about this in terms of those two ends of the spectrum, in the big floods lots of birds go out and breed wherever they can. It may be that we did not have as many birds around as there used to be, so they were not able to take full advantage of the amount of habitat. What happens in an El Niño year or series of dry is that the amount of water contracts. Waterbirds are really dependent on where there is water; they cannot live without water. Therefore it is the big lakes and those permanent areas with water that are critically important. We do not know that much about long-term impacts, but we suspect that with climate change some of those areas may not last as long as they used to. Things that we thought were permanent lakes may not be permanent. I do worry that there might be crunch times when some of these refuge habitats actually dry up – and those birds will die, essentially. A place like Menindee Lakes used to often have water, for example – a big lake system, a carryover in the dry times – and over the last decade or so, because of the development in the Darling, those lakes are a lot drier than they used to be.

The CHAIR: That is the end of my time. Ms Bath.

Melina BATH: Thank you, Chair, and thank you, professors, for being with us today. The interim harvest model you have both worked on and formatted – how robust is the science and are you convinced of the sustainability of this model? That is my first question to both of you – toss a coin. The next one is: can you explain why a recommendation of the model is generally not to shorten seasons?

Richard KINGSFORD: Marcel, do you want to go for that one?

Marcel KLAASSEN: Yes, okay. Thanks for the question. Regarding robustness, I think it is robust. I think we did a good job there. With respect to how this goes into the future, every model, every management, has to be associated with monitoring. You have to monitor the situation. On top of that, it is a statistical model, so it is building on past experience – experience over the past 30 years. So if environmental conditions change significantly from what we have experienced in the past 30 years, then you have to reconsider the model. It is only within the bounds of the environmental conditions that we have experienced over the past 30 years – maybe a little bit outside that, but you cannot extrapolate it too far. It is not a so-called mechanistic model. With a mechanistic model you know exactly how a system works, and so whatever happens you can make predictions. But this is a statistical model, so it is based on patterns that we have seen in the past and you extrapolate from those patterns.

Melina BATH: My other question is: can you explain why a recommendation of the model is to generally not shorten the seasons?

Marcel KLAASSEN: That is based actually on my experience in other countries where they have observed the behaviour of hunters in detail, because that is really based on how hunters behave. Again, in other countries what turned out there is that hunters typically have a plan for a hunting season, so they say, 'We'll go out and hunt four times a year.' That is actually the average for duck hunting here in Victoria. On average hunters go out four times during a season to hunt – and irrespective of the length of the season, they do not change it much. So, yes, you can change the length of the season, like we have done this year, but scientifically there was not really a good basis for it. I do not know if this has happened, if hunters are being asked how they responded to the shortening of the season this year, but I suspect that actually the frequency has not changed all that much. It has remained the same. So let us keep it simple and only change the hunting bag, because also that has shown in other countries to be an effective way of regulating hunting.

Melina BATH: Thank you.

Richard KINGSFORD: Can I just add one thing to what Marcel was saying. I guess like all models there are uncertainties. We still do need data on things like, you know, how much breeding occurs and how much recruitment occurs. There are other measures that over time would improve that model, but at the moment it is essentially telling the story of what happens in this system.

Melina BATH: Thank you. Professor Kingsford, an independent analysis suggests the long-term decline in the EAWS waterbird population estimates is largely being driven in declines in non-game bird species, and you spoke about habitat loss just before. Also, at the same time it suggests that in Victoria and South Australia, where we still have rec hunting, there are no definite downwards or upwards trends. Can you make some comments on this?

Richard KINGSFORD: I am not actually aware of that independent analysis, sorry. Just remember, we are talking nine game species and our data has got more than 50 waterbirds, so obviously most of them are going to be non-game species. It is not surprising that the relative effect would be dominated by non-game species, the point being that those long-term declines are also occurring in the game species. But it is significant because it is really telling the story that it is about habitat. Mainly that is the major driver here, because obviously those non-game species are not being shot; they are suffering from other long-term declines. Have I answered both of your questions?

Melina BATH: Thank you. That is fantastic. Have you recorded or observed any increase in bird populations in New South Wales since the ban on recreational game hunting occurred?

Richard KINGSFORD: No. We have not actually specifically done a New South Wales-focused analysis, but also remember that there is pest mitigation of species in New South Wales, which is also a significant 'take' of game species, so that occurs. But as well as that we have seen some major changes, I believe, in the last 10 to 15 years in the way New South Wales and Queensland have managed the rivers of the Darling, in particular around things like flood plain harvesting, whereby the habitat has reduced for waterbird species.

Melina BATH: Professor, your data is often quoted as a reason to ban recreational game bird hunting. As a scientist, do you believe banning recreational hunting will improve overall waterbird population sustainability?

Richard KINGSFORD: Look, I am a conservation biologist, so I believe in trying to do the best things in terms of the conservation of species. My overall message is really the way you best cater for conservation of game species and other waterbirds is to ensure they have enough habitat. Currently we are not doing that, and that is by far the biggest driver of these long-term declines.

Melina BATH: Thank you.

The CHAIR: You are just about out of time, Ms Bath.

Melina BATH: Thank you. Professor Klaassen, you do a lot of important research, especially around bird flu – avian influenza. Could you feasibly achieve the same results without the help and support of hunters? Could you discuss that, please?

Marcel KLAASSEN: Yes – that is the shortest answer. So yes, absolutely. My research and that of others in this space – Agriculture Victoria, for instance – make use of the services, if you like, of hunters that help them in collecting samples for avian influenza research. I have been doing the same, so they form an important part of my research, but I am not exclusively relying on those samples, and I think the same applies for Agriculture Victoria. By the way, the same is also happening in other states. Tasmania importantly rely, for their avian influenza monitoring, on hunted ducks.

Melina BATH: Thank you.

The CHAIR: Mr Bourman.

Jeff BOURMAN: Thank you, Chair. Thank you, professors, for presenting. I will just drill down into a bit of detail. Between 2009 and 2022 wood duck, black duck and grey teal made up 85 per cent of hunters' bags. Can you tell me something about the abundance of these species and their susceptibility to hunting? So are these species at risk from regulated duck hunting in Victoria as it works now?

Marcel KLAASSEN: Is it okay, Richard, if I start? Thanks for the question. Just generally, for ducks, they are very resilient. They reproduce at a very young age, possibly even within a year, notably here in Australia, and when the conditions are right they just keep on breeding – many species of ducks. They also have large broods. When opportunities arise for reproduction they reproduce, and there is also no so-called density dependence observable in ducks, not only in Australia but just generally. So it is not that they hit a limit; it is really that when there is a good environment for them they breed, and they breed and they can bounce back quickly. That is about duck populations, if very, very short.

Jeff BOURMAN: If I may, Professor. Particularly those game species, are those species at risk from hunting? I understand that environment and habitat are big things, but what part does hunting play in the long-term numbers of those species?

Marcel KLAASSEN: When you have very few animals to start with, then hunting can have a major impact. For instance, the Australasian shoveler is a species that is bouncing back. It has still relatively low numbers, so you should be careful in hunting those.

Jeff BOURMAN: Yes, absolutely. Sorry to interrupt. I was thinking more wood duck, black duck and grey teal, because they make up the major part of the take every year. I mean, obviously with things like the hardhead and the blue-billed duck and things like that, that moves around with their population, but the major ones are the ones I am asking about.

Marcel KLAASSEN: Yes. Well, I can refer here to a study that Richard did looking at the effects of various drivers in duck populations. He found the major effect was water and the landscape, and there was a tiny effect from hunting. Of course when you hunt animals, it has an impact on the population – numbers go down. But if that is, then it will drive them to extinction or it has a major impact. Now, given the specific biology of ducks, it does not really put a dent in the population.

Richard KINGSFORD: Can I just add to that. Those three species obviously dominate. I think the tricky thing with duck hunting is what happens in those dry years where a lot of those birds come down to the wetter parts of Victoria and New South Wales where they may be more vulnerable to hunting. Even if you are a hunter, you do not want to diminish your breeding stock, and that is one of the things that we have been talking to agencies about. The other element in here is wood ducks – and I published on this – have certainly been the least affected of perhaps all of the duck species because they have taken over farm dams and golf courses and they breed in all sorts of places that they probably did not breed in in the past. We still believe that in the big systems they have been impacted by the loss of habitat with river regulation, but they are one of the species that are certainly a lot less affected than others.

Jeff BOURMAN: Thank you, Professor. I will agree that in years where the numbers are down – obviously that is why we have the adaptive harvest model – when the bag goes down in Victoria also the season goes down. If I were to, say, paraphrase it and hopefully not put words in your mouth, hunting has a very little impact, taking the adaptive harvest model into account.

Richard KINGSFORD: I mean, we have published on this and shown that the big drivers in long-term declines are about habitat.

Jeff BOURMAN: Yes. Thank you. Again to either of you: to your knowledge, professors, what proportion of ducks harvested annually by recreational hunters are harvested by recreational hunters here in Victoria on a national scale? And do you consider that hunting here in Victoria is sustainable? Obviously, ducks are shot in other states and hunted in other ones with the pest mitigation, but on a national scale how does Victoria compare with the amount of ducks taken?

Richard KINGSFORD: So I do not actually know what the figures are for that, and I am not even sure if anybody has done that analysis. Certainly Victoria has been the state with the most amount of duck hunting occurring and has more duck hunters than South Australia and Tasmania – the other two. The Northern Territory is the other jurisdiction that has hunting. New South Wales has pest mitigation as well, but I would suspect that Victoria will still dominate in terms of a relative national scale.

Jeff BOURMAN: Thank you. To either of the professors: in a perfect world, what other data would you need on waterbirds to help you with your ongoing studies?

Richard KINGSFORD: Maybe I will have a go and then Marcel can come in. Look, I think it is one of the big challenges in managing our environment that we are collecting not enough data on what is actually happening. I think that the key knowledge gaps are in relation to how much breeding occurs and how many of the young, new generation come through. And then the other is: what are the dynamics around movements? Certainly with the technology that is being used now with satellite transmitters there is a lot more data starting to come in and provide us with what is going on. The aerial survey that we have done has been going for 40 years. There are very few datasets in Australia or around the world of that length, and that is a very powerful way of giving you a long-term idea of what is happening to our freshwater environment. It is really important – whatever long-term consequences of decision-making within Victoria – that those sorts of surveys continue so that we understand better what is happening to the environment.

Jeff BOURMAN: Thank you, professors. If I can have one more question, Chair?

Marcel KLAASSEN: Well, I did not answer this one yet.

The CHAIR: You are still answering last question.

Marcel KLAASSEN: Yes.

The CHAIR: Keep going, Mr Klaassen, please.

Marcel KLAASSEN: I still would like to answer your question.

The CHAIR: Yes, please.

Marcel KLAASSEN: In addition to what Richard was saying, Jeff, you have been asking some really difficult questions, because you ask for numbers, exact numbers, and indeed we do not really know the numbers. There has been very little consistent monitoring taking place over the past years. Richard in this country is the only one that is doing a really good job there, and that is what is needed. So we need to have more information on the exact numbers or better estimates of the numbers of ducks that we are really talking about so that we can have a true impression, an idea, about what percentage of ducks are actually being harvested every year, because we have no clue. So what we are doing is just getting impressions or proxies of the duck population, and based on that we decide on how many ducks we can hunt every year. But rather than having rough proxies, it would be good to have actual numbers.

The CHAIR: We need to move on. Mr Galea.

Michael GALEA: Thank you, Chair; and thank you, professors, for joining us today. I would like to ask first about the interim harvest model and actually take up a point that Ms Bath raised as well, and that is in relation to the model and factoring in season length. If I understand correctly, that assumption was made on the basis of hunting seasons and not actually based on ecological grounds. It was not considered that a shorter season could apply. What difference would it make if you did approach it from an ecological perspective as well as or in place of the sociological one that you have chosen?

Marcel KLAASSEN: You mean from an ecological perspective, so taking the breeding season of the birds into consideration?

Michael GALEA: Yes.

Marcel KLAASSEN: Generally life – this is not just for ducks – is very responsive to environmental conditions in Australia and how they vary from year to year. In the Northern Hemisphere it is very seasonal, and is the same, by the way, in the north of Australia. Notably, when it comes to ducks it is seasonal, so in these years, where we have a lot of water in the landscape, you can find animals that have just been born or have just been fledged being shot. But by and large the hunting season takes place in a period in which there is very little reproduction going on – very, very little. To change the hunting season based on small variations that you have when they reproduce or not I do not think is sensible.

Richard KINGSFORD: Can I just add to that. The history of duck hunting in Australia – the timing of it was determined primarily on, as Marcel said, the breeding season. The breeding season is in spring, primarily, in the south-east of the continent. Some birds will occasionally breed in a wet autumn, but not many. The other

driver was what is called moult. These birds lose their flight feathers and cannot fly. So the timing was meant to occur so that they were able to be undisturbed in that period, and in general that occurs reasonably well. But I think perhaps the key question also that you were asking was: what would happen if you halved, say, the hunting season, as opposed to having the full length? There is quite a bit of work even done in New South Wales in relation to when most hunting occurs and when most ducks are shot, and essentially they tend to happen on that opening weekend but also if you have another holiday weekend during the season. If you have got a long season and you cut it by a week, three weeks, two weeks or whatever, it does not necessarily have the effect of halving or cutting by that same amount the amount of take, because you are not affecting those major points when the duck shooting occurs.

Michael GALEA: That is interesting, thank you. Can I ask a question related perhaps as well to the harvest model. You said that the most accurate indicator of duck populations is water levels, and obviously that has a natural correlation with rainfall. I am just curious to know a bit more about the relationship between rainfall events and duck populations, because as you have also said in the report, despite last year's extreme rainfall, we did not actually see the uptick that you might expect, and I would just like to know – I know climate probably has a lot to do with it – a bit more about the current relationship between rainfall patterns and duck populations.

Richard KINGSFORD: Maybe I can respond to that. There are a couple of ways of looking at it. There is rainfall that falls that fills habitat. So in anything from farm dams to swamps you can get a whole lot of rainfall and the swamp fills up. Then on a big river system it is actually a bit more complicated because of what we have done with the dams. So in fact you can get lots of rainfall in the Great Dividing Range, but if all the dams are empty – the big dams; we are talking about things like Dartmouth dam, Hume dam and Burrendong – they may take a lot of that flow, so it does not turn into habitat and it becomes water for agriculture in irrigation. Some of that is environmental flow that will make its way down the river, so there is not a direct translation like there used to be in terms of when that flood occurs.

That is not to say that in 2022 – because all the dams were full and there was still flooding, so that water did go out, and you had a good relationship between rainfall and availability of habitat. What occurred then was everywhere there was water there would have been food, and ducks would have been breeding in that landscape. We did aerial surveys at that time – we know that helicopter surveys were done in Victoria – and those numbers showed quite a decline; ours were a bit up from the previous year. But what actually happens is that there is so much water – so our survey bands are 30 kilometres wide, and we go to the major wetlands and rivers, but there is lots of water in-between in places that sometimes you would not imagine it would be – and so the ducks are spread out like Vegemite. There is a very thin smear across the landscape, and so your ability to adequately capture the numbers in those very wet years is difficult.

But having said that, in the aerial survey of waterbirds we also collect data on breeding birds – it is an index. We are primarily seeing things like swans breeding and ibis and spoonbills, so things that are easy to see from the aeroplane, but also sometimes broods – that was way up. So it told you that there was lots of breeding happening, and we would expect, looking at our past 40 years of data, that in 2023 and 2024 we will actually see a rise in numbers of ducks as a result of that breeding, as they come through.

Michael GALEA: Okay, thank you. If I can just ask before my time runs out, Professor Kingsford, you mentioned a contrast between the Murray–Darling Basin and the northern Lake Eyre basin. I wonder if you could provide a quick outline of some of the reasons behind that.

Richard KINGSFORD: Sure. So the Lake Eyre Basin starts in western Queensland. It is Cooper Creek and the Georgina and Diamantina Rivers up at Mt Isa, and all of that will flow into Lake Eyre, but along the way there are massive flood plains. The Cooper Creek near Windorah is 60 kilometres wide, so when a decent flood goes down there it spreads out over that flood plain. Now, the big contrast is we have no major dams in that system. There is no major irrigation or hydro-electricity, so the flows and the rainfall translate into habitat. Therefore that water flows across that landscape and all the waterbirds use that, as they would have done for millennia, and they breed in the same sort of numbers that we would have seen in the past.

Michael GALEA: Thank you.

The CHAIR: Mrs McArthur.

Bev McARTHUR: Thank you, Chair. Now, we have been privy to some amazing revelations today, so thank you, gentlemen. And I hope all my colleagues take note: ducks have wings and they migrate. Hallelujah. Also, clearly climate change is more of a problem than duck hunters because of the loss of habitat that is occurring across Australia. So can I ask: do you believe that the GMA brief given to the Minister for Outdoor Recreation for the 2023 duck season arrangements is a reasonable assessment of the evidence of your survey?

Richard KINGSFORD: To be honest, I have not actually seen the brief in detail. I am aware of some of its content, and we work with the New South Wales, Victorian, Queensland and South Australian governments in providing the data that forms part of that brief, and we have been doing that for decades. I guess it is a reflection – we have got more and more sophisticated in terms of translating that data into decision-making, and the adaptive harvest model is the most recent sophistication of that. Certainly it gives me a lot more confidence than I had in the past that we are moving to a more rigorous basis for managing duck hunting.

Bev McARTHUR: The GMA recommended a longer season. But the minister did not take the advice, so we are down to four weeks. Why you think that occurred?

Richard KINGSFORD: Look, I am not a politician, I am a conservation biologist, so I am probably –

Bev McARTHUR: We need to bring some science to the whole issue; that is why I am asking you.

Richard KINGSFORD: I guess we have talked about the data that we provide. We have also discussed to some extent some of the drivers. There are also a lot of data gaps. And I think in decision-making there is obviously the ability for ministers to think about some of the uncertainties involved in some of these datasets. But, you know, the issue –

Bev McARTHUR: They are always telling us they need to listen to experts. You are the experts; why didn't they listen to you?

Richard KINGSFORD: Look, I spend a lot of time, with all due respect, talking to lots of politicians, and I do not expect them to always listen to me, because they have other constituents that they need to listen to as well.

Bev McARTHUR: Okay. So we know that recreational hunters and shooters do an enormous amount for the management of wetlands. What do you think would happen if we banned duck shooting? How would the management of these wetlands continue?

Richard KINGSFORD: I guess there are two aspects there. There is what would happen to the ducks – the game species. I think, as we have been saying, there would be some impact but not a major impact, because it is all about habitat and it is availability that is important. I think there is also some local conservation by duck hunters and others looking after wetlands, which is also very important. I think there are probably opportunities – for example, if you look at New South Wales, where duck hunting was banned, I still believe there are endeavours to locally manage wetlands well. So it is a case of whether others would pick up on that role.

Bev McARTHUR: I have not seen too many activists out building birds nests, I must say. But moving on, in your opinion, with the proper harvest management science in place, is regulated recreational game bird hunting sustainable?

Richard KINGSFORD: I am going to hand that to Marcel first, because I have been speaking rather a lot.

Marcel KLAASSEN: Yes.

Bev McARTHUR: Great. Just say that again: recreational bird shooting is sustainable.

Marcel KLAASSEN: I do not say that it is sustainable, but it is possible. Again, this is the same response to the question from Jeff. Is more data needed? Could we do a better job with monitoring? Yes. I have said a couple of times already that any management of wildlife – this is not just related to a duck harvesting – needs to be associated with monitoring. You can have models, but you also need to have a check on models.

Bev McARTHUR: Do you agree that sustainable human consumption of game bird species is a wide use of this food resource?

Richard KINGSFORD: I mean, I do not have any data to know how wide it is. Obviously, it is a use of duck hunting, but I do not know as a percentage of the population how many people are utilising that resource.

Bev McARTHUR: Could you elaborate on the proposition that climate change is more of a problem to bird species populations than duck hunters?

Richard KINGSFORD: I guess I have already talked to the issue of what the major drivers on duck populations are, and it is all about habitat. The major driver and the major challenge we have is the way we have not utilised our rivers and looked after them, therefore that is the big issue. Climate change is also occurring and coming fast. We do not fully understand what the long-term issues are in relation to that. There are obviously some big challenges in terms of the Murray–Darling Basin plan and how much water goes to the environment and other users. I think I have already talked about the effect of duck hunting in relation to those drivers, and it is there but relatively small.

The CHAIR: This is your last question.

Bev McARTHUR: So how would you advise a government about managing the habitat better if habitat loss is the main issue why bird populations are declining?

Richard KINGSFORD: I would fundamentally advise the Victorian government to engage strongly in environmental flow management in the Murray–Darling. I think in the past few years we have not seen that. If we were really looking after wetland and waterbird habitat, we would be doing that.

Bev McARTHUR: Excellent. Thank you very much.

The CHAIR: Thanks, Mrs McArthur. Ms Copsey.

Katherine COPSEY: Thank you. Thank you, professors, for your submission. You have actually covered a number of my questions, which are around the observed long-term decline in populations given principally the availability of water and habitat. I will not ask you to reiterate that but thank you for your evidence on that point. I did want to ask Professor Kingsford about a particular species referred to in your report. Can you share with us some of your observations around pink-eared duck numbers in recent years?

Richard KINGSFORD: Well, I should preface this by saying I have not done a detailed analysis of what is happening in terms of pink-eared ducks any more than any of the other species we have looked at, so the numbers do not immediately come to mind, but they are a species that I think are vulnerable to some extent to hunting effects just because they are a highly nomadic species. Most of the time their big numbers are up in the Lake Eyre Basin or west of the Murray–Darling. They are vulnerable, I think, because they can collect in very big numbers in a few key places, and so in dry years, it has been a concern to me that you might get up to even more than half of the pink-eared ducks in eastern Australia in Victoria during a duck shooting season. That has always worried me, because I think it is a species that you could have a major impact on because of that highly concentrated, localised effect. We have actually seen numbers of 20,000 or 30,000 pink-ears around Bendigo and places like that in Victoria in October. So it does happen, and I am not sure that we are really onto that as management authorities.

Katherine COPSEY: Thank you. Professor Klaassen, did you have anything to add to that given your comments earlier around the paucity of specific data that would help us understand the impacts of this activity on species that are under threat?

Marcel KLAASSEN: Well, one thing that I would like to say is that in the advice we give to the Game Management Authority and which the Game Management Authority gives to the minister on bag limits we just give an overall bag limit. It is not species-specific, and that is indeed because there is a paucity of data to model with. Indeed it would be better if we could make it more species-specific. Absolutely.

Katherine COPSEY: Yes. Thank you. I take into account both of your comments around the fact that your model is based on past observations and conditions over the decades that you have been undertaking the study. I understand you might not be confident to make a lot of predictions around the future based on that. Nevertheless I am interested in your thoughts. Professor Kingsford, you have been doing the aerial study for a

very long time. How do you think waterbird numbers will look in future if we continue with a business-as-usual approach in Victoria?

Richard KINGSFORD: If I was talking about business as usual, I would be talking about not just management of duck hunting but management of rivers.

Katherine COPSEY: Correct. In the broad sense, yes.

Richard KINGSFORD: In the broad sense I think we are still on the downhill slide, but also remembering that your ducks are not just your ducks. They are also New South Wales and Queensland ducks, and so the things that have been happening in New South Wales, particularly in relation to the Darling River and flood plain harvesting, and Queensland still have not come through. We are talking about effects that have happened in the last 10, 15 years and also various policy slippages on river flow management, by far the biggest issues that we are talking about, in terms of not just duck populations but everything from red gums to native fish to frogs – all of those. People like to see this as a debate about environment versus agriculture. Many people depend on healthy rivers. There are First Nations people all along those rivers that are being affected by these sorts of decisions. Then over the top of that we also know that climate change is going to get worse. The temperatures are obviously going up. Rainfall events are probably going to become more extreme and those dry periods more severe. So I am not that positive that the future is great at the moment, because I do not think we are quite making the sorts of decisions that we need to make.

Katherine COPSEY: Specifically, perhaps if you want to add anything, Professor Klaassen, what do you think the impact of that will be on duck numbers?

Marcel KLAASSEN: I am an optimist, and maybe others will consider that to mean that I am naive. But I do see that there is more attention for these problems. I see the discussions taking place regarding water management within the Murray–Darling Basin, so I hope that that will lead to improved conditions. On the other hand, we also have climate change to take into consideration, so yes, fluctuations are likely to be higher. There will be periods in which nature will be in dire straits, and that will happen more frequently.

Katherine COPSEY: And the long-term decline that has been observed?

Marcel KLAASSEN: Maybe not necessarily for ducks, because they are quite a resilient species, so they can go through troughs, provided that they are well managed when they are going through those troughs. For other waterbird species it might be more problematic. Notably for species that are already present in low numbers it does not look good.

Katherine COPSEY: Thank you.

The CHAIR: Ms Watt.

Sheena WATT: Thank you, professors, for your time today and your expertise and also for your very substantial submission. That made for some very interesting reading. I wanted to talk a little bit about 2022 and breeding abundance in that time, and my question is: was there a breeding abundance seen in particular species, or was it right across the board as a result of extra rainfall during that time? I just wanted to know if it is particularly game species or other protected species during that time. I am not sure who to direct that question to, but I might just leave it to you.

Richard KINGSFORD: I can have a bit of a go at it. I think it does strike at an issue that we have covered a little bit already in this discussion, and that is that no-one is really collecting the data. We do not actually know how much breeding is occurring. There are a few places where that sort of information is being collected. We at UNSW do comprehensive work for the Commonwealth Environmental Water Holder in terms of tracking breeding of colonial waterbirds, so we are talking about the ibis, the spoonbills, the egrets and the pelicans. We did that right across the Murray–Darling Basin, particularly in the northern half last year, and there was widespread breeding everywhere of those species. We also, because the team were out in these wetlands, observed widespread breeding of other species, so there is little doubt that all of the species were breeding, apart from those that do not breed in Australia. It is also fair to add that, as I mentioned earlier, we did collect data during our aerial surveys in 2022 on the birds that we saw breeding when we were flying and surveying, and that breeding index was up as well.

Sheena WATT: And on any other particular game species?

Richard KINGSFORD: The game species I do not think are monitored very well in terms of how much breeding, and that is one of I think the knowledge gaps. They are not easy to monitor, because they are very cryptic, and that is not when they want to be seen because of predators et cetera. They are not as easy as colonial waterbirds to monitor. But certainly in other jurisdictions around the world where duck populations are managed, one of the major indices is how much breeding occurs in a particular year. We certainly picked up some breeding of duck species, game species, in our aerial surveys, but when you are flying in a plane there is even less chance that you are actually going to see one of these birds breeding.

Sheena WATT: Makes sense. Thanks for that. The question I have is around the wetlands. What I understand is that there are two wetlands that support more than 120,000 waterbirds. This is quite an extraordinary density there, with those two wetlands representing about 65 per cent of the total abundance. Where are they? Can you help me out?

Richard KINGSFORD: Not generally in Victoria. The big wetlands are – and they vary from year to year – Macquarie Marshes; around the Murrumbidgee near Balranald there is a big wetland, the Gayini wetlands; the Lachlan wetlands are also very important. In Victoria those Gippsland Lakes can be very important in some years when there is lots of water down there. We do actually two types of surveys: we do the eastern Australian ones, then we survey all the major wetlands in the Murray–Darling Basin, which include the Kerang Wetlands, for example, in Victoria, and Hattah-Kulkyne lakes and Albacutya and Lake Hindmarsh and Lake Buloke. Some of those can have very high numbers as well. A lot of the dynamics of waterbird populations is a combination of where water is elsewhere and how rich the particular wetland is that they are in in terms of food resources.

Sheena WATT: So these big ones – excuse the lack of a technical term there: how vulnerable are those particular ones? Given how much they are responsible for particular population numbers, how vulnerable are those two rainfall variations – more so than some of the smaller numbers? I am just thinking about the density and therefore the vulnerability of those very high numbered wetlands that hold so many significant numbers.

Richard KINGSFORD: Look, they are highly vulnerable. We have published independent research to show that the Macquarie Marshes would be about 50 per cent of what they used to be, and those Gayini wetlands – about three quarters of that wetland is degraded. It is now in a wonderful phase of restoration that is being managed by the Nari Nari Tribal Council. It goes to a point of Marcel's. I do not want to be totally doom and gloom, because I think there are some wonderful things that are actually happening out there, and there are great communities involved in this and very committed governments, but we do need to do more. But to your good question about these big wetlands, that is where a lot of the action is, and our ability to protect those and allow them to flood and get the water that they need to create the habitat for all of these different organisms we share the planet with is really important.

Sheena WATT: You did start to speak to the kind of management model of these wetlands. Is there anything more on them that you want to talk about? Are they all managed by state governments? Or are they also with traditional owner groups or independent interested parties? Talk to me about how they are actually managed.

Richard KINGSFORD: Sure. All of the above. Some of them have national parks and reserves; some of them, like the Gayini wetlands, are primarily managed by the Nari Nari Tribal Council, led and supported by others. There are some areas that are managed by Bush Heritage Australia, Australian wildlife – so private conservation areas. Another fundamental part of the package is the management of environmental flows by state and Commonwealth Environmental Water Holder. A lot of that water that has been brought back as part of the Murray–Darling Basin plan is fundamentally important in terms of creating the habitat or restoring the habitat that used to be there. So it is a combination of who owns the land and then how that is being managed in terms of water flows and flooding in relation to that.

Sheena WATT: Thank you, professors.

The CHAIR: Thanks, Ms Watt. Ms Purcell.

Georgie PURCELL: Thank you, Chair. Thank you, professors, for coming along today. It has been very, very beneficial for all of us, I am sure. My first question is for Professor Kingsford. My office is a keen observer of the EAWS, and we noticed that in 2006 you had concerns when the Bracks government announced the duck shooting season, when game duck abundance was down to around 108,000. Then obviously the following two were cancelled due to the millennium drought. I note that last year's game duck abundance was less than half of that in 2006. My question is: do you have any concerns or have there been any instances where you think that your evidence from the EAWS might not have been taken into strong consideration when making a season decision, as it should have?

Richard KINGSFORD: I am glad you have got the acronym and you are not talking about Eeyore the donkey here. The EAWS is the eastern Australian waterbird survey. Yes, look, I think there is a combination of some key things here. We have got long-term declines in waterbird numbers, which are always going to be of some concern. I think the other two metrics that are really important in this are where the water is in a particular year and how much breeding has occurred the year before. Remember the millennium drought went from, I think, 2002 to 2008, so we were in 2006, in the middle. My concerns around then were really about what was happening in terms of duck numbers and their concentration in the better-watered parts of the continent, which are primarily in the south-east – in Victoria, South Australia and Tasmania – where they are going to be more impacted by hunting than they would be in a year where there is a lot of water everywhere. I do not think it is just about the numbers. I think the numbers are important, but it is the numbers in a particular year relative to the year before and where the water is around duck-hunting time which are important.

Georgie PURCELL: Great. Thank you very much. I understand that you are not wounding experts, but wounding is something that we know is a problem. The estimations on percentages differ, but every shooting season we do have reports of illegal wounding or killing of protected and threatened species – for example, freckled ducks and blue-winged shovelers were both shot on the opening day of this year's season. Do you think that duck shooting poses an added threat to species that are not on the game species list that are already struggling due to the other factors that you mentioned in your opening remarks?

Richard KINGSFORD: If you do not mind me responding, Marcel. I did at one stage – it was some time ago in New South Wales – look at the issue of non-target species, which is separate to wounding. There are two issues that you have talked about. One is what happens to those birds that are shot which should not be shot, like the freckled duck and blue-winged shoveler. I think those species are suffering the same decline, so any loss of those species is of concern. But generally they are fairly small numbers in the big scheme of things because people are not doing that. I remember some horrific times when I was doing surveys of duck hunters in the 80s, where all sorts of birds were being shot, and it was just horrible. We would get a boatload of parrots and spoonbills and swans – a whole range of things. Thankfully that has completely changed, in my opinion. We do not see nearly as much of that, but it still sometimes occurs because we get rogue elements of people out there. I do not think non-target species is an issue. It can be in specific places, particularly if people shoot at the wrong times when it is not light enough to adequately identify birds. The wounding is an ongoing issue in that people are using shotguns where the pellets spread out, so there is going to be some wounding. I have not really done much work on that, so I do not really want to comment.

Georgie PURCELL: Thank you very much. Sorry, did you want to add something, Professor Klaassen, before I go to my next question?

Marcel KLAASSEN: No. Of course what you addressed there is of concern. That should be minimised, and that should also be investigated in more detail –

Georgie PURCELL: Yes, I absolutely agree.

Marcel KLAASSEN: and that is also happening at the moment. The Game Management Authority have a study in progress where they are looking at shots, the pellets in birds – so they X-ray ducks.

Georgie PURCELL: Yes. And I am sure we will hear from them at some point. You mentioned in your opening remarks that you are part of an inquiry that resulted in recommending a ban on lead shot. Lead shot is now banned for duck shooting but is not for quail shooting in Victoria. Can you please explain more to the committee about the environmental impacts of using lead shot and your thoughts on its continued use for quail shooting?

Richard KINGSFORD: Well, first of all, I think everybody does not want any more lead in the environment, basically. We got rid of lead in our petrol some time ago. The problem was that all of these lead pellets – the wasted ones; the ones that spread out – were sitting in the wetlands. I am not sure if the committee knows this, but ducks do not actually have the digestive system that we do with teeth. They have got a thing called a gizzard, which essentially is like a very muscular grinder, and they often take rocks and stones in naturally to do that. So they were taking lead pellets in and grinding them up and getting lead poisoning. That was the fundamental problem with ducks. To some extent that could happen with quail, but I suspect because quail can be found in all sorts of areas it is probably not a huge impact. But I would certainly be saying we should not be putting any more lead in the environment than we need to.

Georgie PURCELL: Thank you. And considering that you have mentioned that we do not really have sufficient data on or monitoring of threatened species – we have obviously spoken about the wounding of them being a concern – would you consider that allowing duck shooting in Victoria is in line with the precautionary principle of best practice conservation management?

Richard KINGSFORD: I mean, I think that is a good question and a difficult question, obviously. I think my view would be that the data seems to indicate that it is not a major issue, but I think we would like more data. For example, if you were looking at freckled duck, it would be good to know how many freckled duck are shot as non-target species in Victoria versus what the population of freckled duck is. That would give you an idea of whether or not you are uncertain.

Georgie PURCELL: Would you say it poses an added threat to the more significant threats that we are seeing?

Richard KINGSFORD: Yes. I mean, I have said that. I think hunting is another threat – it is another source of mortality. It is a relatively small one compared to the others that are going on, and I guess you will hear this from hunting groups. The argument there is that the whole idea of sustainable yield is that you are just taking what is produced in a particular year of young birds and therefore you are not impacting on the population overall. I do not think we have got very good data around that hypothesis in Australia. That is the fundamental assumption.

The CHAIR: All right. We are out of time. Thank you so much, Professors Kingsford and Klaassen. It has been very thoughtful, very thorough, and I have certainly learned a lot about your very substantial body of work. On behalf of the committee, thank you for coming. You will receive from our friends in the secretariat a copy of the transcript of your evidence in about a week to review before we publish it online. I think we are taking a break now and will resume at 10:30.

Richard KINGSFORD: Can I just add to the other hats that I wear that I forgot?

The CHAIR: Yes, sure.

Richard KINGSFORD: One is the Biodiversity Council, and the Wentworth Group of Concerned Scientists – just to my introduction.

The CHAIR: Yes. Thank you very much. I appreciate that.

Richard KINGSFORD: And thank you very much, everybody, for those questions.

The CHAIR: Would you be prepared to answer some questions on notice?

Richard KINGSFORD: Sure.

The CHAIR: Great. We will send them through.

Witnesses withdrew.