REPORT OF PROCEEDINGS BEFORE

COMMITTEE ON INVESTMENT, INDUSTRY AND REGIONAL DEVELOPMENT

INQUIRY INTO MANAGEMENT OF SHARKS IN NEW SOUTH WALES WATERS

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At Sydney on Monday 4 April 2016

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The Committee met at 9.30 a.m.

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PRESENT

Mr K. J. Anderson (Chair)

Mr G. J. Aplin (Deputy Chair)
Mr C. G. Barr
Ms A. A. Henskens

CHAIR: I declare the second public hearing of the Committee on Investment, Industry and Regional Development open. Today we will be taking further evidence in relation to this Committee's inquiry into the management of sharks in New South Wales waters. Late last year we travelled to Ballina to meet with local residents. Today the Committee will be taking evidence from other stakeholders, including government service providers and researchers. I note that the Committee has resolved to authorise the media to broadcast sound and video excerpts of its public proceedings and copies of the *Guidelines for the Broadcast of Proceedings* are available.

SCOTT HANSEN, Director General, NSW Department of Primary Industries, sworn and examined:

GEOFFREY LAURENCE ALLAN, Deputy Director General, NSW Department of Primary Industries, and

AMY SMOOTHEY, Shark Biologist, NSW Department of Primary Industries, affirmed and examined:

CHAIR: I welcome Mr Scott Hansen, Dr Geoff Allan and Dr Amy Smoothey from the NSW Department of Primary Industries. Thank you for appearing before this Committee today. Before we proceed, do you have any questions concerning the procedural information in relation to witnesses and the hearing process that was sent to you?

Mr HANSEN: No.

CHAIR: Before we commence with questions, would you like to make a brief opening statement?

Mr HANSEN: Thank you. Obviously since this Committee was announced late last year a lot of water has passed under the bridge with regards to the New South Wales Government's strategy around shark management in this State. I think we outlined both our current program and our future investments in the written submission we made to this Committee. We are happy to move straight to questions so we can maximise our time with the Committee.

CHAIR: Are you aware of any trends in shark sightings over the past 12 months?

Mr HANSEN: I will start by saying that the shark strategy for New South Wales has two key components: how do we reduce risk to bathers and those who utilise New South Wales waters, and how do we minimise the impact on the environment? Obviously the more attention that gets drawn to shark mitigation and shark activities in the waters the more reporting there is, and hence greater number of sightings, greater awareness and greater involvement of the community in helping keep us informed about what is happening in our waters up and down the coastline. I will now throw to Dr Allan or Dr Smoothey with regards to any specific numbers in increased activity.

Dr ALLAN: In 2014-15 we had 18 shark incidents—two fatal and one serious. That was a spike, but whether or not it shows an ongoing trend is uncertain. As Mr Hansen has mentioned, there are a whole lot of factors that influence sightings, including the number of people making those sightings and local occurrence of shark and other fauna, but we did have a peak in 2014-15.

Mr ALISTER HENSKENS: I am familiar with financial years. So when you talk about 2014-15 are you referring to the summer period or two calendar years?

Dr ALLAN: The financial year 2014-15. It is the period that we report on those shark management strategy events.

Mr ALISTER HENSKENS: We are now nine months into the next financial year. I have no idea whether these incidents are more prevalent in summer or winter—we are coming up to the winter months now. How are we tracking for 2015-16 compared with 2014-15?

Dr ALLAN: Fortunately we have had fewer reported instances than we had this time last year but, as you say, it is only nine months into the year. There has been a lower number.

Mr ALISTER HENSKENS: The No Shark Cull submission went through a history in New South Wales from 1938 going forward and only recorded two shark attack incidents. Indeed, they recorded all incidents with regards to sharks from a flip of a fin to an attack, but what jumped out at me was the fact that between an incident at Newcastle in March 1969 and an incident in October 1992 at Avalon beach there was a complete hiatus for 23 years—that is assuming their figures are correct. Has any analysis been done of that hiatus and whether that contributes to an understanding of what has occurred more recently and indeed since 1992?

Dr SMOOTHEY: Currently there is no scientific evidence to suggest that there is any change in shark numbers on the east coast of New South Wales or Australia. In terms of those figures, there is no scientific

evidence to suggest why there was a hiatus in that period of time—no study has been done to determine that. But in saying that, shark attacks are incredibly rare and when they do happen they are very tragic. There are many years where we do not have unprovoked shark attacks.

Mr HANSEN: One of the challenging things is the fact that in this day and age you are far more likely to have any interaction with a shark reported widely and therefore captured by statistics than what we might have had in previous decades where a bump off a board or an interaction may not have been as widely reported. When you look back over the time in terms of statistics any interaction these days is shared amongst the public—even sharks swimming in close proximity to our new 4G receivers are being tweeted across the State—therefore you are likely to get far better statistics, but also a far richer picture at the moment than what we would have done in previous years.

Mr ALISTER HENSKENS: The period 1969 to 1992 covers my first 18 years growing up at the beach and when I was a kid there were virtually no whale sightings. We now see a lot more whales going along the coast. So there does seem to have been changes in the marine life off our coasts. Is that completely unrelated to sharks or is there any coincidence between what is happening with our shark populations and, for example, what is happening with our whale populations?

Mr HANSEN: I will throw to our scientists in a minute but a key part of why we are investing in the science and research component of this strategy is because we do not always have good, solid answers; we have a lot of theories and hypotheses that are yet to be fully tested. One of the key components for us in the tagging of sharks and then in the installation of acoustic listening stations, is actually to help us pick up movements to get better ideas about where they are and at what time of year so we can start to link those movements with other environmental factors so we can track—whether that be water temperature, currents, whale migrations or school fish migrations. A key part of our investment going forward now is actually trying to fill those knowledge gaps so that we can give you concrete answers to those kinds of questions.

CHAIR: I refer to page 5 of your submission in relation to the tourism and related industries component. In November when the Committee was in Ballina we heard quite clearly from local surf shops, surf clubs, accommodation proprietors and others involved in the tourism industry that there was an economic impact being felt because of shark sightings and shark attacks. In your submission you say that in relation to tourism and related industries to date zone managers have only received limited feedback from tourism stakeholders regarding the possible impact of shark attacks on their businesses. At this stage there is no concrete evidence of tourism and related industries being adversely affected, or a reduction in visitor numbers due to possible shark attacks. Again the Committee heard very clearly from upset retailers and those people I have mentioned that there was absolutely an impact. Will you shed some light on that information?

Mr HANSEN: I guess that is where this Committee is ideally placed to hear more directly from individual businesses who, because of their proximity and the closeness of their link between their business and water activities, would have felt the majority of the brunt in terms of any impact out of not necessarily the shark incidents but the wide reporting of shark incidents over that period of time on the North Coast. We have certainly heard stories of individual businesses saying their business has been impacted but when we look broadly across that region, and that is what we were looking at at that time, in terms of occupancy and visitor numbers and this was in the lead-up to Christmas, we still had not seen any significant impact into the region.

Now individual businesses would have had a very different story because they would have had a direct impact on maybe their singular business as opposed to the region more broadly but I am sure there would be organisations, Chambers of Commerce and businesses far better placed now to tell you what the wash-up has been over this summer period in terms of occupancy rates, tourism and tourism dollars being spent in those North Coast locations.

CHAIR: What do you class as "region" when you say regional impact?

Mr HANSEN: I guess when we talk North Coast, we are talking that Northern Rivers-North Coast region. I do not know if you want more geographical boundaries.

CHAIR: No, I was just getting your view of regions. The Committee has heard quite clearly there was a significant impact.

Mr HANSEN: Yes.

CHAIR: So that flies in the face of what Destination NSW has been telling us.

Mr CLAYTON BARR: Will you clarify North Coast?

Mr HANSEN: Coffs Harbour up? Kempsey up? Taree up?

Dr ALLAN: Yes, I am not sure of the exact boundaries.

Mr CLAYTON BARR: It depends on what regional plan you are reading.

Dr ALLAN: I believe it is Northern Rivers.

Mr CLAYTON BARR: I think public confidence is important and I suggest that we have probably seen more people swimming between the flags as a result of the shark attacks than we ever have. I am aware of the SharkSmart public education campaign and I have an app on my phone. What is being done proactively to engage and accelerate the community's engagement with minimising the risks, taking on board some of the factual information? Obviously you guys are all about science so if you can apply some science to risk then people can absolutely minimise their risk in regard to fear.

Mr HANSEN: A key part in the community consultations on the North Coast over this past summer has actually been working with both community groups and education groups and the local council with regard to how do we build a prototype of community engagement that helps identify what the risk factors are? Again, acknowledging the fact that there is no silver bullet other than staying on the shore in terms of completely removing risk. But what are the risk factors? What can you do to reduce the likelihood of a shark incident? That has been everything from utilising new digital technology platforms—obviously as part of the SharkSmart app as you would be aware there is an outline there of risk profiles that allows you to assess the risk of any particular activity—all the way through to working with some of the current surf lifesaving and Westpac activities around looking at how we build a shark safety message into water safety and surf safety messaging that goes through school programs. At the moment there is still a range of materials that have been produced for distribution in those communities but I might throw to Dr Allan and Dr Smoothey with regard to some of the other activities.

Dr ALLAN: Throughout the North Coast area every beach surf club has had a series of materials presented to them to outline those risk factors and the other information we know about sharks to try to allay concerns. There has been a concentrated campaign over the past year. We have released our new version of the SharkSmart app, which was released at the Royal Easter Show. That is a map-based technology which allows for them to push out notifications and that has been taken up by all the beach clubs as well. We have also increased our area of surveillance through helicopter patrols and that message that is getting from those patrols to the public, I think, has increased that public awareness of sharks and how they can minimise their risk. We agree, I think you are right; it is a very important part understanding with the community about what the risk factors are and how they can best minimise them.

Mr CLAYTON BARR: In a really practical sense, you have concept A: We can inform people about risk and how do we get the message across? So is it marketing? Is it posters in shop fronts? Is it advertisements taken out in newspapers? Is it television and radio advertisements? How do you do it?

Dr ALLAN: It has not been television advertisements although we have had a lot of television and media coverage, but we have not taken out any television advertisements. There were some radio advertisements taken out on local radio stations.

Mr CLAYTON BARR: Yes, it is by way of news as opposed to advertisements?

Dr ALLAN: By way of news. We have had brochures and we have moved directly to the beaches to surf life saving clubs. That has been our approach of how we have got to that community. We have run a few community forums and we will continue to do that over the next coming months to try to engage people on a direct one-to-one basis. We have had several meetings with a group of stakeholders in the Ballina area, for example, to try to ensure they understand what we are doing. We have described the new technologies we have been trialling.

Mr HANSEN: It has been a combination for us. The most successful way has been a partnership approach in most of our awareness and communication activities. So we already have some really successful and well-delivered programs about surf safety in general. How do we tie in with that? How do we best utilise those programs to help get that message out because it is already there, it is already on the ground? Certainly how do we provide tools and information to shop owners and individual businesses in those areas who are concerned about providing confidence back to their customers? How do we give them something that they can hand across their counter or the table to talk about things you can do to reduce your risk, recognising the fact that there is always this balance between alarming and informing?

We are going to continue to look for the best tools to work with other groups to try to get the message out. Because even with simple things such as all of the media reporting that has been on attacks or incidents, how do we build into any of the interviews that are done there that messaging around what steps individuals can take to mitigate their risk? I guess an important part in our strategy is that we are dealing with a strategy that looks at how to do this for a community. What can we do to reduce community risk? Part of our strategy is actually investing into new technologies, new tools, that we think actually will end up providing probably the greatest solution—that is, how do you reduce individual risk, whether that be some of the new technologies around sensor disruptors for surfboards or wetsuits? Or how does an individual take their own individual action to reduce their risk not only by behavioural activity—whether it is where you swim, when you swim, how you swim—but also what new technologies are available to help them reduce their risk?

Community-based activity and whole-of-beach or whole-of-coastline activity can only take us so far in terms of reducing risk. It is how do we then add the additional component, and that is where we are hoping to see entrepreneurs and scientists take us forward? How do you provide that personal protection or personal risk reduction, and that is both awareness and new technology?

Mr CLAYTON BARR: I want to address this idea of perception of safety from the community because it builds confidence, and confidence builds economic activity. There was to be an observation tower rollout of about 10 towers in the first year, 250,000 or something like that. How is that going?

Dr ALLAN: Every year since 2011 we have run a program. It is $30,000 a year and it has been fully subscribed and we have proceeded to expend that money. We brought it forward last year, in 2015, and I think the applications closed in October. The program has funded a whole range of things, not only towers but also sirens in some places and other observation equipment. It has been a very successful and well-received program.

Mr GREG APLIN: A range of those activities that you have described obviously are following a pattern and I would like to explore that. Last October the Shark Management Strategy was announced. I would like to know how what you have been describing and any other activities form part of that strategy. How have you been examining it, implementing it and then subsequently evaluating it?

Mr HANSEN: The important first point to make is about how we developed the strategy and that was we commissioned an independent report of what was happening globally because we are conscious of the fact that this is not just a New South Wales coastline issue but it is very much a global issue in terms of shark risk mitigation. We commissioned a report to be done on what was happening globally. We identified key areas around the globe that were experiencing or had progressed the most significant amount of work in their area of mitigation steps. We invited all of those countries, those government scientists to a Shark Summit in New South Wales to help weave through what was and what was not working and where should we try a multiple investment approach to trial new technologies simultaneously to see what path forward we should take in terms of new technologies and new tools for reducing risk.

It really has three key elements for us. The first one is education and community engagement, and we have talked a bit about that. The second one has been research, and we have talked about the fact that there is still a lot of research we need to do. There are still a lot of knowledge gaps about the behaviour of sharks and about the ecology and so forth. So that is a key gap for us. I guess we have a number of activities occurring under there—we have funding for three PhD positions to help build scientific knowledge within the State with regards to shark ecology, shark mitigation and shark detection technologies. We have a grants program that we are looking to roll out, because we are aware that government is not the font of all knowledge in this space; and in fact there are good entrepreneurs out there who are coming up with solutions and ideas. The grants program is designed to help fast-track proof and trial of those technologies and to take them to market quicker. So those are the key components within our research area.

The third, and probably biggest, investment space is in surveillance, detection and deterrence. If we start with surveillance, we will be continuing our aerial surveillance. Obviously being able to see a shark in the water and notify beachgoers is a pretty powerful tool in terms of protection. To be able to see into the water requires many environmental conditions to be right at any one point in time, and it needs also to be done from some height. Traditionally we have relied on aerial surveillance by helicopters and fixed-wing aircraft. We are now using choppers up and down the coastline in terms of our surveillance activity and surveillance programs.

However, we are investing in trials to take the next step. The next step is actually to use drones which are unmanned. We have already conducted a number of trials year to date in which we have flown the drones simultaneously alongside our manned aerial surveillance to check performance. So are they seeing the same things? Are they capable of picking up and identifying the same things in the water? So far we have had really pleasing and successful outcomes from those early trials. We can see a day in the future when smaller drones operated by those on the beach will be able to provide regular surveillance of the water which swimmers, bathers and surfers are in, and maybe some bigger drones operating along the coastline would be the next step. We are at an advanced stage in terms of trialling that and working out where it fits into the overall surveillance strategy.

We have been tagging a number of sharks up and down the coastline. Our target is to tag an additional 100 white sharks, bull sharks and tiger sharks. These are the predominant species that we are concerned about with regards to shark incidents. We currently have 151 tagged sharks within the combined New South Wales Department of Primary Industries and CSIRO tagging programs that operate along the New South Wales coastline—that is, 80 bull sharks and 71 white sharks. All those sharks have acoustic tags in them, and a number of the white sharks have satellite tags in them as well. To be able to pick up in real time the movement of those sharks up and down the coast, we have an investment strategy of 20 4G acoustic listening stations positioned along the coastline. These will pick up the sharks within acoustic range and send a notification immediately back to land to enable us to distribute that message via SMS and the smartphone app.

CHAIR: Is it working?

Mr HANSEN: Yes, it is. Dr Allan has just reminded me that it is a 500-metre radius for each of those acoustic listening stations. Those with the smartphone app will have seen that going off over the last weekend in particular. There is one bull shark at Lennox Head that seems to be doing circle work around the listening station. It keeps being picked up.

Mr CLAYTON BARR: And his name would be Bart Simpson, I assume?

Mr HANSEN: We try not to name them. It is working. We have been able to bring together the smarts from some work that was done in Canada with regards to 4G relay electronics with some work that had already been done in Western Australia with regards to listening buoys which they had already invested in and put them together to suit the New South Wales coastline. We have nine in at the moment, and an additional one is going into Evans Head as we speak. It is being adjusted because it is at a different depth; it is at a shallower depth than what the traditional ones have been installed in so we are just adjusting for that.

So far it has been a good program and it has been successful in terms of giving us additional data about the movement of sharks. The shark tagging program as a whole really has two key benefits. The first one is the fact that we are catching, tagging and then relocating significant sharks away from a swimming area, a bathing area or surfing area. It has been shown in work done elsewhere—I think it was in Brazil—that relocation provides a significant reduction of risk to those swimming.

CHAIR: And the sharks do not return?

Mr HANSEN: Not quickly, but I might get Dr Smoothey to talk about that a bit further. The second key benefit is the additional information that we get about the behaviour of the sharks. Where are they going? When are they going? And what can we correlate that with? So every additional shark that we tag means not only that we have relocated the shark away from a zone in which we have been specifically fishing for them to take them out of that area but also that there is an additional shark that we are tracking and following to build up our knowledge about their behaviour along the coastline. As I say, we have here with us today one of the country's best shark taggers and researchers, Dr Smoothey; so I will hand over to her.

Dr SMOOTHEY: We are using state of the art technology. We insert the tags into the abdominal cavity. They have a 10-year battery life. So by strategically placing these VR4Gs, as Mr Hansen said, we can maximise our detection and provide the public with real-time information about when a tagged shark comes within range of one of these receivers. As I said, it has a 10-year battery life so this is not a short-term, knee-jerk reaction; we are going to build up a large dataset about the behaviour of sharks.

At this stage we know very little about the movements and biology of sharks around the world and specifically in New South Wales. We are at the forefront and doing all we can to try to learn more about the behaviour of sharks and their movement so that we can feed that back to the public to make informed decisions about when and where to swim. That is also done through the SharkSmart app, which provides push notifications. As some Committee members would have seen, over the weekend one bull shark has been pinging quite regularly off Lennox Head.

Mr HANSEN: So far the nine we have put in have all been from Foster north, because that is where the priority is and the focus in terms of how quickly we can get these things into the water and how quickly we can get them installed. Obviously we will be prioritising the South Coast for the continuation of the remaining 10 listening stations. What we want is a good geographical spread along the coastline so that we can get that additional information about where these sharks are and where they are travelling, and get that in real time.

Mr GREG APLIN: What is the projected costing of the program? And how will the program be evaluated? You said that one of the important aspects is to relay information to the general public. Is that going to be the way in which continued work is undertaken and therefore budgeted for?

Mr HANSEN: The overall strategy is a $16 million investment over the five years. Some of the components of it can be seen to be providing immediate outcomes and immediate levels of confidence or reduced risks. I guess here I would point to the aerial surveillance. Swimmers and surfers in the water see the choppers go over on a daily basis during school holidays and weekends. It provides an immediate benefit for those people. Other components will take longer to start to demonstrate the benefits of the investment—whether it be the investment in research, the investment in PhDs or the investment in the 4G systems and the patterns we start to see in terms of shark movements away from just providing advice to people about if there is a tagged shark within their locality.

So there are varying timeframes in terms of harvestable outcomes from the $16 million investment over the five years. We are trialling a lot of technologies all at once. It might be that some of them are absolutely the best technologies to get that balance right between mitigating risk to bathers and doing minimal harm to marine life and the environment. So far we have only talked about the 4G system but there are some other surveillance components. We are trialling a Clever Buoy system off Bondi Beach. It is designed to pick up, using sonar, the untagged component of the shark population. It uses sonar to pick up moving objects of different sizes and shapes. This is to see if we can come up with a tool that will enable us to identify sharks whether they have been tagged or not.

CHAIR: Is it working?

Mr HANSEN: The trial has been extended and the reports I have heard back are that it is showing some progress. We are hoping to see some results out of this soon. I am sure the proponents of the device would be more than happy to share the results with the Committee.

CHAIR: How long has it been in the water at the moment?

Mr HANSEN: That is a good question.

Dr ALLAN: It was a 30-day trial and it has been extended by two weeks.

CHAIR: Has the Clever Buoy picked up any sharks?

Mr HANSEN: It has started to identify shapes. So it can pick up whether a mass is a school of fish or whether a mass and its movement could be identified as a shark. I think is too early to say whether it is successful or not. Certainly the fact that it is still in the water for the next couple of weeks will mean we have additional data that we can go through with them. It is looking promising.

CHAIR: I understand. If the Clever Buoy is in the water now, it obviously has been recording some sort of data.

Mr HANSEN: Yes, it has.

Dr SMOOTHEY: As well as the sonar technology that they are testing we have a VR2W, which is an acoustic receiver that listens for tagged sharks. They also have a receiver on one of those buoys. I can confirm that in the trial process they did pick up a tagged bull shark in their process. So we know that they have detected a shark. It is like putting a puzzle together with all the multiple pieces. So through the acoustic telemetry and the sonar we will hopefully be able to determine the effectiveness of the sonar buoy.

CHAIR: Is the Clever Buoy working in real time? If it picks up a shape, mass or whatever is that able to be detected immediately?

Dr ALLAN: At the moment it is within a closed circle domain. So the information is not out in public because this is still in a trial phase. But it has the capability to be real time.

CHAIR: Can you inform the Committee whether this Clever Buoy has done its job yet?

Dr ALLAN: It is still in the trial phase. As Dr Smoothey said we have had some confirmation that a tagged shark, so we know it is a shark, was picked up by the Clever Buoy. So in that sense it was successful. But it is still in the trial phase so we should not pre-empt anything by saying it is fully successful because it is still being developed.

Mr ALISTER HENSKENS: Just to understand the context and the potential importance of this, what proportion of the believed shark population off the New South Wales coast would be tagged in percentage terms?

Dr ALLAN: We do not know the total population of sharks off the New South Wales coast so we do not know the answer to that.

Mr ALISTER HENSKENS: You must have estimates.

Dr ALLAN: We do not have an estimate in numbers. The percentage of tagged sharks at the moment—there being 151 tagged—is very low. But it does give us an indication of where a percentage of the population is travelling and where they are moving. So our aim of course is to increase the numbers, as Mr Hansen said. At the moment we do not know what proportion of the population we have tagged or how many sharks are out in the ocean.

Mr HANSEN: The challenge for us is the fact that, and the sharks we do have tagged show us this, a shark that might today be a New South Wales east coast shark and might in a couple of days time be a New Zealand shark. So the fact that they can go almost anywhere in the Pacific means that identifying numbers in total is pretty hard with regards to great white sharks. But the bottom line is that it is a small number in terms of percentage. It is 151 more than what would otherwise be there.

So it is starting to give us information that we would not otherwise have and the more we tag the more confident we are that it is a representative sample of what is out there. Obviously if we can come up with technologies—whether it be the clever buoy in terms of identifying sharks that are untagged or whether it be unmanned aerial surveillance picking up sharks in the water whether they are tagged or not tagged—all of those tools are going to be important in terms of not only reducing risk but also adding to our pool of data for our science and our knowledge.

Mr ALISTER HENSKENS: Does your tagging technology allow you to measure whether a shark is going to New Zealand or not? Is it done by GPS or does it have to be within a range to pick up those sorts of movements?

Mr HANSEN: The acoustic tags need to be within the 500-metre range of one of our 4G buoys. We also have acoustic buoys on the bottom that are not 4G. They are not feeding live data and we have to go down and retrieve the data from them in terms of collection. However a number of the great whites that have been tagged have also been satellite tagged and those satellite tags we can follow anywhere around the globe.

Dr ALLAN: Can I just add, one of the things about tagging is that it allowed us to answer the question: Did the population of resident sharks contribute to the large number of incidents in 2014-15 and were they a new population that had become resident in the North Coast or not? Even though we tagged a relatively small number, our tagging data showed us they all moved away. It showed us that they were not part of the resident population. That is a good signal and that tagged data was a good source of information, regardless of the numbers that were tagged.

Mr ALISTER HENSKENS: Obviously the advantage of a clever buoy, if it works, is that the beaches do not move like the sharks do. We are worried about the beaches anyway.

Dr ALLAN: That is right.

Mr HANSEN: That is right. If it works, you can see the combination because none of these technologies need to work in isolation. We can see an opportunity for those on the beach, having identified there is a mass or something in the water which has been picked up by a clever buoy and confirmed by a drone flying over to get an image or to show live footage of what is in the water. We can see some of these technologies working hand in hand in terms of providing a really effective tool in respect of mitigation of risk. But none of these have been trialled before the strategy came into being to invest in these trials in New South Wales. We have been fast-tracking them and we have been working as quickly as we can over the past 12 months, and we have made significant progress but it is still far too early to be calling any of these successful in respect of what the end outcome of the research trial is meant to be.

CHAIR: In relation to public confidence, are manned surf lifesaving towers mandatory or are the lifesavers instructed to have someone with the SharkSmart app on while that beach is patrolled?

Mr HANSEN: I think the Surf Life Saving NSW people are on straight after us.

CHAIR: Yes.

Mr HANSEN: We might defer to them in terms of how they are managing or utilising the information that is being provided.

Dr ALLAN: It is a partnership area. It is not a mandatory approach. We do not regulate anything in terms of what they need to do; we just work with them in partnership and it has been a successful partnership.

CHAIR: In relation to public confidence, a family going on a beach holiday would be assured if that information was disseminated. If they are staying in rented accommodation, a caravan park or whatever it may be, if that information is readily available, which says that if they swim at beach X during patrolled beach times they can be assured that that surf lifesaving patrol and tower will be using the SharkSmart app and that they will be informed if there is any movement in the zone. I know that would give me a great deal of confidence and it might give the community confidence. That would then spread throughout the industry that a lot of good work is being done in this area in trying to get people back on to the beach with confidence.

Mr HANSEN: Again, our colleagues who follow on after us will provide you with more detail about what they are doing with their network. The partnership approach should also reflect the fact that the confidence for beachgoers is provided through much greater and much richer activity from surf lifesavers than merely monitoring a shark app. Their presence out on the water, their presence in towers, their monitoring of conditions, their connection to the aerial surveillance are all important components that says that our surf lifesavers have access to the best information for people swimming between the flags on our beaches in New South Wales. Part of that is through these new technology platforms, but part of that is through the day-to-day activities that they have been carrying out for many decades now in respect of a wide range of risks and managing those risks for people in the water.

CHAIR: Is the message getting out to people in the community, local chambers of commerce and local businesses that this work is going on to try to minimise risk and increase confidence? Scott, there is no doubt you are doing a great job in respect of what you are trying to do but I am not sure that the public relations component is there.

Mr HANSEN: That is a challenge of my own. It is a tricky one. We have put a lot of effort into the North Coast in terms of community engagement and working with chambers of commerce and the community to ensure that as much of the information—in fact, it is a two-way street—about what we are doing is being fed to them. Equally, the information from them about what they want or do not want us to be doing to provide confidence to their visitors, to their communities is being fed back in a two-way street. We hold regular meetings with the communities on the North Coast, but that is not a broader conversation that is had up and down the coast. It has been North Coast-focused, for obvious reasons. We have another community meeting up there in one week. Dr Allan chairs those meetings with the communities. It allows us to have those conversations to outline everything we are doing to plan when activities will be on. We can talk to them about when we will have trials in the water, what the trials are doing. We are working at that community level to try to get the best outcomes we possibly can. There is always more you can do in respect of that communication.

I do not see that the community's confidence is necessarily being dented when it comes to swimming between red and yellow flags. When you have a look at the risks that are posed, the biggest risks are quite often those on boards or those swimming on unpatrolled beaches or outside those beaches. When these technologies might come into play when you cannot have a red and yellow flag is a question that we are trying to answer. How do you provide the same level of confidence for those who are either surfing outside of the patrolled areas or surfing outside of patrolled times as for those people swimming on patrolled beaches?

Mr CLAYTON BARR: In respect of finding your locations, I think you said there are 10 beacons or listening stations.

Mr HANSEN: Ten listening stations.

CHAIR: Is it 10 or nine?

Mr HANSEN: There are nine in the water at the moment. There is one going into Evans Head.

CHAIR: There is another one at Evans Head.

Mr CLAYTON BARR: In terms of choosing the locations for those, I think you are spot-on. In essence, it is about surfers and the data would support that it is surfers who more often are getting attacked. By way of industry and economics, it is those surfers moving up and down the coast who drive a lot of the small businesses that this Committee is concerned about. How do we choose the sites where we are placing these pieces of equipment and are they focused on bathers and swimmers in the water in between red and yellow flags, or are they based on popular surfing spots, or are they based on known recent shark attack history?

Dr ALLAN: All of those factors.

Mr ALISTER HENSKENS: All of the above.

Dr ALLAN: A combination of the above.

Mr CLAYTON BARR: There are only 10 and they have only a 500-metre radius, so a kilometre from side to side. We are talking about a needle in a haystack. To be fair, the coast between here and the Queensland border would be, I do not know, about 1,000 kilometres, so you have picked only nine spots to date with one to come.

Dr ALLAN: We will have 20 in total. We will have 10 more put in before the next summer.

Mr CLAYTON BARR: They are going down the South Coast?

Dr ALLAN: We will move down the South Coast at that stage.

CHAIR: Before next summer, Dr Allan?

Dr ALLAN: Before next summer we will have 20 in the water.

CHAIR: Is that November, December or January?

Mr HANSEN: It is ongoing. We will continue to put them out. As soon as we get the buoy component from Western Australia and the electronics, they get put together and put in the water. It is ongoing. As soon as they arrive, we put them in. To your point, the 10 listening stations are doing a great job in the sites they are in. Some of those are the most populous swimming and surfing spots on the coast, but there is a lot of coastline that is not covered. That is where we come up with what are the other technologies, what are the other pieces, whether it is aerial surveillance, which tends to covers the broader suite, but aerial surveillance is only great when you have the right visibility through the water. Is it the clever buoy, if that is proven to work in terms of picking up untagged sharks? Does that supplement? Is it a spotters' program, either using headlands or towers? This is where we continue to come back to the point that there is no one silver bullet solution. It will be a combination of technologies that help further reduce a risk.

We also have a hope or a belief that there are other technologies out there that will not work towards the site risk mitigation but the individual risk mitigation through coming up with additional tools and new technologies to help risk for individual surfers, which we have seen covered in the media over the weekend, or with regards to swimmers. That is why we believe whilst we will continue to invest in this broadscale site specific risk mitigation activities, we will also be working on how do we invest to fast track and stimulate the individual surfer protection or individual swimmer protection that we see technology opening up the door for.

Mr ALISTER HENSKENS: Can I go away from the technological-based approach you have been talking about now for about 10 or 15 minutes and take up some of the old approach, in particular, the shark meshing program. Some of the submissions have been critical of the effectiveness and the other consequences of the shark meshing program. First, can you tell us how you evaluate it and the criteria you have used to evaluate the shark meshing program? Secondly, can you tell us about the level of by-catch that is caught in the shark nets?

Mr HANSEN: Sure. As you would be aware, the meshing programs have been operating since 1937. It has grown from 18 original beaches to 51. We have a joint management agreement with regards to management of that meshing program that has a specific number of triggers in respect of when we review the program. Those figures concerned shark interactions with humans and, in particular, shark attacks on people, safety to the contractors and those deploying the nets, and by-catch. All of the data on those for each of the years from 2010 to 2014 have been compiled and it was released late last year for review. Again, this is one of those mitigation efforts that we have that tries to get the balance right between reducing the risk to those in the water on those 51 beaches versus minimising the environmental impact of those nets.

If you have a look at the impact-reducing risk, whilst it is impossible to run a counter factual that says let us go back and repeat the 80 years without them in place and see what the outcome is, over those 80 years we have had 33 interactions between sharks and humans on those 51 meshed beaches. Of those 33, one has been fatal, and that was in 1951. We have had two serious injuries and serious attacks in addition to that on beaches that were meshed over that 80-year period. We have had 21 other injuries over 80 years as a result, and we have had nine which have been simply that someone was bumped off their board or it has been a bite to a board or a ski.

You are looking at 33 interactions over 51 beaches that, according to Surf Life Saving NSW, have about 8.5 million people swimming in them per annum, over an 80-year period. That is part of the measurement of what do we look for in terms of is it working at reducing the risk. If you refer to the joint management agreement report that is up on the website it points to a number of studies that have been done that have shown the impact and reduction in risk to humans as a result of meshing in New South Wales, across Queensland and in Natal, South Africa, where it is in place. That is one component of it.

The second component is the interaction with the environment and the reduction in by-catch. Every five years since the program was introduced it has been reviewed, adapted and modified to minimise its impact in terms of by-catch. It has been modified by reducing the period in which it is in the water—between May and the end of August, key whale migration periods, the nets are taken out to reduce potential risk. There have been six whales caught in the nets since the introduction of the nets. Electronic pingers, or acoustic sounders, that are tuned for dolphins and whales have recently been put on nets. The nets, in terms of the location and how they are set on the floor of the beaches, there has been constant modification trying to reduce the by-catch.

In terms of the management of the nets, those that are putting the nets in, the contractors, they have to check them at least every 72 hours because we know that gives us a good opportunity for anything caught in the nets being released alive and successfully. All those mitigation steps have lead us to a point where we believe

the balance is right between mitigating the risk to humans with shark interaction and mitigating the risk to the environment. Should we get some of the new technologies providing the outcomes they promise there is a greater chance to reduce the risk to humans and by-catch. In terms of the numbers for each of the species that are caught that is in the joint management agreement and we are happy to take that on notice and provide detail.

Dr ALLAN: Every year they are on the website and we publish those numbers.

CHAIR: Thank you for your time; we appreciate how busy you are. In closing there is an enormous amount of work being done and you have outlined that today. The focus of this Committee is almost chicken and egg stuff: you have to look at what happens offshore and we are very focused on what happens onshore with the regional growth and economic development and impact on businesses and tourism operators. We have heard that clearly. The work you are doing there has to help the mum and dad businesses that have been operating all their lives. Please keep the communities informed, Dr Allan, with your community meetings and include the chambers of commerce and businesses to let them know of the good work you are doing and the new technology.

Dr ALLAN: Could I clarify one point: our next stakeholder meeting in Ballina will be within the next few weeks.

CHAIR: Thank you for appearing before the Committee today. The Committee may wish to send you some additional questions in writing, the replies to which will form part of your evidence and be made public. Are you happy to provide a written reply to any written questions?

Mr HANSEN: Yes.

Dr ALLAN: Yes.

Dr SMOOTHEY: Yes.

(The witnesses withdrew)

SHARNIE CONNELL, Chairperson, No Shark Cull, affirmed and examined:

CHAIR: I welcome Ms Sharnie Connell from No Shark Cull. Thank you for appearing before the Committee today. Before we proceed, do you have any questions concerning the procedural information sent to you in relation to witnesses and the hearing process?

Ms CONNELL: No.

CHAIR: Before we commence with questions would you like to make a brief opening statement?

Ms CONNELL: Yes, I would. I thank the members of Parliament who are here today for undertaking this parliamentary inquiry into the management of sharks in New South Wales and for the invitation to provide further information to No Shark Cull's submission. I wish to note that at the time of writing the submission to the parliamentary inquiry no announcement had yet been made by the Baird Government regarding the $16 million commitment to funding a trial of new non-lethal alternatives. As such, my submission is largely a critique of the New South Wales shark meshing program, which is a highly ineffective environmentally damaging program with no proven efficacy in improving beach safety for ocean users. No Shark Cull's submission goes into great detail about the history of the New South Wales shark meshing program, its major downfalls and lack of justification for nets.

The State's duty is to conserve biodiversity and habitat. There is a lack of underlying evidence to prove that unwanted shark encounters have an impact on tourism six to 12 months on, the impact that the shark meshing program has had on more than 16,000 precious marine animals, and the vitally important ecological role sharks play in our oceans. It highlights the major concerns raised by two scientific committees about the management of the program by the Department of Primary Industries. Given that there is scientific data illustrating the importance of sharks in keeping our oceans healthy, and given the frightening figure of 90 per cent decline in some shark species, No Shark Cull's submission highlights the need to find a better way to coexist safely with sharks in their environment. I would like to add that I, along with representatives from Sea Shepherd and the SEA LIFE Trust instigated the initial meeting with Premier Mike Baird to highlight the limitations of the current shark meshing program and to advise newer, more effective, non-lethal alternatives are now available.

If it were not for that meeting in November 2014 these non-lethal trials would not be a reality today. Having said that, I believe that Premier Mike Baird has entrusted the roll-out of these trials to the fisheries department who have largely ignored the results of the independent scientific review, the Cardno review, commissioned for $30,000, into which non-lethal methods should be trialled. They have also refused to consult with the public and were adverse to forming a multi-stakeholder taskforce to manage the rollout and spending of the trials. As such, it is very disappointing to discover that most of the $16 million has already been spent in six months on helicopter surveillance at $8,000 per hour, which were never meant to be part of a trial of new alternatives.

It is also disappointing that the number one recommendation from the review, the cheapest and arguably most environmentally sustainable, tried and tested method, the shark spotters program, will not receive funding under this trial. I do believe that Premier Mike Baird was under the assumption that fisheries officers from his department would follow a transparent, scientific and accountable process: sadly this has not been the case to date. I look forward to the result of this parliamentary inquiry and I sincerely hope that it manages to bring about much needed accountability and transparency into the topic of shark management in New South Wales.

Mr CLAYTON BARR: You said 90 per cent depletion of some shark species?

Ms CONNELL: Yes.

Mr CLAYTON BARR: What do you base that on, how do you measure a shark species?

Ms CONNELL: It is difficult. As you heard from the fisheries officers and the scientists it is very difficult to count sharks. A lot of this information is based upon fishing catch and how it has declined over the years. To bring it down to a species level is difficult. I think the Committee will get a lot of information from Dr Barry Bruce this afternoon. He is the number one white shark expert in the world and he has been doing

genetic studies into the population of white sharks so he should give you more of an understanding. I have fully referenced everything in the submission.

Mr CLAYTON BARR: Have you been travelling throughout the North Coast during this campaign?

Ms CONNELL: I have not, we have members of No Shark Cull present in the Ballina area, Queensland and in Western Australia [WA] as well.

Mr CLAYTON BARR: Anecdotally, regardless of whether it is Queensland, the North Coast of New South Wales or Western Australia, is there any feedback from your membership around the economic impacts on the ground in the shops, in the restaurants and in the accommodation places as a result of shark attacks and the fear that has spread?

Ms CONNELL: My understanding from a psychological perspective—that is my background in psychology—we would expect a short-term reaction from people potentially not wanting to buy surf boards. When they had the Malaysian airline crisis lots of people suddenly decided they were not going to buy Malaysian airline tickets but in the medium to long-term that picks up again. This morning I picked up the *Northern Star* paper. It says the Ballina Chamber of Commerce chief executive officer has said the summer of 2015-2016 has been given the thumbs up with accommodation providers, as well as retailers, saying that it has not been affected. One operator said it was the best December they had on record. There are occasionally one or two people or a number of people who say that they have been affected but that could be a range of operational things with their business.

Mr GREG APLIN: I would like to focus on the chapter of your submission titled "The impact of shark attacks on tourism related industries." You argued that sharks are worth more financially alive. How could eco-tourism benefit the New South Wales economy and in what forms?

Ms CONNELL: I am a diver and I know for a fact that people pay good money to interact with sharks in their own environment. It was not apparent with the Western Australia shark cull, because we do not have much of an understanding about sharks, that there was a large population of tiger sharks around WA and there had not been incidents involving people in decades. There are places such as Tiger Beach in the Bahamas where people pay money to dive with tiger sharks. There is also the cage diving industry. There is a lot of money that could be made in the industry if people were to capitalise on the fact that we have all these wonderful sharks that people want to interact with.

Mr GREG APLIN: Moving to a different area. We asked the previous witnesses about the shark management strategy. I would like to get your view of that particular strategy and the measures that are proposed in it?

Ms CONNELL: You are referring to the $16 million trial? At the time Mike Baird made his election promise, following the November 2014 meeting that I had with him that he would be trialling these alternatives and the $16 million would actually be for trials of new and emerging technology or methods. Helicopters are not new methods. They were not part of the Cardno review at all. I find it very surprising that to the tune of $8,000 per hour—and that is the cost of flying a helicopter—that is what they are spending the money on.

Mr GREG APLIN: You mentioned that in your introductory statement. Can I take you beyond that into some of the other strategies?

Ms CONNELL: Okay. The number one was the Shark Spotters. No Shark Cull and Sea Shepherd decided to do a crowdfunding project to bring the Shark Spotters out to Australia to assess beaches in Western Australia, Queensland and northern New South Wales. We just concluded that tour of Australia a couple of weeks ago. Following that we had a meeting with Fisheries and it was very disappointing that they said that they will not be funding the Shark Spotters despite it being the number one recommendation and despite there being I think five sites that were selected as potentials to set up a Shark Spotters program.

The Shark Spotters is the cheapest alternative. There is not a lot of technology involved with it, and technology appears to be the buzzword at the moment, but this method is tried and tested in the second largest aggregation of great whites in the world in Cape Town. For those of you who watch Nat Geo channel, you have maybe seen *Air Jaws*, where the sharks actually breach out of the water. That is the location that the Shark Spotters program is operating in. I find it very surprising that the Government has chosen not to fund this

program. Even more surprising is that we have a report made by the Shark Spotters as to the assessment of the beaches that are suitable and the Ballina local council actually voted down at their last council meeting even receiving a copy of the report from the Shark Spotters. I am not quite sure why that is the case.

Mr ALISTER HENSKENS: I grew up very close to the beach and in an area where there were very elevated areas where you could watch the water. You would know as a diver that your capacity to be able to look from an elevated position into water when there are choppy or clouded conditions and various different weather configurations is very different. Every day is not a beautiful summer's crystal clear water day. There are significant limitations to shark spotting, are there not?

Ms CONNELL: There are, yes.

Mr ALISTER HENSKENS: Even the paper that Sea Shepherd provided us with noted those limitations.

Ms CONNELL: Yes.

Mr ALISTER HENSKENS: So it is not a silver bullet, is it?

Ms CONNELL: That is right, and there is no silver bullet. I think that when it comes to shark spotting aerial surveillance from helicopters or fixed-wing aircraft and also from drones you run into the same issues. The difference with the Shark Spotters, when I had the time to discuss this at length with them, is that aerial patrol covers a long range and I believe in integrating these methods as much as possible. I do not believe there is any one method. Shark spotting is conducted over one beach at a time, so it is constant surveillance. Basically, what they are looking for are changes. It might be that you have got a cloud that will make it very difficult to see into the water but that cloud will then move. It is looking for changes. It is difficult to do that from a moving perspective. When you have got a drone or when you are in a helicopter it is very difficult to see changes, whereas when someone is static they are much more able to see the changes.

CHAIR: Just explain for *Hansard* how the Shark Spotters program works.

Ms CONNELL: They have a series of flags that they use to alert people to the presence or non-presence of sharks. They also have some flags that allow people to be aware of the spotting conditions on the day. They are very transparent in the way that they let people know that things that affect the spotting conditions are choppy water, wind, overcast skies, and waves. I like it because it puts the responsibility back on to people to decide if they wish to take the risk based on the conditions of the day.

CHAIR: Where is this person located?

Ms CONNELL: There is one person located on the headland or in the tower and their job is to 100 per cent just spot sharks.

CHAIR: You do not think that job is covered by a surf lifesaver at a patrolled beach?

Ms CONNELL: My understanding from when I spoke with the Shark Spotters who have had 11 years of experience in this is that you do need a dedicated shark spotter. It may be something that a subset of surf lifesavers or lifeguards could be trained in, but it is very different to looking for rips and people caught in rips.

CHAIR: But you would not be able to have a shark spotter in a different location on a beach that does not have a headland, for example?

Ms CONNELL: Exactly, or some sort of elevation. As I said, there is not one type of shark mitigation that is going to suit every single environment.

CHAIR: In that case the responsibility would fall upon the surf lifesavers, so the shark spotting situation would not be the best option?

Ms CONNELL: I think that lifeguards and lifesavers have historically been very effective in reducing the chances of shark bite, particularly lethal shark bites. In my submission I did make note of the fact that in

1937 there was not a lot of medical technology. The advent of lifeguards and lifesavers being available on the beach to give medical assistance immediately are the sorts of things that actually allow people to survive.

CHAIR: Can I just take you back to shark spotting? What depth do they go to?

Ms CONNELL: Different types of sharks travel at different depths depending on what they are doing. I believe that great whites will typically be higher in the water than bull sharks.

CHAIR: At what depth, do you think?

Ms CONNELL: I think it varies and I do not think enough is known about them, but just generally speaking bull sharks will tend to be lower in the water.

CHAIR: But how far down can a spotter see?

Ms CONNELL: I think that really would depend on the conditions on the day and the visibility of the water.

CHAIR: Anecdotally we hear that when there is murky water it is a favourite time for sharks to come into headlands and to feed. What is the percentage of a shark spotter spotting a shark at, say, 10 metres below the surface?

Ms CONNELL: I would not be able to give a percentage off the top of my head but I think helicopters are around 18 per cent and fixed wing are at around 12 per cent.

CHAIR: In terms of what the Government is doing—and you talked about question marks around what the Government is doing—what about the smart buoys, the Clever Buoy, where they are able to do that job?

Ms CONNELL: I will just clarify the Clever Buoy is the sonar system that is being trialled at Bondi; "smart buoy" is the new term that they are using instead of "smart drum line". This is another example of the Government, as I have outlined in my submission, confusing the public as to what is actually going on.

CHAIR: Could you please explain a smart drum line for *Hansard*?

Ms CONNELL: The smart drum line is like a drum line. It is basically a baited hook on a buoy so it is attracting sharks to the area. No Shark Cull is very concerned about attracting sharks towards swimmers and bathers. The smart component comes in because it has some sort of mechanism—I think it is a solar panel—that allows it to send a message to the operator to say that something has been caught on the hook. The idea behind that is to minimise the response time so they can then tag the animal.

CHAIR: What is your understanding of the Clever Buoy? You would have heard the evidence earlier, but what is your understanding?

Ms CONNELL: The Clever Buoy system is a detection system. It uses sonar much like a fish finder a fisherman would use to find fish. It was really not recommended that highly in the Cardno review because it needs a lot more further development. My understanding is that it comes out from the buoy in an arc and the arcs cannot overlap, so you are going to have quite a lot of space where sharks can swim through and they will not be detected by the Clever Buoy.

CHAIR: Have you raised that issue with the Department of Primary Industries [DPI]?

Ms CONNELL: This is something I have literally found out in the last week and a half.

Mr ALISTER HENSKENS: If I can just put it on *Hansard* while we think of it that that may be a question for DPI on notice.

CHAIR: We will check the tracking patterns of the Clever Buoy systems. How do you propose to protect communities and reduce their risk through other methods?

Ms CONNELL: I think just getting back to basics really is an important step. We have lifesavers and most of them are operating on weekends only. We have lifeguards and they generally operate throughout the week but that varies depending on the location. The vast majority of beaches do not have shark alarms and they do not have adequate signage. We did speak to DPI when the Shark Spotters were out two weeks ago and we said, "What about putting up warning signs to people that sharks are in the area?" They pretty much laughed and said, "People know there are sharks in the ocean. Why would we put signs up?"

CHAIR: Who said that?

Ms CONNELL: Vic Peddemors from Fisheries. I just feel that people should be made aware and it should be a more transparent process.

CHAIR: What about the SharkSmart app?

Mr ALISTER HENSKENS: Sorry, before we go to that, your proposal was that a sign go up at beaches to say that from time to time but not necessarily at the moment sharks are in the ocean?

Ms CONNELL: Yes. I think it should also—

Mr ALISTER HENSKENS: How is that going to help things?

Ms CONNELL: I think it should be also accompanied with some information that is on the SharkSmart app—and there is some really good information on there—about how to reduce your risk. I think that should be made available at every beach so people are aware. That is definitely part of the Shark Spotters program.

CHAIR: How do you reduce the risk, do you propose? I am talking about public confidence generally.

Ms CONNELL: What we noticed with Ballina, and it is in my submission, is that a lot of the surfers, as I saw in an extensive news report when they were all sitting around discussing it, had changed their behaviour following the shark incidents. Instead of people surfing at remote locations all by themselves at dawn and dusk, they started to actually follow the guidelines and the rules around what you can do to minimise your risk.

CHAIR: Are there rules and guidelines around swimming?

Ms CONNELL: There are, yes, around what you can do to reduce your risk.

CHAIR: There is a rule?

Ms CONNELL: Well, there are guidelines, yes.

CHAIR: Who puts out those guidelines?

Ms CONNELL: Fisheries itself in the Department of Primary Industries has put out some excellent guidelines around this, so I would just like to make that more publicly available. Obviously the towers, as you heard, the uptake on that every year is 100 per cent in terms of how many they have funded with the $30,000 that is allowed in funding. It is really important to have elevation not just for shark spotting but also for the surveillance of the beach for swimmers for drownings, which is obviously much higher than shark incidents. It is just really about integrating these things.

One of things that I really want to raise is the Eco Shark Barrier. We spoke to Fisheries probably 18 months ago now and again they just said, "You can't put a barrier in the water. It won't work. It will break." There is a barrier that has been installed in Western Australia on a relatively flat beach and it has been really highly successful. As part of the trial, rather than put this Eco Shark Barrier on a relatively flat beach, what they have decided to do at Lighthouse Beach at Ballina is to put it on a very heavy surf beach. I have heard that they can get up to 25-foot swells there during a storm.

CHAIR: Whereabouts?

Ms CONNELL: At Lighthouse Beach at Ballina.

CHAIR: Twenty-five foot swells?

Ms CONNELL: Yes. Personally I feel that they are setting this Eco Shark Barrier trial up to fail.

CHAIR: I want to come back to our terms of reference. A major focus of the Committee is regional growth and economic tourism. How do we provide confidence to those businesses?

Ms CONNELL: It is not my area, I will admit. I keep harping on about the Shark Spotters Program and Fisheries were very worried about making it very clear about when there have been shark incidents and this whole concept of alerting but not alarming people. Shark Spotters are very clear, when there is an incident—

CHAIR: You are going back to Shark Spotters. Come back to how we help businesses. What are the messages?

Ms CONNELL: But they are very transparent; they let people know exactly what has happened, exactly what the reaction is.

CHAIR: But is that not what the SharkSmart app can do, and we can download it sitting here in Macquarie Street?

Ms CONNELL: I think that that alarms people more than alerts people. I do not know how effective it is to know that there is a shark swimming past.

CHAIR: But is that not what a shark spotter does?

Ms CONNELL: I believe that that information should be passed on to the lifeguards or the shark spotters or the lifesavers and then they take that information and tell the public when it is relevant.

CHAIR: How do we reduce the risk overall and help businesses like the mums and dads and local surf shops, surf clubs and accommodation guys? I note in your submission in relation to tourism, and I will take you to it, you talked about response and you made reference this morning to the *Northern Star*. You say, "Ballina Chamber of Commerce ran a survey of local businesses and found that 85% had not been affected by recent shark activity (Northern Star 2015)". Of that 85 per cent of local businesses, how many businesses were surveyed?

Ms CONNELL: I am not exactly sure. I would have to go back and—

CHAIR: That would be great if you could because in November last year our Committee did talk to local businesses face to face. We did not rely on surveys; we made it our business to go and hear firsthand, and they were affected. We are trying to get to the bottom of who is saying what, where and how. So for us it is getting the facts, and the facts were told to us by a number of businesses at the Ballina Surf Club in November.

Ms CONNELL: I think engaging with the businesses and engaging with shark attack victims and people who are affected is very important in these processes, definitely.

Mr ALISTER HENSKENS: Can I just ask a little bit about your group? Did your group start with the cull in Western Australia?

Ms CONNELL: Yes, we did.

Mr ALISTER HENSKENS: How many members do you have in New South Wales?

Ms CONNELL: Basically, the way it has developed over time, originally it was a community group that was outraged over the WA shark cull. From there we decided that if there is that much outrage about that then surely they have to be outraged about what is happening in New South Wales and Queensland in terms of the meshing program and the shark control programs which are designed to cull sharks, and we found that was definitely the case. From there we went on and we became an incorporated association.

Mr ALISTER HENSKENS: In New South Wales?

Ms CONNELL: It is actually in WA currently, but we are in the process of changing that to a national group.

Mr ALISTER HENSKENS: When did you start having a New South Wales presence then?

Ms CONNELL: Fairly early on. I have been involved since the very beginning and it is just over two years now. I organised one of the first rallies against the WA shark cull and we made reference to the fact that we were killing sharks in New South Wales during that rally. So we have been discussing that since the beginning.

Mr ALISTER HENSKENS: You have a psychology background I think you have told us. Did you write the submission that has been put to the Committee?

Ms CONNELL: Yes, I did.

Mr ALISTER HENSKENS: Did someone assist you with the technical information or is that something you did on your own?

Ms CONNELL: I did that on my own.

CHAIR: It is quite an impressive submission.

Mr GREG APLIN: Just a final question and it goes back to the previous one I asked about the shark management strategy. You were being critical and you went through a couple of the issues that you had concerns about but you did acknowledge that a range of measures need to be undertaken and even in your own submission you mention things like shark-repellent cable, the Clever Buoy, the acoustic tagging and tracking. All of these are elements which I think you were a little bit negative about in response to questions about the technology, but all these rely on technology. Do you not see that there is an important role that needs to be analysed and implemented and evaluated here for that public confidence?

Ms CONNELL: Yes, I definitely think that technology has a role and I also think that the Shark Spotters Program has been tried and tested and was the number one recommendation. One of the things that I would have to critique is in the rollout of the trials prior to the trials being announced. I have a group of stakeholders that I meet with regularly from other conservation groups and we put recommendations to the then Primary Industries Minister Katrina Hodgkinson about if you were to conduct trials in a scientific manner how would you go about doing them? One of our recommendations was that you do not just ad hoc put a barrier here, put a Clever Buoy there; what you would need to do to make it scientifically viable is to test one thing in a variety of locations within and outside of the Shark Meshing Program, because they have obviously reduced the number of sharks within the Shark Meshing Program.

So if you wanted to test the Clever Buoy, for instance, you would not just test it at Bondi Beach but maybe test it at Ballina at the same time so you can get a bit of a chance to assess the effectiveness of it in different locations. But they have not really followed those recommendations whatsoever. We also asked, as part of our stakeholder group, to be part of a task force that is part of overseeing the rollout of the trial and the spending of the trial and it just seems like they have completely blown it out within six months. Obviously some of the things will last for five years for the trial, but apparently, according to Fisheries two weeks ago, nearly all of the money has already gone and a lot of it went to helicopters, which were not supposed to be part of the trial.

Mr ALISTER HENSKENS: As a psychologist you are aware of the studies that have been done on people at airports that look at X-ray scanners. Are you familiar with those studies?

Ms CONNELL: I am actually not.

Mr ALISTER HENSKENS: There are studies that say that people whose job it is to look at what is in bags, for example, after a while they mentally just shut off and that they miss a whole lot of things in bags. Are you familiar with that?

Ms CONNELL: I am not familiar with those studies, but I am sure what you are saying is correct.

Mr ALISTER HENSKENS: The same problem would apply with shark spotters, would it not?

Ms CONNELL: It is a very specific type of personality of a person that you have to hire as a shark spotter. When I was talking with the shark spotters they said that the type of person you want is a fisherman or someone who is used to staring at the water for very long periods of time, looking for the tiniest little sign of activity, and that is a very specific personality type.

Mr ALISTER HENSKENS: If you had drones which were sensitive to moving figures and with high technology, for example, that would take out the human error, would it not, and would probably be far more accurate?

Ms CONNELL: I think there are definitely pros and cons with drones. I think at Bombo Beach where there was an incident literally a couple of days ago where a person was attacked quite severely, they have just trialled a $250,000 drone this morning and that trial was called off because it was raining and it was also windy. So as much as you might be able to get better visuals than a person with polarised sunglasses and binoculars, these things cannot operate in all conditions. There are pros and cons to everything.

Mr ALISTER HENSKENS: I mean rainy and windy conditions are as much of a problem for shark spotters as they are for drones in terms of visuality. You have already agreed that there are problems with geography in terms of shark spotting, there are problems with environmental conditions with shark spotting and you have agreed with me that there is also human error with regard to shark spotting. I am just interested why you put so much emphasis on shark spotting when it seems to have significant limitations.

Ms CONNELL: Simply because it was the number one recommendation from the review and DPI have completely ignored that recommendation.

CHAIR: From the Cardno review?

Ms CONNELL: The Cardno review, yes.

CHAIR: I am mindful of the time. There were a number of recommendations from the Cardno review—three in fact—and they were going to look at a number of them, including a Smart Drumline, the Clever Buoy systems and the Shark Spotter Program; so it was not number one, just to clarify.

Ms CONNELL: The Shark Spotter Program was number one that was ready to trial immediately, that did not have to overcome certain difficulties. The Clever Buoy had development issues; it was not quite ready for trial at the date of the Cardno review, and the tagging programs specifically they were really worried about, particularly up in Ballina, being able to actually get out past the river and the pass, when the tag goes off to say basically there is a shark or there is an animal on the hook, how are they going to be able to get out there within two hours? I was told by Fisheries two weeks ago that they caught a hammerhead that was about one metre long and it did not set off the Smart Drumline. So there are technological issues in terms of development with these things that they were not quite ready to trial at that stage.

CHAIR: My understanding is that now—and as you would have heard before, they are well advanced in technology—there is an integrated approach, obviously, to looking at how we get some confidence back in our communities.

Ms CONNELL: They actually included a lot of the CSIRO tagging, and Amy Smoothey, who was sitting here, has done a lot of the bull shark tagging in Sydney Harbour. So that is not using that Smart Drumline; there are other methods that they use to tag, and you can have a chat with Barry Bruce this afternoon more about the 151 or so sharks that he has tagged.

CHAIR: Thank you very much for your time, we sincerely appreciate it. Thank you for appearing before the Committee today. The Committee may wish to send you some additional questions in writing, the replies to which will form part of your evidence and be made public. Would you be happy to provide a written reply to any further questions?

Ms CONNELL: Yes, definitely.

CHAIR: Thank you very much, Ms Connell, we appreciate your time and your efforts. Thank you for making such a detailed submission.

(The witness withdrew)

(Short adjournment)

ANDREW GRAHAM KENT, Life Saving Manager, Surf Life Saving NSW and

BRENT PHILLIP MANIERI, Manager, Australian Lifeguard Service affirmed and examined:

CHAIR: I welcome Mr Kent and Mr Manieri to this hearing. I note that Mr Anthony Turner from Illawarra Surf Life Saving is absent. Before we proceed, do either of you have any questions concerning the procedural information in relation to witnesses and the hearing process that was sent to you?

Mr KENT: No.

Mr MANIERI: No.

CHAIR: Would either of you like to make an opening statement?

Mr KENT: Just briefly. From a Surf Life Saving NSW point of view, we appreciate being asked to be here and when we talk further I think our position in working with the Department of Primary Industries over the past 12 months has been a great success for both us and the DPI. I think that relationship is now a lot stronger than it ever has been before and in wanting to breed further success in shark mitigation across New South Wales.

Mr MANIERI: I echo Mr Kent's comments but for the information of the Committee I will give a quick background on the Australian Lifeguard Service and those we look after. The Australian Lifeguard Service is a subsidiary of Surf Live Saving NSW. We provide contracted lifeguard services to 15 councils across New South Wales, two national parks and two resorts. We have 83 locations across the State of New South Wales and employ more than 300 lifeguards each year to fulfil those contracts. For the purpose of this hearing we look after every council from Port Stephens to Tweed Heads, with the exception of Coffs Harbour City and Port Macquarie-Hastings councils—I believe the main focus of today's Committee hearing will be looking at that region.

CHAIR: The focus has been on the North Coast but Kiama was also in the news so the Committee will be looking right along the New South Wales coast. Indeed, the member for Wollongong, who is absent today, is also a member of this Committee.

Mr ALISTER HENSKENS: Surf Live Saving Australia is located in Surf House at Bondi, is it not?

Mr KENT: That is one of our offices, yes.

Mr ALISTER HENSKENS: Is that the national body?

Mr KENT: Yes, and we are the State subsidiary.

Mr ALISTER HENSKENS: For the purposes of your evidence today have you spoken to the surf living saving clubs in the northern region of New South Wales?

Mr KENT: Yes, we speak with them quite a lot. We attend most of the meetings that the DPI was talking about earlier to ensure that mainly the collective approach of surf live saving is represented because there are also issues at different levels. Surf live saving in an organisational sense is a big beast. We have the clubs at grassroots with sand between the toes; then we have the branches, and we have split that into 11 branches in our State—from Yamba to the border, the North Coast, then mid North Coast—and it has evolved that way through more than 100 years of the organisation. There is the State body and then there are all the States and Territories in Australia, which obviously form the national body.

Mr ALISTER HENSKENS: Councils used to employ beach inspectors, the full-time persons who would patrol the beaches Monday to Friday, and then the volunteers would patrol the beaches on Saturday and Sunday.

Mr KENT: Yes.

Mr ALISTER HENSKENS: But Surf Live Saving NSW now employs and trains people to provide a service to certain councils, is that correct?

Mr MANIERI: The Australian Lifeguard Service as a subsidiary is a separate company. We do have paid professional lifeguards who work either Monday to Friday, if there is a surf club on that beach, or seven days a week. It varies depending on the council's financial limitations and the scope of service they wish to provide their community.

Mr ALISTER HENSKENS: My next question is common to whether someone is a full-time lifeguard or a volunteer on a weekend, but as a consequence of the more recent proliferation of shark attacks have you changed your training or anything you have been doing with your members to address that?

Mr KENT: No, not specifically. Formalised risk mitigation to keep a beach safe in the last 10 to 20 years has obviously grown a lot. A long time ago it was more a matter of turning up, putting the flags up and just sort of getting on with it. The organisation has now started to take very seriously documenting risk mitigation steps for marine life, sand erosion and all sorts of things and working with councils individually to ensure that we are keeping the public safe in a wider sense, but not specifically over the past 12 months because we were sort of doing it anyway.

Mr ALISTER HENSKENS: Has it always been part of your standard training how to minimise blood loss if a shark attacked a swimmer, for example?

Mr KENT: Yes, at certain levels. The organisation is when you get a bronze medallion you are taught basic first aid, mainly CPR, stuff which would save someone's life in the case of drowning. For major blood loss that is taught at a high level of senior first aid as you become a lifeguard. If you seek employment as a lifeguard on a patrolled beach on a weekend generally it is safety in numbers if you want to put it in real simple terms, the minimum standard of three with certain levels of qualifications. But most patrols—again we have differences in size of clubs—would have five or six people on patrol. Lifeguards and councils with limited budgets—and I am probably talking on behalf of Brent—cannot afford to have that many people on the beach. The lifeguard standard is higher because they have less people so therefore their standard of first aid would be high level.

Mr ALISTER HENSKENS: They are trained at a higher level?

Mr MANIERI: Correct.

Mr ALISTER HENSKENS: If you look at your average patrol on a weekend, correct me if I am wrong but the minimum level of training is the surf bronze? Is that right?

Mr KENT: Yes.

Mr ALISTER HENSKENS: Then you have to do your run, swim, run every year to keep your fitness?

Mr KENT: Yes, and you do your basic CPR, radio skills, surveillance skills, what are you looking out for and all that real baseline work, everything which makes it the bronze medallion.

Mr ALISTER HENSKENS: Do you say that no part of the bronze medallion would really involve how to deal with the treatment of a shark attack and that it is more CPR?

Mr KENT: It depends on the level of the shark attack, I suppose, or the shark encounter. If there was a leg missing we would not go into that much detail. The bronze is more basic life support for a basic drowning type of incident, not necessarily shark attacks.

Mr ALISTER HENSKENS: I am only referring to media reports over the past few days but it seems that in Kiama, with the use of a leg rope or something, they were able to stop the blood loss.

Mr KENT: Yes.

Mr ALISTER HENSKENS: Is that part of the training that the beach inspector level would have?

Mr MANIERI: No, we do not go that deeply into such severe trauma cases. For us, once again, it is about doing the best job possible with the first aid training that lifeguards are given and ensuring that we give as much chance until a paramedic or an ambulance can turn up and take over. The skill level that is required to deal with that sort of trauma is quite involved.

Mr ALISTER HENSKENS: I know it is very high but have you looked into the possibility maybe of upskilling just so you can do as much as you can on the beach until the ambulance and other professionals arrive?

Mr KENT: There are courses to do that. Setting it as a minimum standard for basic patrols or for a general patrol, it is weighing up how much you want to put on the volunteer club to do that.

Mr ALISTER HENSKENS: Yes, I understand that.

Mr KENT: It is a valid point but then again the use of a tourniquet in the past 10, 15 or 20 years since I have been a lifeguard and a life saver has come in and out of general practise. It is hard: what are we teaching? What are we taking up? And we try from an organisational point of view—it is probably a bit easier for bring it into the lifeguards to mandate different awards—but to try to keep it uniform across the State or across the country in terms of a basic bronze medallion is quite difficult. There is training there.

Since this happened, a lot of first-aid providers started trying to sell all of our clubs haemorrhaging kits and trying to almost take advantage of the situation. If they had the training, we would support that. If we were going to buy this gear you need to ensure that your members have the training to be able to use it. Certain clubs realised that maybe they do have that need so they ensure members on their patrols are trained up. They see it as a risk at their local beach, much like rock rescues. If you have got lots of rocks around your beach you are probably going to train your people in that fundamental skill.

Mr ALISTER HENSKENS: I think surf life saving certainly was involved in the early days of helicopter patrols. Are Westpac helicopters still run by Surf Life Saving? Is that right?

Mr KENT: In different areas, yes.

Mr ALISTER HENSKENS: Yes, in different areas, I think in certain parts of Sydney and Newcastle. Even before that may be Surf Life Saving was involved in fixed wing patrols before helicopters came in. I think Surf Life Saving has had a long history of surveillance and part of that aerial surveillance has been shark spotting as well as rescuing people on rocks or in other calamities around the beach areas. The Committee has heard evidence about shark spotting from South Africa where they set up on headlands with binoculars and watch for sharks, and certain groups are pushing that very much. Given the experience of Surf Life Saving with different methods—presumably people on the sand or in the surf pavilions will also look out from to time into the surf—do you have comments as to the relative benefits of looking from above as opposed to looking from the beach to pick up sharks?

Mr KENT: I attended the meetings with the shark spotters. One of the things that was pointed out by the Department of Primary Industries, and we pointed out, is that at the moment to find the volunteers on weekends—because Surf Life Saving, and something which I stress a lot, does an incredible job at the moment and all of our volunteers on the beach do an incredible job and have a passion for an organisation that saves lives. With the shark stuff we are starting to get into a bit of a space where our brand and our organisation is sort of if we are seen there the public feel reassured. In certain things it has been passed onto Surf Life Saving. I have told Surf Life Saving about it so therefore it is almost like passing the buck on to us. Surf Life Saving has been told about things so we are all good.

With the shark spotters there was discussion "Surf life savers could be on headlands and looking out for sharks". It is taking away resources from drowning prevention. We do not see that as our role. When there were other comments around "Council should be funding that on weekends", currently councils sometimes struggle to fund our patrols with highly skilled individuals or two people on patrol. As a weigh up of options is it better for councils to support drowning prevention, bear in mind we have had 40 coastal drownings in New South Wales this financial year already, and better bang for the buck funding more lifeguard services or funding shark spotters?

When we look at this we say it has been successful in South Africa but, as was pointed out by the Department of Primary Industries, the cost of putting someone on a tower in South Africa is dramatically less than in New South Wales. I think if we are going down this path—again the height which is needed on those South African beaches is sometimes 40 metres of height of elevation which they are recommending to look down and use this strategy effectively—in New South Wales there are very limited spots to do that anyway. In some cases maybe, but I do not think it is an approach which would actually be beneficial compared to other strategies.

Mr MANIERI: I echo Andy's comments there and state that, yes, councils at the moment, especially one or two northern councils, cannot even fund a second lifeguard to patrol a beach let alone fund someone to predominantly look out for sharks on a headland. We did see over the summer period Shoalhaven City Council put on lifeguards at Hyam's Beach after there was a report in the newspaper of a school of small bronze whaler sharks in the area. The lifeguards sitting on that headland did not spot one shark in the entire two weeks that they were there. There were environmental conditions that played a part in that with murky water but even during the periods of clearer water across those two weeks they did not spot anything. It was basically a waste of money.

Mr ALISTER HENSKENS: Mr Kent, you have just, very importantly I think, drawn a comparison between the incidence of people who were in danger through rips and swimming related issues and people who are at risk because of shark attack, and the relative risk compared to resources around those two issues. Also relevant to what you have just said on that although, I assume, your organisation is able to attract a large number of fantastic people who give up their weekends to patrol beaches probably like all voluntary organisations, and we could name a whole lot of them, I would imagine that over the last 25 years it has become more difficult for you to get volunteers. So you have to be smart about the way in which you deploy your voluntary resources. Is that fair?

Mr KENT: Yes, absolutely. I think it is an issue which we face all the time in terms of surf lifesaving. There are all sorts of things which can happen and a volunteer space which fluctuates in terms of membership. Different clubs struggle at different points in time. Committee members might have read recently that there were some issues at Fingal Beach on the far North Coast where their membership is quite low. But other clubs in the surrounding areas have quite high memberships. Our struggle around keeping people safe on the beaches, whether around drownings, first aid or shark mitigation, is about the best use of our resources. It is something which we work with on a day-to-day basis—to try to take our limited resources and spread them across for the best fit.

At a State level it is easy to say one thing. But at a local level there are people who are very passionate about their local surf club and they do not want to go and patrol anywhere else. So in terms of drowning prevention it is an issue which we face. Our strategic and long-term strategy is to try to sort out that issue. There was evidence given earlier about the number of unpatrolled beaches. Different encounters can happen at unpatrolled beaches or remote beaches, and drowning is the same. So how do we start to use technology and use better methods and strategies—rather than the bricks and mortar approach of building a surf club on every single beach, which probably was the way 100 years ago—spread across the State to ensure the safety of the public?

Mr GREG APLIN: Over the past 12 months with the reporting of shark sightings and incidents related have your members noticed and reported any changes in beach going activity—for instance, the number of beachgoers?

Mr MANIERI: I had a feeling that this may be a question asked so I had one of my staff pull the 2014-15 attendance figures and compare them to the spring and summer figures from 2015-16. We need to bear in mind that these are subjective and differing factors can determine whether there is an increase or decrease. For the Tweed across both periods we saw a healthy increase in beach attendance. In Byron Bay in spring this year we saw a 7,000 person increase but in summer a 12,000 person decrease.

Similarly, in the Ballina Shire Council area there was an increase in spring but a decrease in summer. In the Clarence we had a decrease across both periods when compared to 2014-15. So the figures differ. If we look at the time periods for when the shark incidents occurred up in that area, I would have suspected that we would have seen a decrease in the spring period and potentially an increase in the summer period. So those figures, whilst they are subjective, do give some credence to the idea that maybe there has not been as big an effect on the beach going population as may have been expected.

Mr ALISTER HENSKENS: Could those figures be more weather-related?

Mr MANIERI: Yes.

Mr ALISTER HENSKENS: It was a bit of a rotten summer.

Mr MANIERI: Yes, and as I said the environmental factors of what transpired across the summer, especially the first few weeks, would have had a bearing on whether people attended the beach.

Mr ALISTER HENSKENS: Assuming spring was good weather were you able to look at the good weather from more recent times and compare that to the good weather in the previous year to get some sort of idea of whether there has been a change?

Mr MANIERI: I do not have that information in front of me but that is definitely something we could provide.

Mr KENT: We could look at that. With lifeguard data it is easy because the lifeguards are paid to enter that data. With the volunteer data there is probably a general lag in all of the information coming through. So, for example, data around what happened over the weekend probably will not be entered by the clubs for another two or three weeks.

Mr GREG APLIN: Given that environment factors are obviously an issue here I would like to link it to the very comprehensive report you gave on your community awareness programs and to look at exactly what you feel is absolutely effective. Are you getting any feedback from stakeholders such surfers?

Mr KENT: Do you mean around the community awareness programs such as Shark Smart?

Mr GREG APLIN: All of your programs. You listed quite a few initiatives: beach safe, the coastal accommodation network, surf rescue first-aid CPR, the Shark Smart program and a whole group of programs. I am just thinking, in its totality, of the way in which you are approaching the dissemination of information to people to mitigate risks and to make people more aware of responsibilities; and, obviously relating that to any known risks, how you are then disseminating that information effectively to the people who need to be aware of the conditions.

Mr KENT: I would say, in terms of feedback around what success it has had, we probably have not had much feedback at all really. With the Shark Smart stuff it is hard to determine on the beach the feedback which we are getting. We do not collect that data from our lifesavers on the beach to say how many public contacts they had and how much information they gave out. It is something which anecdotally just happens. The Shark Smart stuff we have given to all of our clubs. We probably could ask them how much they have given away and if they have received any feedback from it. But at this stage I would not have any information around how successful it has been.

Mr GREG APLIN: So what drives your programs? How are they initiated? Are they in response to a perceived need or are they initiatives driven by tourist bodies, by your members or by an analysis of what needs to be undertaken in conjunction with government?

Mr KENT: It is just stuff which has organically happened. I suppose the Coastal Accommodation Network is a good example. That initiative was driven through our project blueprint project. I am not sure if the Committee is across this. It was funded by the New South Wales Water Safety Council. It was a four-year project which mapped the entire coast around risk and analysis of beach types and structures along the coast. It was then broken down by individual council areas. So, for instance, there would be a map with Warringah Council areas and it would say that at Dee Why there are a few barbecues, there is this shade, there are these things in this area, and it goes right down to beach level so it says where the permanent rips are, where there are rocks and where there are rock pools. It made recommendations to councils about appropriate signage in different areas. This is the fourth year it has been done and it has been done right across the State.

Through that they realised that, for the Coastal Accommodation Network, if we started to build up a database of accommodation providers so we can consistently promote safety messaging to these accommodation providers, they would be doing the job for us. And then we can link that in to our dangerous surf warning work which we do with the bureau of meteorology. Every time information comes out from them around dangerous

surf warnings we push it to the Coastal Accommodation Network to again drive safety messages to their punters. Could that be enhanced? I think it is something that we really need to work on further to grow that network and to ensure the safety messages are getting out as fast as possible, and that as many safety messages are getting out as possible. The problem with that is: How many safety messages are we pushing to them? People need to be aware of sharks, people need to be aware of big surf, people need to be aware of rips and people need to be aware of the sun et cetera.

CHAIR: And stingers.

Mr KENT: Yes, it becomes a lottery really of how much take up we get. Through our Facebook page and all the social media stuff which we do, and even through our print media, how much take up there is on all the different issues there are depends on the severity of the issue as perceived by the public.

Mr CLAYTON BARR: I would like to ask about the enrolment of junior trainee lifesavers.

Mr KENT: I do not know what we had this year with the Far North Coast clubs. At the start of the season there were two clubs which decided that they would not put the Nippers into the water. In Ballina they moved to Shells Bay, and I think Lennox Heads did the same.

CHAIR: Did they move to Lake Ainsworth?

Mr MANIERI: Yes, they did.

Mr KENT: It is the club's prerogative to do that. Since then over the summer there have still been surf sports events held back on the beaches. I think, again talking about the psychology of what happened, first of all there was a very gently, gently cautious approach and then as the summer went on the surf sports ended up back on the beach. Yes, there were further mitigation steps put in place such as more jet skis, more IBs and helicopters flying across and drones out to see if there was anything around. I suppose that happened right across the State. There was a lot more general surveillance to keep our competitors safe, which I think is to be expected. We wanted to act proactively to really ensure the safety of our members. Nipper numbers, whether on the Far North Coast or across the State, did decline. We will be able to get those to look at the correlation.

Mr CLAYTON BARR: Obviously participation in Nippers can drive some of the local economy in and around the beach, and it would be interesting to see how mum and dads were feeling about sending their kids into the water. I guess the other aspect to that would be to look at the number of seniors. Did some of the mums and dads themselves feel a bit nervous and decide that this year they were not keen. The third part of that I guess, and you may or may not have this data, would be about donations and whether or not the community was giving more generously because they thought you guys were under stress and strain or whether it was giving less generously because they just were not around the beach. I do not know how you go about measuring that or whether or not clubs report that back to you.

Mr KENT: Certainly we did go to Minister Blair and ask for some funding.

CHAIR: Was that to cover a loss?

Mr KENT: Yes. I would not think that we would be pushing to the general public. We did not see it, and I do not think any clubs went directly to the public around a public campaign to fundraise just because we were under the pump on shark mitigation. I did not see that.

Mr CLAYTON BARR: I did not mean that at all; I just meant that you were going about your normal thing which is to sometimes have a collection bucket at the car park or to sell raffle tickets or whatever and whether or not people instead of giving a fiver were giving a tenner or something like that. You may or may not have that data.

Mr KENT: Yes, it would be interesting to see, you are right. We realised three months into it that the amount of activity on callouts for shark sightings in the Far North Coast dramatically increased. So we went to Minister Blair and said, "Hey, look these guys have to run all their jet skis and whatever else. They need to get all the stuff serviced and the season has not even started yet." Quite generously Minister Blair gave us $20,000 to disburse between the branch, the jet boats, the jet skis and the clubs. It almost like saying, "Thanks very

much. Hopefully, you are ready to go for this summer of drowning prevention." It was great to see, but we were not pushing for any massive campaign from a New South Wales point of view.

Mr CLAYTON BARR: What is the mood and the spirit of the lifeguards and the lifesavers? Are they saying, "You would be mad to go in the water", or are they saying, "Yeah, it is business as usual"? Are they telling family and friends do more water, less water, the same? Are they going to pubs and saying, "Mate, I cannot believe you brought your surfboard up here." What is the general anecdotal flavour, feel and spirit of the movement?

Mr KENT: Depends which clubs, I suppose. Some clubs are more affected than others. Certainly initially it was the guys who operate the jet boats who are out there a lot, and the clubs in the Ballina and Lennox areas. The duty officer system that we have up there, the amount of work they were doing initially was tremendous, so they were almost very tired of doing it. Sometimes when they did see some big sharks their comments were, "We probably better think twice about this." Again, as time has gone on and the information which has come out from the Department of Primary Industries about shark numbers and their activity, it has been quite reassuring.

The constant communication with them has actually been very, very good for the clubs to understand fully what is going on. Certainly the clubs that have participated are well informed and I think always have known the risks. I think they are more informed. Maybe it is a general feeling of the community as well, looking at the lifeguard numbers. Initially, yes, maybe, there was a lot of talk and a lot of heated discussions at the early meetings up there, but the latest consultative meetings I have been to, there is more interest about the technology rather than the fear factor, I suppose.

CHAIR: Andy, we see that the numbers are down—Byron Bay, 12,000; Ballina is down as well. What would have happened if there that been a shark attack at Ballina over the summer in mid-December or mid-January?

Mr KENT: I think there would have been quite a big deal.

CHAIR: What sort of an effect would it have had?

Mr KENT: We would seriously have questioned putting our own—maybe because surf lifesaving got on with patrolling the beaches and got on with surf sports and everything, it may have had an effect. The public see it is a safe area or safe place to be because the surf lifesavers and lifeguards are there and doing it. If something happened during that time, I really think there could have been an issue for us to wonder is it safe to put our own people in the water.

CHAIR: What impact do you think it would have had on local community businesses?

Mr MANIERI: It would have been hard to tell, particularly for accommodation providers. If it happened in the middle of December, a lot of people would have been already booked in and already in the area. Whether we would have seen an effect immediately, I am unsure, but perhaps, yes, if there had been another unprovoked attacked we may have seen longer term effects to the local community, maybe not so much instantaneous but moving forward there potentially could have been an effect.

CHAIR: We are seeing a lot of work being done offshore by the Department of Primary Industries in respect of an integrated approach. Onshore, what else can Destination NSW do? In particular, I am talking about the recommendations you have put forward to actively promote being beach safe. What else can Destination NSW do and, in fact, what are they doing?

Mr MANIERI: I may be speaking on Andy's behalf here. When we first saw all the incidents occur, out of that we had many different approaches to deal with it and promoting what they were going to do. As we have had a more level-headed approach over the past few months, we have started to see more of a concerted effort from everyone moving in the same direction, and I think from a Destination NSW point of view, ensuring that there is one message through Beachsafe and the SharkSmart app is definitely the way to go. If we have a fractured approach, we will not have the same uptake as we would if we have a strategic direction through a central point of information such as Beachsafe and the SharkSmart app.

CHAIR: Does Destination NSW have that now?

Mr KENT: Yes.

CHAIR: Do they?

Mr KENT: I think so. Sorry, in respect of using our website, Beachsafe?

CHAIR: Yes. Also, what messages are you hearing from Destination NSW that they are trying to get the right information and get some public confidence back into the market?

Mr KENT: I would not know about Destination NSW, but there are councils in the North Coast area that have started using an app or info called MyBeachInfo, which basically draws information from Beachsafe. What we need to stress is consistency across this public approach. We believe that you should go to Beachsafe for your beach information. What is the weather doing, what else is in the area, that should be there, and it is free. Surf lifesaving does it. That is something that Destination NSW and/or councils should be pushing. We should not have a MyBeachInfo app trying to work alongside it. That does not make sense to me. When you are drawing the same information out of that and possibly almost competing with it, I do not see the point, especially when it is councils doing it.

From our point of view, the SharkSmart app should be the number one go-to in terms of public information for shark mitigation or shark activity. Beachsafe should not be interfering on that. The Beachsafe app should be about beach safety, what is in the area. SharkSmart, because it is an authoritative position from a Government organisation, that is the one thing we did not have up until two weeks ago when it first went live with the virtual reality [VR] 4G stuff. From what I was hearing, all the public wanted to know was information. Where are the sharks? We are doing all this tagging, where are they? Now they have the information. Going forward, that is a really good thing for us, and a really good thing for surf lifesaving. This is Government. This is serious. This is what is going on. It is truthful, not random things that are happening which would muddy the waters, if you like, for the public to get the correct information.

CHAIR: Does Destination NSW know about Beachsafe?

Mr KENT: I presume so, yes.

CHAIR: Have you had conversations with them about it?

Mr KENT: Not me. I do not work with them. Our government relations officer probably would.

CHAIR: It might be an idea to see if there is connectivity there because it sounds like a pretty good idea to me, if you are working towards the one thing. As you rightly point out, a lot of work is being done offshore, but what is being done strategically onshore to get the public confidence back, and for businesses as well as beachgoers.

Mr KENT: One thing we talked about when the spotters were here, the information and the VR 4G stuff is really good. One of the discussions we had is that all of a sudden there are these yellow buoys 500 metres offshore and you can see them. The public are asking what are they for, what do they do, how do I get this information? Possibly a sign on the beach would help. It has to be information. Again, we are not trying to scaremonger, it is all about information. Jump on the app, it will tell you.

The other thing is there was evidence before about how does surf lifesaving inform the public. If you are familiar with how the police inform surf lifesaving for rescue emergencies, the police call a direct number to our operations room. We are set up to get the information direct to our clubs to respond to after-hour emergencies and since 2008 we have responded over 3,000 times. This year, it is up over 600 times. We want the same thing to happen with the SharkSmart stuff. We do not expect the lifesavers or lifeguards on the beach to be looking at their phone, scrolling through waiting for the next beep. It should come through. We need to work on resourcing our operations room to ensure we get the information either direct from the Department of Primary Industries or through the app, however it may be, to then inform the clubbies and lifeguards on the beach to then say: You have been informed.

It has come through a structured approach, otherwise if members of the public are looking at the app and our clubbies or lifeguards are too focused on drowning prevention, they then come to the club and say, "Do

you know there has been a shark spotted 500 metres off the beach through this thing", so we want to disseminate that information through a structured approach. We need to resource our operations room to do that. That is the discussion I will be having with the Department of Primary Industries in the next few weeks.

Mr ALISTER HENSKENS: We were talking earlier on in your evidence about the numbers on patrolled beaches. It occurred to me that because the public perception would be that it is safer to swim on a patrolled beach than an unpatrolled beach, consistent with people being fearful, there could be an increase in the number of people on patrolled beaches because you are getting a whole lot of people from unpatrolled beaches and there are many of those on the North Coast. Have you any anecdotal evidence that that might be happening?

Mr KENT: Possibly, but we still know that over 71 per cent of people nationally drown more than one kilometre away from a patrolled location.

Mr MANIERI: More than one kilometre, yes.

Mr KENT: That is not getting any smaller. It is pretty consistent. That is an Australian statistic, not a New South Wales statistic. It is quite alarming. There is a whole campaign going on in surf lifesaving that people know to swim between the flags, but they still are not doing it. People are still getting into trouble. We are trying to change the perception and we are doing a lot of research through the Australian Bureau of Statistics research on behaviour data to try to get the right message to people to do the right thing. Whether the numbers have gone up because of sharks—I hope everyone is doing it because they want to stay safe from rips, but we are not too sure.

CHAIR: Recklessness is not a defence.

Mr KENT: No.

CHAIR: Thank you for appearing before the Committee today. On behalf of the Committee, thank you to all the volunteers who do an outstanding job for Surf Life Saving NSW. I know you do a fantastic job. You cannot put a price on volunteers. When you speak to your members, please thank them on behalf of our Committee. Brent, thank the lifeguards who have a role to play during the week.

Mr MANIERI: Not a problem.

CHAIR: The Committee may wish to send you additional questions in writing. The reply to those questions will form part of the evidence and will be made public. Will you be happy to supply a written reply to any further questions?

Mr KENT: Yes.

Mr MANIERI: Absolutely.

CHAIR: Thank you again for your time. We sincerely appreciate it. Keep up the great work.

(The witnesses withdrew)

HARRY MITCHELL, General Manager, Australian Aerial Patrol, and

DUNCAN LEADBITTER, Volunteer, Australian Aerial Patrol, affirmed and examined:

CHAIR: Before we proceed do you have any questions concerning the procedural information sent to you in relation to witnesses and the hearing process?

Mr MITCHELL: No, I don't think so.

CHAIR: Would you like to make a brief opening statement?

Mr MITCHELL: In terms of the organisation that we are representing?

CHAIR: It is entirely up to you.

Mr MITCHELL: The Australian Aerial Patrol is a trading name, the entity is the City of Wollongong Aerial Patrol Incorporated. The organisation was formed by North Wollongong Surf Club and the City of Greater Wollongong Council in 1957 as a result of a fairly well attended public meeting where the city at that time was concerned about shark activity and wanted some sort of aerial surveillance. The organisation has continued to provide the service of surveillance across the entire region. We are widely known as the shark patrol and funded entirely by community, corporate sponsors, local government in our region, and we sell lots of lamingtons and so on.

Predominantly we are a volunteer group. We have always been a volunteer group. We only have a couple of paid employees, and I am one of these. I did start as a volunteer many years ago. We are a member of the District Marine Subcommittee, which is formed under the Illawarra District Rescue Committee. We are a voting organisation on that committee. We work hand-in-hand with not only beach safety providers, but also with police and other emergency agencies in the primary function of keeping people safe, helping to mitigate risk as best we can with the people on the ground and in the water.

Mr ALISTER HENSKENS: Gentlemen, you operate in a very beautiful part of the world. Can you give us an idea of the frequency of your flights and what times of the year your organisation operates flights? Different operators have operated north of you, various different coastal surveillance, Westpac helicopter service and others—can you give us some information along those lines?

Mr MITCHELL: I believe the Australian Aerial Patrol is unique to the whole of the Commonwealth. We are a dedicated platform that is up in the air and best known for Saturdays, Sundays and public holidays. Over the last two or three years we have stretched that and from the middle of December to the middle of January, subject to funding, and fortunately we have attracted a level of funding from across the wider community that enabled us to provide a service on week days as well. If I can touch on this current season: we started early September 2015. We started off providing the service Saturdays, Sundays and public holidays. We stepped that up at the end of November. When the schools went on holidays we increased the service to weekdays because the beaches are most populated during the school holiday period.

We are part of a region, as you said a beautiful part of the coastline, and I believe it is probably the top ranking tourism area in that part of the world. I am the deputy chair of Tourism Shellharbour, which is another hat I have. Together I am conversant with tourism in our region. We were doing daily patrols until the week after the end of January, the first week in February. We have now reverted to weekends and public holidays and we will continue those through to the end of April, Anzac Day in fact. All through that period we chose different times. We feel we have a fairly good knowledge of marine life behaviour from our platform 500 feet above the beaches. We see the various cycles that are taking place with not just sharks but observations that could lead to the attraction of sharks closer to shore.

We plan our missions, our patrols, to work in at the best times. I must say that this current season we have done more patrols over a longer period—seven months, in fact, when we usually do five and a half months—and we increased our passes over beaches, particularly in three local government areas, up to as much as eight and 10 passes a day in those busy periods. We have not done that many passes over beaches in previous years, I would suggest.

Mr ALISTER HENSKENS: As a boy I must say that it was moderately reassuring on the beach to hear planes going over that you knew were looking out for sharks. Is the public aware of you going overhead, can they hear you from the beaches?

Mr MITCHELL: They are indeed. We have a big profile across our region and that is measured in many ways. Some of our fundraising programs include car shows. One of the most popular car shows on the whole of the South Coast is conducted at Black Beach, Kiama, and thousands of people go to that. People do know us.

Mr ALISTER HENSKENS: Mr Ward's territory.

Mr MITCHELL: Yes. I heard the discussion earlier about fundraising and so on. At that type of function we do not receive a commission or partake of any of the takings that say the automobile club might receive through memberships and so on. We do the bucket brigade at the gate and we call for gold coin donations. As a measure of what we stand for in the community it is not unusual to receive not only gold coins but 5, 10, 20 and 50-dollar notes to go into those buckets. I think that is recognition of the service that we provide and the recognition that we are an integral part of surf and beach safety in our region.

Mr ALISTER HENSKENS: Can you tell us, from your perspective, a bit about the relative benefits of someone in an elevated position on the mainland looking for sharks and somebody in a fixed wing plane, such as the ones you operate, looking for sharks. You have mentioned being able to observe what is happening in the water and patterns of fish and the like, can you expand on that?

Mr MITCHELL: Our platform does not profess to see every shark. We know that we see a lot of sharks. Our platform is 500 feet above the beach and is impacted by many factors. Probably one of the most sensitive factors is sun penetration through the water. Our crew, our volunteers, dedicated volunteers—without whom we could not do the job—train extensively each year to carry out the task at hand. Between the years 2000 and 2007 the Australian Aerial Patrol won a tender and conducted, in partnership with the Australian Maritime Safety Authority, the highest level of fixed wing search and rescue in the Commonwealth, one of only three providers. Through those programs we learnt a lot in terms of training our people. We do see a lot.

Mr ALISTER HENSKENS: More than you could see from the land?

Mr MITCHELL: I was coming to that. I live at Kiama. You know the hills around Kiama.

Mr ALISTER HENSKENS: Very steep.

Mr MITCHELL: Just yesterday afternoon I went for a drive to Boneyard, I am not sure if you know where that is. It is between Kiama Downs, or Minnamurra, and Bombo. I often do that because I stand on the top of a hill to see what I can see. I did that the other day at Bombo. I was an hour in front of that shark attack at Bombo on Wednesday. From the road, just passing by looking over the railway line, I said to my wife, "There are a lot of seagulls, a lot of birdlife on and around the water, the fish are still there". We are seeing lots of fish. I think standing on a high platform on the land has a lot of merit. I am probably not qualified enough to suggest it is equal to our fixed-wing aerial surveillance or whether it is better or not but I know I can see shadows of fish and I have stood at Byron Bay on the steps walking up to the lighthouse and I have seen a lot of marine life in the water. I think there is merit in shark spotters on the land.

Mr ALISTER HENSKENS: Your organisation is quite old, going back to 1957. We have heard from some witnesses today that there is not great information about shark movements and so on. I was wondering whether your organisation have kept any records with regard to the incidents of sharks and if so whether you are able to tell us anything about recent trends, if at all?

Mr MITCHELL: We do keep shark records and at the end of every patrol a report of our daily activities goes out and that gets sent to some of our other partners as well. Wollongong City Council is one of those partners. People get annoyed with me when I say there is a lot of common sense in what happens. I have used the statement in some recent media reports over the last summer. I try to keep things simple without complicating things. We will never figure out sharks. They have probably got us figured out but we will never figure out sharks. However, we see trends. One of the comments I make often in trying to explain to people who are conducting interviews with me or our organisation, when I try to describe the trends that we see and those

trends, there is not a lot of variation. I will get back to that in a moment. But I say, "It is nature taking care of business."

If I can qualify that further and get into that trend aspect that you have referred to, we have a coastline that has many estuarine systems. They meet the ocean. It could be Sydney Harbour, Lake Illawarra, a little stream or a creek. They are all sizes and all shapes. The nutrients that those estuarine systems provide or put out into the ocean attract marine life. We see that. This is a trend. It is a common trend and it is usually the common thread that I believe attracts marine life from the smallest to the largest. We see that all the time. Given various weather conditions, particularly after rain, you will see these estuarine systems spewing a whole lot of things out into the ocean. It is a cycle.

Now, unfortunately, many of those geographic locations where the estuarine systems meet the ocean are close to a lot of popular beaches. Once upon a time it was only a few popular beaches but now it is a lot of popular beaches and we are seeing marine life moving in closer. I was asked the question by Wollongong Council not too long ago—we meet regularly with them and with other partners—about if I was to guess where an incident might occur in view of trends and how we have seen them over the years. I would have chosen Port Kembla. I was asked why I chose Port Kembla. We are seeing some changes in the trends at Port Kembla. We have always had quite a number of hammerhead sharks between Windang, which is north of the Lake Illawarra entrance, and Port Kembla Beach. Particularly that strip where there are two big radio towers. Again, those hammerheads are feeding off whatever might be coming out of the lake.

More recently we have seen this particular season a couple of rare turtles. That was only recently. If you look at our Facebook page you can see the rare turtles. Mr Leadbitter is more qualified to tell you why they are rare. I think he was on that flight, in fact. We are seeing a lot more seals. There is a lot of seal activity off the Five Islands, more so than we have seen in the past. One incident last year—

CHAIR: I am so sorry to interrupt but I am mindful of the time. I know my colleagues have some questions to ask.

Mr GREG APLIN: I have two questions relating to the form of aerial surveillance. In your submission you argue that fixed-wing aircraft are cheaper to operate than rotary-wing aircraft. Are there any other advantages of using fixed-wing aircraft?

Mr MITCHELL: The high wing creates a wonderful platform because we have no obstructions underneath. The pilot is just that; he is the driver. The mission coordinator is in the front right-hand seat, he has the wherewithal of how to conduct the flight and he is in communication with all the emergency frequencies we have on the radio. Then he is also an observer and we have observers in the back. In terms of the fixed-wing, we can cover a larger area, a longer area, in a shorter time. I use the analogy that we are the legs and rotary are the arms. I think there is an application for both, but in the type of surveillance that we are doing and given the area that we have, the fixed-wing is, in my mind, the better platform. We have talked about going into rotary as well but I think we will stay with fixed.

Mr GREG APLIN: Many people have talked about the increasing usage of drones. You referred to the promotion of drones for patrols in your submission. Can you quickly encapsulate the benefits and the disadvantages or advantages of using drones? I imagine if one is the legs or arms it is going to come to some other analogy to the human form. Fingers, perhaps?

Mr MITCHELL: It is early stages with drones. I think they will have a place. However, given the extent of coverage of our coastline by the Australian Aerial Patrol, I think it will be a very long time before we can have drones carrying out some sort of surveillance over all of those beaches. I say that because south of Kiama most of the beaches are not patrolled, so there is no beach safety representation there. I just think it is going to take time. I really do. I believe our colleagues in Surf Life Saving have announced what they are going to be doing with drones. I stand to be corrected but I recall a cost of $250,000 for that drone. It is on our Facebook page. I put it on there because I thought it was worth putting on there.

Mr LEADBITTER: One of the things that has not been really looked at with the drones is sightability. The same issues we find as human beings you are going to find with somebody sitting in a room somewhere looking at a TV screen. You have to see the shark first. Sure, there are fantastic photographs taken from drones of sharks but you have to cover a lot of ground and be able to see the animals first. I think that has not yet been evaluated. We have been through that evaluation process with the DPI and these other platforms have not as yet.

They all come across the same issues about glare from the water and water visibility. Some of the same solutions that have been looked at such as the use of multispectral scanners and other high-tech equipment that could apply to drones can also apply to what we do. There are some similarities, but at the moment I think a lot of the drone conversation is about potential rather than actuality.

Mr GREG APLIN: Basically we are getting back to the forms of building public confidence. You mentioned it earlier and said in your submission that aircraft are visible and people like the idea of someone looking out for them. That is very true. There might be a false sense of security with drones in that respect unless they are being monitored and are able to detect certain patterns immediately and relay that concern back to a monitoring base by a form of audio technology.

Mr MITCHELL: Yes.

Mr LEADBITTER: And there are significant costs. One of our sponsors has provided funds for us to put a live video to ground system in. We are going to be using the sort of equipment that journalists use to feed TV quality images from the ground in areas where there is no TV van set up. We have a budget for that equipment. The big cost is the data downloads and fundraising for that is a pretty big issue. Another issue is the capacity of cell towers to handle that. When we trialled that late last year Telstra shut down one of the cell towers because we were pumping too much data through it. If we are going to be flying along the coast from Wollongong down to Ulladulla and beaming live images to ground crews in Surf Life Saving or to others you do not want to have somebody shutting down the cell towers because we are pumping too much data through. There is a big cost associated with that, which we need to fundraise for.

Mr CLAYTON BARR: Most of the media attention has been on the North Coast because primarily that is where the shark attacks have been. You guys live and operate on the South Coast. Do you think there has been any transfer of that heightened awareness or anxiety down to the South Coast? What evidence would you use to say there are indicators that people are broadly aware along the entire coast, not just the northern coast?

Mr MITCHELL: When everything was happening up in the North Coast, I think it was 5 July last year, the Mayor of Ballina called me. We had met earlier in the year. He knew our platform. They had the junior surfing contest up there. He said, "We'd like to hire your aircraft." We sent it up. What it did was provide a surveillance platform for seven hours a day. When we had to go back and refuel midway through that seven-hour surveillance a small helicopter came up to fill the void and landed when we got back in. I stayed in the Illawarra. I had regular updates with the organiser up there and they were delighted with the work that our people were doing. More so, they were delighted that the competitors, the parents of the competitors and the organisers all had a degree of comfort.

I think that is what we do. Our planes are red and yellow. People know them. They can hear them coming because they have a distinct sound. When we see sharks or marine activity that could attract sharks we are on the radio straightaway to the beach safety providers. We give them a heads up. We will report also through the media without trying to cause alarm. I am not sure if I am answering your question. I do not think we have had the sensation down our way that has existed in the north. I do not think we have seen that.

Mr LEADBITTER: Last December when there were a lot of sharks seen in Jervis Bay it was big news. There are two things. The reason we took our planes up to the North Coast at the beginning of last year was—and it comes back to a question that was asked by the other member about trends—we were looking at shark attack trends and we noticed an uptick in the number of shark attacks on the North Coast over the last 20 years. We originally went up there to see whether we could help people there set up an equivalent of what we do, which is community funded and owned by the community. That was just based upon looking at data which is publicly available. But there was a big spike towards the end of last year.

We very commonly see sharks in Jervis Bay and they have been there for decades. They swim around people. One of our pilots and I have been wanting to go out snorkelling with them but apparently they are pretty hard to get close to because most sharks are quite shy of people. We had to do what we do, which was publicly report that we had seen them but try to say that these are not a big issue for people and they are whaler sharks, they are dusky whalers. There was a huge amount of public interest then and a bit of angst in the run-up to Christmas, but I think that between ourselves and other community members we were able to reassure people that these animals have been there for decades and we see them every year, we have records of them going back for years and there is no big issue.

CHAIR: I am mindful of the time. We will conclude there, gentlemen. I sincerely thank you for appearing before the Committee today. The Committee may wish to send you some additional questions in writing, the replies to which will form part of your evidence and be made public. Would you be happy to provide a written reply to any further questions?

Mr MITCHELL: Of course, yes.

Mr LEADBITTER: Is it possible to make two quick statements before we finish?

CHAIR: Very quickly.

Mr LEADBITTER: The key elements of our submission were that what we do is no less protective of people than the beach meshing program. Secondly, we think that the DPI or at least an agency should be encouraging a lot more collaboration between people such as ourselves and others. At the moment there is no coordination. And thirdly, sorry, there should be some funding allocated to research to help us improve in areas that we believe need some improvement. Thank you.

CHAIR: Thank you very much. We note your submission is 42 pages long and very comprehensive. Thank you for taking so much time and providing that detail to the Committee.

Mr ALISTER HENSKENS: We also thank you for your voluntary work. We appreciate it very much.

(The witnesses withdrew)

(Luncheon adjournment)

BARRY BRUCE, Senior Research Scientist, CSIRO, Hobart, affirmed and examined:

CHAIR: I welcome Mr Barry Bruce from the CSIRO. Thank you for making the time to appear before the Committee today. I understand you have travelled from Hobart.

Mr BRUCE: I have indeed.

CHAIR: Before we proceed, do you have any questions concerning the procedural information sent to you in relation to witnesses and the hearing process?

Mr BRUCE: No, I do not.

CHAIR: Before we commence with questions would you like to make a brief opening statement?

Mr BRUCE: If I may seek your leave to make a presentation on our research, which summarises some of the work we have done on white sharks particularly here in New South Wales.

CHAIR: That is not a problem. How long does the presentation go for?

Mr BRUCE: About 15 minutes.

CHAIR: That will be fine. Please proceed.

Mr BRUCE: Thank you very much for the opportunity to present a summary of our research. One of the things that I commonly see is some level of confusion and misinformation on what sharks do along the New South Wales coast and the technologies we use and I would like to use this as an opportunity to inform the Committee a little bit about the technologies used to understand shark populations. Needless to say, although this work is based in CSIRO in Hobart it is collaborative with a number of agencies both here in New South Wales and around Australia and we run a national program on white sharks throughout Australia.

Just to give you a brief idea of the sorts of things that we focus on, we have been working on white sharks now around Australia for a good many years. Most of the work we have done is on understanding their biology, looking at their movement patterns, their population structure and working out ways of counting them, which is always on people's minds. To do that we develop and trial new technologies both within CSIRO and with partner agencies. Our current main focus is trying to get hold of that allusive question of estimating population size and trends across the Australasian region, and that is not easy to do, and I will explain why.

A lot of the work that we have done in the past and we still do and it is still relevant is to understand their movement patterns and what areas they use and why. One of the things I will show you now is a video clip of exactly how we get some of this information and how some of the technology works. This is work that we have done for a long time now with New South Wales DPI. This is the Bennetts Beach area, Hawks Nest, just north of Port Stephens. This is where we have done a lot of tagging of juvenile white sharks—and by "juveniles" we mean sharks less than three metres in length.

Mr ALISTER HENSKENS: Is this One Mile Beach?

Mr BRUCE: No. This is off Hawks Nest, so north of Yacaaba Head. This is typically the distance offshore that we find white sharks of two to three metres in length—you can see it is quite close to shore. As I said, New South Wales DPI has provided enormous assistance with this work. We steam along the beach looking for sharks and when we find one we throw it a baited line; it is actually a rope with a short wire trace and a mullet. So we do not chum the water of burley; we look for the sharks and we present them with the bait. We have just hooked one up and you will see it splashing there. What happens now is that we slowly tire the shark out—it is not a fight. In the process of doing so we generally move offshore because that is safest for us and safest for the shark. The idea is to tire the shark to the point where it is safe for us to handle yet too tired that it will not swim away. So there is a lot of consideration for both our safety and the shark's safety involved.

There are two boats involved in this process: a catching boat, which you are looking at now, and the tagging vessel, which sits outside the surf zone. We then transfer the shark to the tagging vessel and we put the shark in a stretcher. We do not bring these animals out of the water; there is no need to do so. Once they are in

the stretcher in the water we provide them with an oxygen feed and that keeps them quite calm. These techniques are the same techniques we would use to catch four-metre and five-metre animals, which we have done and our colleagues have done as well. So the technique is no different; it is just the size of the gear you use might be a little bit different.

Once the shark is ready to handle we will put it in a stretcher beside the boat and once secured the sharks are quite calm in the stretcher. That is iodine we have put on the skin. What we are doing now is we are going to tag the shark, we are going to use two sorts of tags: we are going to use an acoustic tag, which you have heard of—you have heard of the VR4 technology, the acoustic receivers off various beaches. The acoustic tag is placed inside the belly of the shark, the shark is sutured up and then we roll the shark over and we will put a satellite tracking tag on it as well. These tags work in very different ways, so it is really important not to confuse how they work, and I will show you an animation of how they work in a minute.

The whole process takes about 10 minutes once it is in the stretcher, but it can take 15 to 20 minutes, sometimes a little longer, to get the shark to a position where we can safely handle it. Once the acoustic tag is in the shark is turned over.

Mr CLAYTON BARR: Are they dissolvable stitches?

Mr BRUCE: Yes, they are.

Mr ALISTER HENSKENS: There is probably going to be a scar.

Mr BRUCE: Actually, it is pretty good after a while. It does take a little while for them to heal but it is not too bad. It is a badge of honour for them. You can see the oxygen feed going in in front of the gills there. So they are quite calm in the stretcher, quite easy to handle once you have got them to that point. We pierce the dorsal fin and the tissue plug that comes out of there is what we use for our DNA analyses which will become important later. They are just tools with special surgical stainless steel tips. That is the satellite tag on the dorsal fin. The shark is then measured and released.

Mr ALISTER HENSKENS: How long does this take all up?

Mr BRUCE: It can be, on average, around about 20 minutes to get the shark to the point where you can put it in the stretcher and anywhere between five and 10 minutes once it is in the stretcher. It is not a particularly long process.

CHAIR: I take it the hook is non-barbed?

Mr BRUCE: The hook has had the barb removed and we remove the hook before releasing the shark. You have got to be very careful because the sharks, as you can see, are still lively. They may look quite calm and collected but you have got to exercise a bit of caution with them. This gives you an idea of how the tags work. This is the acoustic tag. Each acoustic tag has a unique number that is encoded in the series of pulses that comes from the tag. When the shark comes round these tags ping out those unique codes about every minute and they are recorded on underwater receivers, and there are various underwater receivers—there are hundreds of them along the New South Wales coast.

Those receivers record the date and time and the ID code of the shark. The satellite tag only works when the shark sticks its fin out of the water, it does not transmit when it is under water. So a shark has to come to the surface and transmit its ID code up to overhead satellites and if the satellite is in the right position then we will get a position—and that does not happen all the time. A shark can come to the surface and there will be no satellite in view or it will not come to the surface for long enough. So these are not failsafe identifications of where sharks are all the time. In the case of the acoustic tag the shark has got to swim within range of the acoustic receiver. In the case of the satellite tag the shark has got to stick its fin out of the water for long enough to get a signal away to let us know where it is.

CHAIR: Do you know how long that would be?

Mr BRUCE: It depends where the satellites are, how far above the horizon they are. A good satellite fix would take a couple of minutes at the surface.

CHAIR: And the radius of the underwater tags?

Mr BRUCE: The acoustic tags, at least the receivers, would typically have a range of 500 metres; it can be a lot bigger than that, it can be a lot less, depending on the conditions. So the difference with the standard acoustic receiver, which we had an animation of there, is that particular one you would have to take it out of the water to download the data; you would not get the data until the receiver came out of the water. That is very different from the VR4, the iridium-linked systems that are in place off Ballina and Evans Head and a few other places, and off WA. The difference with those is that it is exactly the same receiver but it is linked to a surface buoy and a modem that when a shark is detected it transmits that information. There are various versions of these tagging technologies.

Let us just dwell on the satellite tracking for a minute. What you see here, every dot is a successful position received through the satellite network for individual sharks. These are all white sharks; these are sharks tagged in South Australia, in Western Australia, in New South Wales and in Victoria, and this is typically the range of movements you see in Australia, basically from up around Ningaloo Reef right around the southern edge of the continent right up to Rockhampton—and that is typically the range of white sharks in Australian waters. You can find them occasionally a bit further north than that but that is typically the range.

You will see also some movements between Australia and New Zealand. So these animals get around quite a bit. It looks, based on that information, that we have one population of white sharks that moves extensively in Australia—unfortunately, that is not the case. In fact, if you have a look at the sharks tagged in eastern Australia and sharks tagged west of Bass Strait you see very different patterns. Although Bass Strait is not a permanent barrier—it is a leaky barrier—you do get some exchange, but by and large sharks tagged off eastern Australia stay off eastern Australia and sharks tagged west of Bass Strait stay west of Bass Strait.

CHAIR: How many sharks are we talking about? Would there be several hundred?

Mr BRUCE: Not for the satellite tagging. The satellite tagging data refers to the movement of about 60 sharks.

Mr ALISTER HENSKENS: But there could be multiple dots for the one shark?

Mr BRUCE: That is right. There are multiple dots for the same shark.

CHAIR: Are you able to extrapolate from that data, for example, a shark tagged in Bass Strait travelling all the way north? How far does it generally travel?

Mr BRUCE: You have read the presentation already. I will show that in the next couple of slides.

CHAIR: Thank you very much.

Mr BRUCE: When you look at the sharks east and west of Bass Strait genetically we have two populations. To understand the population dynamics and the numbers of sharks and what trends are going on you have to look at those two populations separately—we cannot mix them up. To give you an idea of all of the east coast movements of sharks tagged by our program, this is all the sharks linked together. So there are about 40 sharks here. Each dot is just a location that a shark has transmitted but that typically gives the north-south range of sharks tagged in New South Wales. That is what they do. If you tag them in, for example, the Port Stephens area then this is what you expect to see in terms of their movements—you expect to see movements as far north as the southern Great Barrier Reef and as far south as Tasmania and across the Tasman Sea to New Zealand. These are animals only two to three metres in length. We have had white sharks 1.9 metres in length cross the Tasman Sea and dive to 1,000 metres—quite frankly, we do not know why they do that. So they get around a lot. These things do not live in one place.

These extra dots are the sharks that were tagged in Ballina last year—the 14 sharks—and you can see the range of movements that those sharks have had since we were involved in assisting the NSW Department of Primary Industries—movements right up north of Brisbane, right down to the south of Tasmania, into the Tasman Sea and almost to New Zealand. We did have one that went over to South Australia as well but, like I said, Bass Strait and that separation east and west is not a firm barrier. A shark can freely swim between those two areas but they do not do it very often and they do not appear to breed with each other. So you can see sharks

tagged in Ballina do not live in Ballina, they show the same sort of scale of movements as other white sharks that we tagged along the New South Wales and Victorian coasts. If you have a look at what these sharks are doing on a monthly basis and you pool all of the information across a year, this is the sort of pattern that you get. So the size of those dots refers to the amount of shark activity or the numbers of sharks that are being detected by both acoustic receivers and satellite tags in various places. The Central Coast of New South Wales is truly a hotspot for juvenile white sharks up to sort of three metres in length.

Mr CLAYTON BARR: So the dots are based on the longitudinal activity of the sharks?

Mr BRUCE: That is right. So you can see in January most of the activity of the sharks that we have tagged over the years and have been monitoring has been about the Port Stephens area south to northern Tasmania. That is pretty typical because during the warmer months white sharks tend to be further south. During February, March and April you tend to get a spread of sharks back up the coast, and you can see sharks going as far north as the southern Great Barrier Reef. You tend to start to focus back into the central New South Wales area during the latter part of the year—the winter and spring. I draw your attention to the Ballina region where there has been some notable and very tragic interactions with white sharks. You can actually see dots up in the Ballina region at virtually all times of year, and this is pretty typical too. Although most of the really strong activity in white sharks is during the winter and spring, the fact is you can get white sharks up and down the east coast of Australia at any time of year. So it is not a well-defined pattern, although there is considerable movement north and south during those periods.

Mr ALISTER HENSKENS: Am I reading the slide correctly when I say that Port Stephens appears to overwhelming have the largest number of sharks throughout the year?

Mr BRUCE: There are a lot of white sharks at Port Stephens, correct.

Mr ALISTER HENSKENS: This is only white sharks?

Mr BRUCE: We are only talking white sharks or great white sharks, the same species. That is the species that I am focusing on for you today. So it is not only sharks tagged in New South Wales and Victoria that go up and down the east coast—this is one white shark that was tagged off in Stewart Island in New Zealand. As we know now from our colleagues in New Zealand, we share our east coast white shark population with them. It is the same population and we have sharks regularly coming from New Zealand to the east coast of Australia, the North Coast in particular.

Mr CLAYTON BARR: Does Western Australia share them with South Africa?

Mr BRUCE: There has been the case of a South African tagged shark turning up in Western Australia but we are not quite sure how common that is.

Mr ALISTER HENSKENS: Why have you focused on white sharks? Are they the sharks that are most responsible for the attacks?

Mr BRUCE: Whilst that is true—in Australian waters white sharks by species is the shark that has been responsible for most attacks—our work does not involve looking at shark attacks. The work that we have been doing is in support of the recovery plan for white sharks and providing information to the Department of the Environment on white shark populations.

Mr ALISTER HENSKENS: From the slide about two slides ago—yes, that one—if there was some proportionately between shark numbers and attacks then one would think that Port Stephens—which is also a large holiday area, so it is not short of people in the water—would be the shark attack capital of Australia?

Mr BRUCE: Can we come back to that?

Mr ALISTER HENSKENS: Yes.

Mr BRUCE: I will not ask if any of you have swum at the beaches at Port Stephens. One of the challenges we have in understanding white shark movements—in fact, any movements of animals like this—is that whilst there are patterns, there is a lot of noise in it as well. This is the same shark and I point out that it is the same shark that we tracked over two years—in 2011 and 2012. If I point you to the figure on the left, 2011,

the shark was up around the most northern extent in this case during the April to July period and it was down in Bass Strait in March. In 2012 it was down in Bass Strait during the June period and it was up at its northern extent off Rockhampton in March. That is completely opposite between years. This is one of the reasons why it is really hard to pigeonhole these animals into specific patterns.

Mr ALISTER HENSKENS: Do they follow the food?

Mr BRUCE: Generally for sharks of the size we are talking about, which is typically two to three metres, the thing that would drive their movements would be food. They are very good at being in the right place at the right time to take advantage of food events, prey events. We are always asked: Why are things different from year to year? One of the things really obvious about eastern Australia in particular is that it is a really dynamic area oceanographically—there is no one year that is the same. This is just picking the month of August by the way and looking at the sea surface temperature over the years 2008 to 2015—the red or orange is warm water and the green or blue is cold water. You can see that the patterns are quite different from year to year. These drive all sorts of differences in the availability of upwelling of food, of prey for small things and prey for big things. These are the challenges we have faced in trying to understand why certain things happen in certain years.

I want to take the Committee to the Ballina area to just illustrate the difference—we will come to Port Stephens in a minute. What this figure shows is all of the positions of satellite tracked white sharks. Each colour is a shark and each dot is when it has come to the surface. There are four or five different sharks there that are giving us data. In most cases the sharks have just swum past Ballina, but the purple dotted one did spend some time off the coast of Ballina in the year that we tagged it. These are all sharks that were tagged at Port Stephens by the way. I just make the point—Mr Henskens made the point about Port Stephens—about how this activity compares to further down the coast. I will show you what it looks like off Port Stephens; it looks like that. There is an enormous amount of white shark activity in the coastal beaches around Port Stephens.

From the middle of Stockton Beach up towards Seal Rocks is a white shark nursery area. It is one of two that we know of in eastern Australia. This is a very geographically discrete one—it is over three beaches, over about 60 kilometres of coastline and extends about 15 to 20 kilometres offshore. The second nursery area is down off south-eastern Victoria and white sharks from Port Stephens seasonally move down to Victoria. The sharks here we believe are around two to six years old and they will come back on an annual basis. For those of you with surf lifesaving knowledge, the Hawks Nest Surf Life Saving Club and Birubi Point Surf Life Saving Club are there. They regularly close their patrolled areas because white sharks swim between the flags. Interestingly enough, there has never been an attack on those beaches.

Your question was very astute. For example, if you were going to use the number of shark attacks as a proxy to estimate the numbers of sharks in the environment then you would come up with the conclusion that there were no sharks here, yet there are a lot of them. So Mr Henskens is entirely correct, the number of shark attacks is a poor indicator of numbers of sharks and numbers of sharks is a poor indicator of attack risk.

Mr ALISTER HENSKENS: Does that mean that there is something about their breeding activity which is different to their other activities?

Mr BRUCE: Remember, these are juveniles or young sharks. Breeding does not occur here. We believe that breeding occurs down in Bass Strait, so the adults will pup down there. The young sharks will go to the Bass Strait nursery area first and then they will start migrating up the coast to Port Stephens and beyond, and they will do that for several years.

Mr ALISTER HENSKENS: So what are they doing in this area?

Mr BRUCE: It is a very good question. It is certainly something we would like to find out more about. We have some suspicions that in this particular place what they are doing is they are feeding on the coastal reefs and they are coming back into the surf zone to have a rest. So they are not feeding in the surf zone. They will obviously take bait. Sometimes it is very, very hard to get them to even look at bait. That could well be the reason we do not see those sorts of interactions here as the sharks may not be feeding. But there are certainly a lot of sharks there.

The other thing I would like to point out briefly—I am cognisant of time—is that we have seen some really terrible incidents up around the North Coast of New South Wales, and not wanting at all to seem uncaring

and callous, but just looking at it from a factual basis, prior to 2014 that was the distribution of recorded shark attacks in the region between the Queensland border and Yamba. There has been a history of shark attacks, and serious shark attacks. I am referring only to attacks that have caused death or injury, not attacks that have not caused injury and it is not that they are not serious but our capacity to record those over time has changed, so it is a bit hard to compare.

Mr ALISTER HENSKENS: So a Mick Fanning would not show up on there?

Mr BRUCE: A Mick Fanning would not show up on there, you are right. If you look at the distribution of shark attacks in blue there over the 2014-15 period, it exactly mirrors the historical records of shark attacks in the area. Like I said, I absolutely emphasise that this in no way diminishes the tragedy of what has gone on. But in terms of a place that has a history of shark attacks you probably have to expect that you would see shark attacks in the future, this area is certainly one of those.

Mr ALISTER HENSKENS: What period pre-2014? How many years?

Mr BRUCE: That is the entire record from the Australian shark attack file which does go back to the late 1700s. There is a lot of time period prior to that that is covered as well.

Mr ALISTER HENSKENS: That would suggest a rather intense experience 2014-15 by historical standards?

Mr BRUCE: There was certainly what people call a spike or a cluster or whatever but keep in mind it is pretty difficult to compare these sorts of things over time. There are all sorts of things that have changed from numbers of people in the water and the way we use the environment, the number of people on land, et cetera. If I could make a clarifying point, a lot is said about numbers of people in the water and how it has increased over time and how that explains an increase in shark attack. It is very important to be mindful of timeframes when you make those sorts of statements. Changes to the numbers of people in the water cannot explain a sudden spike or cluster in shark attacks; that is quite silly. However, over periods of decades where you see an increase in the number of shark attack incidents along our coastline then that is where those statements about numbers of people in the water will come into play.

CHAIR: What are those green marker buoys?

Mr BRUCE: They are not the acoustic receivers that DPI have put in. They are, in fact, the location of FTDS—fisher tracking devices—that are put off the coast for fishermen to fish around. So they are a long way offshore. I put them in because we did have acoustic receivers on them for several years and we would pick up white sharks as they swam past. We are often asked: is it normal for sharks to be close to shore. If you look very carefully there is a whole bunch of fuzzy grey dots on that and you can see the shoreline. They are all sharks and that is completely normal. These are a species of whaler shark in the Forster-Tuncurry area and it is not abnormal behaviour.

In terms of white sharks, I can assure you that is pretty close to shore and that is not abnormal behaviour either. The surf zone environment is the common environment for white sharks of two to three metres. It is not unusual. It has not changed over time; that is just what they do. We have a much greater capacity now to see them, which is an interesting point we should probably talk about. Speaking of seeing sharks close to shore, one of the issues is that they are not always easy to see. On perfect days you can see up on the left a white shark above a sandy patch. Below it there is also a white shark but it is a bit harder to see because of light conditions.

The interesting thing about seeing white sharks from our perspective when we go out looking for them is that we search in the surf zone, we search in areas where we can see the bottom and we often have aerial support to assist us. If you look at this though if you put a baited underwater video camera at the back of the surf zone where it is too deep to see them from the air or from a vessel this is the nursery area for white sharks up at Port Stephens and it is very common to see that happen. Sometimes the numbers of sharks that are visible in the surf zone is not always a good predictor of how many sharks are there either.

Finally, and I will finish off on this, thank you for your time, one of the things that we are often asked about, even though we at CSIRO do not work on shark attack—we have colleagues who do—there is always this attempt to understand why sharks attack people. Over time maybe somebody will work that out but I have

my doubts. The reason that we find it so challenging to interpret is that every attack is different and the other thing is that in most cases when sharks and people meet or are together in the same environment nothing happens. That does not take away again from the tragedy of when bad things happen but the norm is this.

If you look at the bottom right hand corner there is a fuzzy blob that is a white shark. There is a whole bunch of people in the water up there. Can anybody see the shark? I cannot. There it is and a bunch of surfers. There it is on the right hand side and the surfers. These are white sharks swimming around people and nothing happened. One of the challenges that we as researchers face trying to interpret when an attack occurs is because the attack is the exception, not the rule, and we are trying to put a pattern to the exception, not the norm, hence the difficulty. That is not to say that you should not take the sighting of a white shark with a great deal of respect and seriousness. These are not playful puppies, these are dangerous animals and you should treat them accordingly. The message is though that just because it is in the water around you it does not mean it is going to bite you.

I will not go into this too much but we can ask questions on this but a great deal of our work is now focussed on how do we count them? This is not an easy thing to do because there is no easy way to do that. There is no way to survey them. There is no historical catch data that provides us with the information that we need to understand historical population trends or what is there now. We have had to find new ways of doing it. What we have done is we have been able to DNA fingerprint white sharks in particular. So we can take a tissue sample out of a juvenile white shark and genetically identify its mum and dad. Even though we may never see their mum or dad we know who they are. What we can do with that information is that every shark has a unique mum and dad.

If you can imagine the chances of taking two juveniles in your sample and for those two juveniles to have shared a mother or a father in a small population compared to your chances of picking up related animals in a big population. It is a bit like if you live in a country town and you walk down the street of that town there is a high likelihood you will run into somebody that you know because it is a small population. If you come from the country town into the centre of Sydney and you walk down George Street there is a high likelihood that you will not see anybody you know because the population is so much bigger. We can use the proportion of related animals that we find to estimate the population size in adults of white sharks. That is what we are working on at the moment.

What are we doing at the moment? We are finalising estimates of east coast population size. We are looking at ways to monitor trend because knowing the size of the population does not tell you anything about whether it is going up or down. We are also working with our colleagues in South Australia and Western Australia on estimating population size in the west to find a truly national scale estimate of abundance. That is it from me and I am sorry it was a bit more than 15 minutes.

CHAIR: That was very interesting.

Mr ALISTER HENSKENS: The takeout I get from that is if, in fact, the overwhelming proportion of interaction between humans and great white sharks is benign then understanding the aberrant behaviour is perhaps key to more scientific strategy in terms of reducing shark attacks?

Mr BRUCE: I understand the term "aberrant behaviour" but sometimes it is probably more a case of bad luck, being terribly and tragically in the wrong place at the wrong time. So we do not see any evidence of there being bad sharks out there that are undertaking bad behaviour. I think it is a case of if you are in the water and there is a shark through it is normal pattern of behaviour that is in hunting mode then that is a dangerous situation to be in.

Mr ALISTER HENSKENS: Do you think that is probably the characteristic that they are in hunting mode?

Mr BRUCE: Yes.

Mr ALISTER HENSKENS: Is that totally a function then of just when it got its last food et cetera rather than anything that you are doing?

Mr BRUCE: The problem is we cannot be in their minds. People can pretend they can but we cannot. We know that white sharks, like other shark species, do not feed all the time. A lot of their time is spent just

swimming around doing nothing much in particular. It does depend too on where they are and what they are feeding on. The sort of behaviours that you will see around a seal colony, which everybody talks about seals are a mistaken identity and all that sort of stuff, but the sort of hunting behaviour a white shark uses around a seal colony is very different to the sort of hunting behaviour it would have if it was hunting rays, salmon, mullet or mulloway along a beach or reef area. The sorts of things that might prompt an attack are probably going to be different, depending on the different environments.

Mr CLAYTON BARR: What are your thoughts about shark tourism, rolling people out in a cage and letting them have a chance to be in the environment? What your thoughts on that practise?

Mr BRUCE: It is actually something we have looked at a fair bit and so have colleagues overseas. There are a lot of strong opinions about shark cage diving and training sharks to associate people with food. If you break it down though, in order to train something to associate a positive experience with a stimulus you have got to expose that animal to that. It is like training your dog. It has got to be positive. It has got to get a positive reward. It has got to be ongoing and it has got to be one stimulus as well. That does not happen in shark cage diving for a number of reasons; one, sharks are only temporary visitors to shark cage diving sites so there is a turnover of sharks all the time; and, second, shark cage diving involves a number of different stimuli—there is the vessel itself and the associated noise and sacrificial anodes that sharks can respond to, there is the cage itself, there is the berley or chum that goes in the water and there is the divers in the cage and all the associated noise and issues with that.

There is no one particular stimulus that links a shark to a person that is in a cage in a wet suit and scuba gear anyway. Remember the chumming; the berley that occurs is not a reward, so there is no reward for them in shark cage diving because they cannot eat berley. Berley is mashed up fish; it feeds the fish. There is a huge benefit to the fish life in these areas but there is no demonstrable, as far as we can see, training of sharks to associate people with food from shark cage diving. Having said that it is not the sort of thing that you want to go and do off a beach somewhere here. These sorts of activities should be cognisant of other water users around those areas, and be careful as to where they occur.

Mr CLAYTON BARR: I guess this Committee is essentially charged with the responsibility of looking at the economic impacts on regional communities in New South Wales as a result of the fear and hysteria around shark attacks. To flip that completely on its head, there might be an economic opportunity here, particularly in Port Stephens. People go whale watching and on dolphin cruises. Maybe there is an appetite, and forgive my use of the term "appetite", for people to go out there and do some shark cage diving, if that is what people want to do. There seems to be an absolute abundance of animals.

Mr BRUCE: Yes, while that may be true I would probably hesitate to recommend that as an industry in an area where there are many water users. We can never be sure what our activities really do. We do not see any evidence of sharks being trained to run off and bite people because of this. Certainly people can see white sharks without having to put berley or chum in the water. Shark cage diving only occurs in one place in Australia for white sharks, and that is at the Neptune Island in South Australia. They are a long way offshore in quite a remote location. They use chum to bring sharks that are already in the area to the vessel so that clients can see them. Off New South Wales you could drive around in a boat and you would probably see one at certain times of the year. These are wild animals and you cannot always guarantee it. But I would always be cognisant of other water users.

CHAIR: In terms of a shark attack, whether it is fatal or not, what do you think the authorities should do to address community concerns?

Mr BRUCE: In the case of shark attack I have had a look at the strategy that has been rolled out here in New South Wales and I see a lot of positives in it. There is good follow up from New South Wales DPI with local authorities to try to establish the species and the size of the shark involved. There is the proactive closure of beaches by Surf Life Saving Australia and local councils to allow a shark to move on and usually they do, but not always. For white sharks in particular their typical cruising speed would be in the order of three to five kilometres an hour when they are travelling. So if we multiply that out by 24 hours then they could be 100 kilometres away, and that is pretty typical.

The challenge that I think we are all facing is the volume of information that we are now able to provide. It is both a good thing and a bit of a millstone around our neck. We now have the capacity as researchers to track white sharks, and some of these sharks we have been tracking for six years with acoustic

tags. We have the ability now to tell people where sharks are and when they turn up at their local beach. We are putting a lot of effort into aerial assets to fly along beaches and spot sharks; and—guess what?—we are seeing sharks. The more effort we put in the more sharks we will see and the more people will start to realise that there are sharks in the environment around them.

In my mind we are getting rapidly to a point where although there are all sorts of technological advances that we all hope will help us reduce the risk of shark attack we will never make it zero. I think what we really have to look at in the future is mitigating fear, because the amount of information and the amount of sightings that we can tweet and Facebook about, and the press can do whatever it likes with, I think is starting to create a culture of fear in the community. How we work on that in the future I think is going to be really important. We need to get people to accept that it is actually okay for sharks to be there. They are not always going to hurt you, but you should take the sighting of a shark seriously and take appropriate action. Whether we can eventually become much more shark aware by reading the conditions, that is always a positive step forward; but it will never be foolproof.

Mr GREG APLIN: Just looking at those maps, and in particular focusing on the Port Stephens area, are there instances where human activity might have inadvertently contributed to the gathering of sharks over a prolonged period? Is there anything that we can match in that respect?

Mr BRUCE: There are certainly things that humans can do that will influence shark activity and shark abundance. Back in the early days around Sydney abattoirs were pumping out effluent and all sorts of things. That is a classic example of what we can do wrong. If we are talking specifically about the Port Stephens area, Port Stephens has always had a history of juvenile white sharks. I do not think this is anything new. Game fishers used to target juvenile white sharks around the Broughton Island area prior to their protection; and, to their credit, for a long time even prior to protection game fishers were not targeting white sharks. They used to do that north of Broughton Island because they could catch small white sharks with light line and get a record. So I do not believe there is anything new about the situation at Port Stephens. It is just that now we have a much greater capacity to understand, look at and report on their movements there.

Mr GREG APLIN: If you were able to judge a dominant area, and the map certainly tends to indicate sections where there is much more activity over a prolonged period than in other areas, from the new technologies that are emerging which would you consider to be most advantageous for application and which would you suggest have disadvantages?

Mr BRUCE: Are we talking about the tagging technology?

Mr GREG APLIN: There is a whole range of technologies that are emerging, and I am thinking in relation to the dominant area that seems to be emerging on the map.

Mr BRUCE: It is certainly one of those cases, if we just take tagging technologies to start with, where different technologies have different capabilities and different pluses and minuses. An acoustic tag will only tell you where an animal is if it swims within range of the receiver. So you have to have a lot of receivers or put them in the key areas, and that is what we tend to do. If it is more than 500 or 600 metres away then it may not be heard. Satellite tagging technology can tell you where a shark is wherever it goes in the world provided it sticks its fin out of the water for long enough and there is a satellite in view. So that is one of the reasons why we marry the two technologies—to get the best of both worlds.

The satellite tag turns off when it is underwater because there is no point transmitting. The radio waves it uses to signal the satellite do not travel through sea water. Then again satellite tags in general on white sharks in coastal waters will only last several months. Sometimes we get several years out of them, but that is unusual; and it is very unusual when the shark's activity is confined to coastal waters because we get fouling on the aerial and it stops the tag from transmitting. If the shark goes offshore for long periods of time, that fouling can fall off and you get a longer track.

An acoustic tag, on the other hand, can now last up to 10 years. So there are very great differences in the technologies. There are all sorts of technologies that are emerging and a lot of this stuff is new developments. There are technologies that have various abilities to detect sharks. Some of them are better than others. All of them are still under review. There are sonar technologies. There are the acoustic VR4G technologies. I have heard your experts talking about aerial assets, whether they are manned or unmanned. I think it has been said, and I have read some of the submissions, that there is certainly no silver bullet in what

you are trying to achieve. It is going to be a combination of technologies or applying technologies with particular abilities in different areas.

Mr GREG APLIN: As you said, there is no silver bullet. But the alleviation of fear is paramount here for dealing with tourism economies.

Mr BRUCE: Absolutely. One would hope that, over time, the information and knowledge that we glean will help people understand and reduce fear. Sharks are a very emotive topic for people, not surprisingly. I think to some extent that before we had all these ways of understanding where sharks are—and people can do it themselves with their own drones and phones, so what used to be a pub conversation is now on Twitter and being retweeted a thousand times so everybody is immediately aware of it—in the past we were blissfully unaware when we swam with sharks. We are no longer blissfully unaware. Before it was a case of, "I know there are sharks, but not at my beach." Now we are all saying, "Yes, there are sharks at your beach." This is where we have to manage this and mitigate fear. I think having a good discussion about how effectively we can do that would be something that would be worthwhile over time because it is something we should address.

CHAIR: Do you think though that is not happening now given what the Government is doing in response to what we have seen?

Mr BRUCE: Do not get me wrong—I am sure it is happening now with the sort of information that is being put out. On the one hand, information is a powerful tool when it is accurate in terms of educating people. But I think we also have to accept, and we are all part of the general public, that this will probably tell us that there are more sharks in the environment than people realised; and that is what generates the fear, because we do not quite know how to manage that yet.

CHAIR: So it is information versus alarm?

Mr BRUCE: Yes, that is right. The process has certainly started. But I think it is something that we really have to work hard on, including agencies like mine and DPI, and I know that we are. Providing information in a non-alarmist way is going to be the challenge in the future. There are a lot of people who provide information in a very alarming way, and that is the ying and yang that we have to work with.

CHAIR: Are there any further questions?

Mr CLAYTON BARR: I have one. It has become clear today that there is no way we can measure the number of sharks, and yet the white pointer is an endangered species and it is protected. Is that reasonable?

Mr BRUCE: We need to be very careful about the terminology we use. "Endangered" is a particular classification.

Mr CLAYTON BARR: So they are not endangered?

Mr BRUCE: No. White sharks are listed as a threatened species, of which there are various categories. Endangered and critically endangered are the most serious categories. White sharks are listed as vulnerable.

Mr CLAYTON BARR: My apologies for the confusion.

Mr BRUCE: But this is an important point to raise because that terminology is often misused and misunderstood. So white sharks were protected in various jurisdictions around Australia during the late 1990s. The reasons for protection were based on the best available information at the time, including perceived trends in catches, in terms of their relationship to population size, in the shark control program, of game fishing captures, of a reduction in sightings at certain hotspots and because white sharks, like many shark species, are very slow to reproduce. They produce few young and they do not reproduce every year.

For example, a female white shark does not start reproducing until it is five metres long. There are various viewpoints on how old that animal is—ranging from being its twenties to being in its forties or fifties. Probably once every three years they give birth. So they do not have the capacity to increase their numbers rapidly, and generally the populations in the past, before we fiddled with the environment, had a birth rate that approximately equalled their death rate. As soon as you start taking them accidentally in by-catch what happens is that the population goes down. So the life history strategy, the available information and the concerns about

the species at the time were the reasons for listing it as vulnerable. You are absolutely right. One of the problems there is, how can you measure the success or otherwise of conservation measures if you cannot tell how many live there and if there is a trend? That has been the challenge for us since, to work out a way of doing that and we are getting very close to being able to do that, to at least estimate the numbers in the population then from there trend it.

CHAIR: Given the restrictions now around taking fish generally, whether it be the North Coast, South Coast, East Coast, or wherever, do you think that the conservation measures, as you rightly put it, should now come into play in relation to listing, because longlining off Victoria has been restricted significantly and those measures apply right up the coast.

Mr BRUCE: I am not quite sure what the question is.

CHAIR: In terms of the conservation measures that you were talking about, is it timely now that we review. For example, are they protected species, are they endangered?

Mr BRUCE: One, there is a process to delist an animal and that process is quite rigorous. One of the processes is understanding how the population is going. At the moment, we do not know. It is pretty hard to go through that process. In respect of shark conservation and white shark conservation, particularly, you are right, there is a whole bunch of things that have happened in a marine fisheries management sense that have reduced pressure on sharks species. It is not complete why sharks, in particular, are still caught as by-catch in a whole range of exercises in fisheries along the East Coast in the shark control program, although it is not really by-catch, and in other areas of the range. I guess that is the risk and the dilemma there is that protection and some of the things we have done has no doubt reduced some of the threats, but not all of the threats. Where the shark population sits in relationship to that is hard for us to know until we have an effective way of counting them.

CHAIR: That is really interesting. We have heard a number of organisations say they know numbers are dropping, et cetera.

Mr BRUCE: Show me the data.

CHAIR: Very good point. Mr Bruce, thank you very much. We sincerely appreciate you coming across from Hobart today and appearing before the Committee. The Committee may wish to send you additional questions in writing. The replies will form part of your evidence and will be made public. Are you happy to provide a written reply to any further questions?

Mr BRUCE: Yes.

CHAIR: Thank you for taking the time and effort. It was most interesting.

(The witness withdrew)

MARK WINDON, Chief Executive Officer, Surfing NSW, affirmed and examined:

CHAIR: Before we proceed, do you have any questions concerning the procedural information sent to you in relation to the witnesses or the hearing process?

Mr WINDON: No.

CHAIR: Before we commence with questions, would you like to make a brief opening statement?

Mr WINDON: No.

Mr CLAYTON BARR: Mr Windon, one of the primary responsibilities of this particular Committee concerns the economic impacts. There could not be a more pressing industry than surf lessons up and down the coast—

Mr WINDON: Surf lessons, events.

Mr CLAYTON BARR: —in terms of shark events having an economic impact.

Mr WINDON: Can I give you an example? Last week, Brett Connellan, a young surfer, was attacked on Bombo Beach. This week, the Subway Pro Junior was to be held at Kiama. That is now being rescheduled and moved to Wollongong.

CHAIR: As a result of that—

Mr WINDON: As a result of that shark attack, yes. That is a direct example of how it impacts.

Mr CLAYTON BARR: What about surfing lessons for tourists, backpackers or kids who surf at the local beaches?

Mr WINDON: They are feeling the pinch. There are 250,000 learner surf lessons a year. The surf schools on the mid to far North Coast of New South Wales have felt a downturn since what has happened in the last 18 months.

Mr CLAYTON BARR: Do you have any numbers?

Mr WINDON: We are still working on those to give you direct numbers. Every operator is saying that occasionally people might ring up and say, "Is there a problem with sharks?" Now that happens regularly. They are seeing a downturn in numbers, especially in school groups.

Mr CLAYTON BARR: What about retail, surfboards, et cetera?

Mr WINDON: The retailers have been hit hard as well. There a few surf shops up around Lennox and Ballina that have closed. I would say tourism across the board is feeling the pinch.

Mr CLAYTON BARR: There is tourism data that actually suggests tourism is growing. Rooms are still full, more than they were last year.

Mr WINDON: Yes.

Mr CLAYTON BARR: The pubs, clubs and cafes are still doing business. People are still going to the newsagent and hot fish and chip shop, but they are missing from the water by the sounds of things.

Mr WINDON: We do quite a bit of work with Destination NSW and we are still waiting to get figures off Destination NSW.

Mr CLAYTON BARR: So are we. It is really interesting that there are 250,000 surf lessons per year in New South Wales.

Mr WINDON: In New South Wales.

Mr CLAYTON BARR: Are all of those surfing schools—

Mr WINDON: Some of them are accredited surf schools with us. There are outside surf schools as well.

Mr CLAYTON BARR: There is not a single body they are registered with that oversees them?

Mr WINDON: A lot of the surf schools that are not in our system would like to be but they do not meet our criteria and the standards that we want.

CHAIR: You mentioned Destination NSW. What work have you done with Destination NSW? What have you provided them?

Mr WINDON: We run numerous events in New South Wales that Destination NSW helps fund. Prior to Destination NSW, going back to when it was Tourism NSW, we actually did an in-depth study on surf tourism and how many dollars it brings into the New South Wales economy each year.

CHAIR: Can you elaborate on those numbers?

Mr WINDON: It is quite a few years since the study was done, but it was around $500 million a year.

CHAIR: On surfing?

Mr WINDON: Just on surfing, yes.

Mr ALISTER HENSKENS: Can you go through the components? Was it everything from surf lessons to competitions?

Mr WINDON: Lessons, competitions, the whole gamut.

Mr ALISTER HENSKENS: That would include accommodation?

Mr WINDON: Accommodation and all that.

Mr ALISTER HENSKENS: Restaurants?

Mr WINDON: The whole thing, yes.

CHAIR: In respect of the past 12 months, do you think tourism has been impacted?

Mr WINDON: I can only go off the feedback I am getting from our surf school operators, but they have noticed a bit of a downturn, so I would say that would spread across the board, yes, for sure.

CHAIR: Have you fed that into Destination NSW?

Mr WINDON: Yes, they are aware of that.

CHAIR: Have they come back to you with anything?

Mr WINDON: Like everyone, we are waiting to see how the new strategies work, what it is going to do and whether it comes out with positive stories to put across to the far North Coast area. When you are taking steps forward and all of a sudden something like what happened last week on the South Coast happens, it freshens it all up again. I heard someone say before there is no silver bullet. I do not think there is either.

CHAIR: I have spoken personally to surf schools at Port Macquarie who have noticed a significant downturn.

Mr WINDON: The Hudsons?

CHAIR: I do not know their name. I also spoke to families who were sitting on the beach at the time, and they said they would not let their kids go in the water.

Mr WINDON: I understand. Long term, it could have a major effect. One of the biggest jewels in our tourism crown is our beaches, and if they start being perceived overseas as not being safe, Port Macquarie and Coffs, those towns—I do not know what their percentage of income is from tourism, but if they started feeling a 10 per cent or 15 per cent downturn, it would have a major impact on all of those towns, for sure.

CHAIR: So far as taking responsibility for your own actions, and I know the Government is putting in place a raft of measures and alerts and so on, is Surfing NSW putting out a message to its surfers that if you grab a board and go surfing you do not need to be a member of Surfing NSW?

Mr WINDON: No, you do not. There are a lot of recreational surfers in Australia and 1.3 per cent or 1.4 per cent are New South Wales-based. We have a competitive membership of 15,000, then we have clubs and surf schools and everything that falls down underneath that. We have been giving messages to our members. It is standard and what the Department of Primary Industries has got to say about surfing. The young kid who got attacked last week down at Bombo Beach was surfing at quarter to seven at night and there were bait fish. Two of those things are no-noes, but he is a good surfer, he is used to the water, so he is increasing the risk by doing that sort of thing. The messages that are on the website of the Department of Primary Industries are pretty good. It is just a matter of getting them out to the public. That is why the shark app is pretty important.

CHAIR: There could be a better method of how to get information out there and how to be safe?

Mr WINDON: For sure.

Mr CLAYTON BARR: In your experience, among the surfing community are there no-go places, sites or surf spots about which you would say, "No, we do not surf out there because there are always sharks"?

Mr WINDON: If they are not top of mind, then they probably do not exist. If the surf is good most surfers are going to go there. We were talking before about Port Stephens and Narooma being the shark capital of Australia or the white capital of Australia, but they are all juveniles, probably only three or six foot long. In my opinion it paints a picture. I have run competitions at Samurai and One Mile and never had an incident up there. I think one of the other shark species that are causing problems, especially on the North Coast with the Northern Rivers, are bull sharks.

Mr CLAYTON BARR: Around the inlets?

Mr WINDON: They come out of the river mouth and hang around there and they are causing just as much damage as the great whites.

Mr ALISTER HENSKENS: It seems that your organisation has a large membership. Can you give us an idea of how people are associated with your organisation and how many members you might have in New South Wales?

Mr WINDON: Competitive members?

Mr ALISTER HENSKENS: All members. If I joined Queenscliff surf riders club—

Mr WINDON: You become an associate member of Surfing NSW.

Mr ALISTER HENSKENS: You have associate members?

Mr WINDON: There are 120 boardrider clubs and most of them have 100-plus members. We have the hard core surfers who are looking to create a career pathway.

Mr CLAYTON BARR: Does that make up the 15,000?

Mr WINDON: They are the hard core and then you have the club members and then we are looking to try and tap into the recreational surf market as well and have them come on board as members.

Mr CLAYTON BARR: Of the Surfrider Foundation?

Mr WINDON: A lot of organisations that we tap into—

Mr CLAYTON BARR: They do not come under your umbrella?

Mr WINDON: Not all of them.

Mr ALISTER HENSKENS: Did your organisation start as more a body that was initially geared towards surfing competitions and people that might become professional surfers?

Mr WINDON: It was set up in 1963 after the first world championships in Manly and they needed a body to organise professional competition. It has been looking at the pointy end of the triangle you are talking about with competitive members. Over the last 15 to 20 years we have tried to branch down into the recreational and other components.

Mr ALISTER HENSKENS: Through your organisation you have strong links with surf schools and surfboard makers?

Mr WINDON: Yes. Everyone throughout the industry, yes.

Mr ALISTER HENSKENS: Typically do they have the capacity to join your organisation?

Mr WINDON: Yes.

Mr ALISTER HENSKENS: Or is it that people in those organisations are likely to be in a surfboard riders club as well?

Mr WINDON: We have 110 boardrider clubs in New South Wales insured and affiliated through us and most of those members come on board and get insurance through us and different discounts and so on. As I said, in the last two or three years we have been trying to tap down into the recreational surfers and there are probably another 200,000 or 300,000 people we can tap into and that is our goal over the next three to five years.

Mr ALISTER HENSKENS: We are trying to focus on the economic impacts. My friends are going on surfing tours to Indonesia or Papua New Guinea or exotic locations like that.

Mr WINDON: Half their luck.

Mr ALISTER HENSKENS: Are the people coming to New South Wales in terms of tourism for surfboard riding from around Australia, overseas or a bit of both?

Mr WINDON: We do get people from all around Australia. I think our big thing is the international market through our beaches and you see the camper vans—Wicked campers—with people coming here from overseas from all different walks of life and the first thing they do is go to a surf school, have three days tuition and go and buy a board and camper van and do the trek from Bondi to Byron—and hopefully in between they will not get bitten.

Mr ALISTER HENSKENS: European, Americans, South Americans?

Mr WINDON: Yes. They are the ones that are usually getting rescued as well.

Mr ALISTER HENSKENS: Is that a big part of the tourism dollar generated by surfing?

Mr WINDON: It is a big part of the surf tourism market.

Mr ALISTER HENSKENS: What about surfing events with competition, will they attract tourism dollars from people around Australia, the grommets?

Mr WINDON: There are two levels of professional surfing, the world tour, which is Bells Beach, and the second tier is the world qualifying series. The world qualifying series [WQS] events are like English soccer; the bottom 15 go out and the top 15 come in. There are 5,000 or 6,000 surfers worldwide who compete in the WQS who are trying to get into the top tier. Through a bit of support from Destination NSW and local councils we have run four one-star WQS events: one in Maroubra, one at Tweed, Boomerang Beach on the Great Lakes, and one at Avoca on the Central Coast. We were averaging 300 competitors at each event. We had 22 different countries competing as well. They will come and follow the tour and hopefully amass enough points to get into the bigger events later on.

Mr ALISTER HENSKENS: I come from Mark Richards country, up Newcastle way.

Mr WINDON: Good mate of mine.

Mr ALISTER HENSKENS: He had surf shops?

Mr WINDON: Yes.

Mr ALISTER HENSKENS: Is surfing one of the areas where we manufacture surf boards, surf equipment and the like, or but is that more and more going offshore?

Mr WINDON: A lot of it is being done offshore in China but I think for the top-end equipment Australia has probably some of the best shapers and board manufacturers in the world. Some of your best competitors from all over the world want a board shaped by Darren Handley. We have that end of the market sewn up.

Mr CLAYTON BARR: Mr Henskens made a good point, an Australian might go to Indonesia but they are not a backpacker or having three lessons, they are surfers going on a surfing holiday. Is the east coast of Australia one of those destinations? If you live in Japan or New Zealand or Western Australia, do serious surfers actually want to go on a surfing holiday on the east coast?

Mr WINDON: Some of the best surf in Australia is in New South Wales on both the north and south coasts. Everyone heads to Byron but some of the waves on the mid North Coast around Forster, Great Lakes and some of the reefs we have on the South Coast of New South Wales—if you are a hard core surfer—there are world class waves.

Mr ALISTER HENSKENS: Some people go to the Margaret River region in Western Australia and have a wine and surfing trip. Would people visit Port Stephens and the Hunter for a surfing and wine tour?

Mr WINDON: Maybe your older demographic like myself would find that attractive. Yes.

Mr GREG APLIN: In your submission you noted that surfers are the most heavily represented group amongst the victims of shark attack?

Mr WINDON: Most of the victims.

Mr GREG APLIN: Looking at the impact on your organisation you mentioned earlier the movement of an event this coming weekend. But that is not removing it, it still continues. Can you assess the impact on your organisation of those attacks and the reporting of those more generally?

Mr WINDON: It has increased our operations costs because we run around 40 events a year and the only way that we can get insurance or permission to run events is to have surveillance in the water. Previously we would not have guys in the water on jet skis but now when we have an event we must have two jet skis in the water for the duration of the day. To have a guy on a jet ski is costing $750 a day, so we are increasing costs by $1,500 and some of them are multiple day events, so our costs have increased by $150,000 this year.

Mr GREG APLIN: You describe the management overall, but on the micro and smaller business level what do you believe can be done to mitigate the effects on the economy? Whether it is a small operator or a larger organisation what should we be looking at doing to relieve the fear, the apprehension that is there?

Mr WINDON: There is a perceived fear out there by a lot of people. I think education in anything is a big thing. It needs to be explained to them. As I said, what happened last week with the young kid on the South Coast—surfing at that time of the day is not a good idea. That needs to be pushed a lot more. If the towns can see there is something being done to alleviate the problem that will make things a lot better. In the short-term until these are tried and proved they want to see something else, whether it is increased aerial surveillance or whatever.

Mr GREG APLIN: A range of activities. You have not anything specific you believe should be explored in greater depth?

Mr WINDON: The two things tried and proved in New South Wales are meshing since 1937 and drum lines in Queensland since 1962. But they are not user friendly to marine life. The way around that is to throw more dollars at the contractors that are checking them and increase their surveillance of the nets and drum lines and if something is caught in there that should not be there it can be released—that is until the new technology is up and running.

CHAIR: How much is it educating surfers that are out there knowing that they are placing an increased risk upon themselves by surfing early morning and late evening? Surfers will say they knew something was there, they felt something was going on. How much is educating surfers that if you have a concern do not go in the water?

Mr WINDON: I am not 100 per cent sure on that. Most surfers are risk-takers; it is an extreme sport. Surfing in itself shows they are willing to take that risk. Anyone who has ever surfed, such as Mr Barr, knows that by going into the ocean an interaction with a shark is a real possibility. Why there has been so much more interaction in the last 18 months I do not know. There are a million reasons for that. I would say surfers in the Ballina region should be taking more responsibility for their actions. If something does go wrong it is going to affect a whole town. They need to be more aware of the consequences.

CHAIR: That is the point I am getting at. In your submission you rightly say that surfers are the most heavily represented group among shark attack victims at three times the rate of swimmers and five times the rate of divers. You also say that there has never been an attack at a patrolled beach. Surfers who are out there enjoying their favourite pastime are the ones who perhaps need to—

Mr WINDON: They are the ones putting themselves at the greater risk for sure

CHAIR: Yes, and they should be maybe thinking about the risk it is putting on others who are using the beach and the community generally.

Mr WINDON: Yes.

CHAIR: How do we get that message out?

Mr WINDON: I think that a lot of it comes back to us and going to the boardrider clubs. We could perhaps start having some seminars for them and things like that, but we need to be drilling down. We do a lot of school surfing. Even at that level when we get kids at school we can start bringing in some sort of shark mitigation thing, making them more aware of what they need to be on the lookout for. A lot of them probably would not even realise that bait fish are a sign and there could be a danger if there are bait fish in the area. That is why we get the all clear before we even paddle out in the water. I think it is important. The older guys, the guys who already have it in their DNA are going to do that and it is probably going to be hard. But I think moving forward it is really important that we start doing it for the younger kids so they become much more aware than alarmed about it.

Mr ALISTER HENSKENS: Mr Barr was talking about a new app. What was it called again?

Mr CLAYTON BARR: The Department of Primary Industries SharkSmart app.

Mr ALISTER HENSKENS: Have you seen that?

Mr WINDON: Yes.

Mr ALISTER HENSKENS: Will that SharkSmart app tell you that there is bait fish in your area or that a combination of that and the time of day means that now is not a good time to go surfing?

Mr WINDON: I think the SharkSmart app is good but not many people are going to go to the Department of Primary Industries website to try to find out what is going on. I do not think it has that appeal. I think it probably needs to be linked into something like Coastalwatch or somewhere. Every surfer would be going to Coastalwatch to find out surf conditions. If that app was linked into that you would get far more people going to it and they would be more aware of the fact than just going to a government website—I am not bagging the Government—to try to find something out. I think you would get much more bang for your buck if it was linked into somewhere like that.

The other thing I think we should be doing with recreational surfers and recreational fishermen—the guys who are at the beach 365 days a year—is asking them for intel as well. At the moment we are probably getting a lot of the information from Surf Life Saving. They do an amazing job and we are working quite closely with them, but they are only on the beach Saturday and Sunday between October and April. There are big gaps in some of the information that can be fed into this. If you started tapping into those guys who are in the water all the time and fishermen who are on rocky outcrops who can see what is there I think you would get a lot more information into that app and it would make it a lot more viable.

CHAIR: So better connectivity and some more communication?

Mr WINDON: For sure.

Mr CLAYTON BARR: We have some DPI people listening to you at the back.

CHAIR: A recurring theme out of today seems to be the need for people to talk to each other and say, "Here's what we're doing."

Mr WINDON: Everyone wants the same result. Like I said, there is no silver bullet. I do not know what the answer is. I reckon the shark app is a great idea but we just need to get it out there to the punter and let them know it is available and start using it more.

CHAIR: Good call.

Mr ALISTER HENSKENS: I think that exemplifies a good thing. For example, every time I have ever been caught in a rip it has been a surfboard rider who has given me a tow into shore rather than a surf lifesaver. Your members do a lot for the community.

Mr WINDON: We brought out a program called Surfers Rescue 24/7 because we are in the water 365 days a week. We do it in conjunction with Surf Life Saving. We are teaching surfers how to use the modern shortboard as a rescue tool. The biggest advantage they have got over anyone is they are already in the water with a floatation device. If they see someone in trouble they can just paddle over to the guy and say, "Hang onto this. Settle down, mate. We'll get someone out here to help you out." It is the same deal.

CHAIR: But also lifting education.

Mr WINDON: In anything, that is your number one.

CHAIR: Look after yourself; be responsible for your own actions.

Mr WINDON: For sure.

CHAIR: Thank you very much for taking this time. We have learned a lot about your industry and it has been very good of you to update us on that. The take-home message is better collaboration. The Committee may wish to send you some additional questions in writing, replies to which will form part of your evidence and be made public. Would you be happy to provide a written reply to any further questions?

Mr WINDON: Yes, no problem.

(The witness withdrew)

(Short adjournment)

DALE CARR, Member, Bite Club, and

DON MUNRO, Member, Bite Club, before the Committee via teleconference, sworn and examined:

CHAIR: Bite Club is a group for people who have been affected by shark attacks. We are pleased to have representatives from the club here today. In what capacity do you appear before the Committee?

Mr CARR: I am a shark attack survivor and also a member of Bite Club.

Mr MUNRO: As a supporter of Bite Club, not as a victim. I am also the president of the local Lennox Head-Ballina Boardriders Club and president of the surfing reserve and a spokesperson for the shark action group in this area.

CHAIR: Before we proceed do you have any questions regarding the procedural information sent to you in relation to witnesses and the hearing process?

Mr CARR: No.

Mr MUNRO: No, I have not.

CHAIR: Before we commence with questions would you like to make a brief opening statement?

Mr CARR: Thank you for allowing me to attend the hearing. I have read the five points in regards to the terms of reference and I would like to make a quick opening statement. Obviously, since my attack on 22 August 2015 it has been a very large experience and very much a wideranging shaping of who I am today. In regards to the impact of shark attacks on tourism and related industries, I found that in my case Port Macquarie is currently going through a massive growth phase in terms of population and has a great infrastructure rebuild. We have recently had a $110 million upgrade of the Port Macquarie Base Hospital and also we have a Charles Sturt University campus being constructed. So the impact of my shark attack probably was not as impacting as Ballina or Lennox Head firstly primarily because it was a single incident and it was not a series of incidents. Secondly, we have larger forces that impact Port Macquarie such as the construction industry and the growth of our residential base.

Also in my particular case I did not take a strong opinion. I have no opinion at all in regards to the shark debate, which was important for me. It was more about my actual recovery. What I found from people in Port Macquarie was that they were very much respectful that they were happy to see me have a great recovery but also they accepted the fact that I respect the fact that there should be an opportunity for everyone to make their own decision in regards to how they use the ocean. Changes in shark numbers, behaviour or habitat—I can honestly say I knew nothing about sharks before my attack, but once you get bitten on the bum all of a sudden you have a thirst for understanding or trying to rationalise what actually happened to you.

In my case I had a massive thirst to meet people who had been attacked by sharks and, by chance, Dave Pearson, the founder of Bite Club in 2011, along with Glen Folkard, made contact with me and it resonated with me that everything would be all right. From there I made a concerted effort as Dale Carr—not as Bite Club, but just as Dale Carr—to make contact with many shark marine science people and researchers just to gauge a better understanding and by the use of the internet and other resources to try to find as much material as I could on sharks and habitats and so forth. All I knew was that I had been bitten by a 2.7 metre great white and that roughly it would be around about 350 kilograms and it hit me at approximately 25 miles per hour. Essentially we grew from that. Then I went on to meet other people.

What I have found is that in regards to shark numbers, behaviour and habitat there was a really, really poor relationship with anybody who wanted to find out more information about sharks if you were a shark attack survivor and, more importantly, if you were a member of Bite Club. There are some people who were originally in Bite Club who are conspiracy theorists, so to speak. I met these people personally and, obviously, being on the same platform of being a survivor you gravitate to anyone that wants to show interest in who you are and what you do. But I soon realised that people had very much contrasting and polarising views. So straightaway when I had an opportunity to take in and assess the shark numbers, I was like I know nothing about

this. Just because you are involved in a car accident it does not make you an expert in traffic. I found it was far better to see the human side of it.

So what I did was I researched it and I would say that for me to pass on any sort of judgement in regards to shark numbers, behaviour and habitat would probably be disrespectful to the person who has probably spent the last 25 years of their hardworking life trying to find that answer themselves. I have found it has been a much better opportunity to take a much more moderate view and accept heavily peer-reviewed papers and read up and take it all into perspective. Generally what I found from my own investigations was that in my case, with the great whites, there was a recovery plan that was established in 1997; there was a committee of about 20 people who formed that plan in regards to the potential for the reduction of a species' numbers.

There are varying views on the reproduction rate of a shark, whether they start to reproduce at 13 years or 17 years or whatever it is, and you have all these different views and you go: right, okay. People from a conspiracy background would say, "Well, that means that these sharks are now starting to reproduce and there are many more and we are going to see a lot more attacks". In my particular instance it was a confluence of many things. After speaking to the people experienced in fishing and also who live on Lighthouse Beach and actually see Lighthouse Beach every day I know the following: there were extraordinarily high water temperatures, very warm water temperatures; we observed whale migration behaviour very, very close to the coast; there were bait balls in the days before my attack; and there was a pattern of shark attacks up and down the coast.

So really at the end of the day when you look at what happened to me, I was located approximately 150 metres from shore, close to the afternoon, in murky water, windswept conditions, and if anyone was standing on the beach they would say, "What a bloody good day for a fish". So at the end of the day, maybe my decision process resulted in my attack. Maybe if I came out half an hour earlier or I was 100 metres further up shore I might not have been attacked. The place that I was attacked has a gutter that you have to swim across where, if you were a bait fish, would be a perfect place to rest. So at the end of the day maybe it is just that I got attacked and that is what it is. In regards to shark numbers, behaviour and habitat, I would rather hear from someone who is making a concerted effort to be educated in that marine science and to provide their research.

But also in regards to shark numbers, behaviour and habitat there is also a human aspect which we talk about in regards to management strategies. The adequacy of management strategies—I was very fortunate, Port Macquarie did not have a policy on how to deal with shark attacks until a week before my attack. Because of the other attacks that had happened prior to me in that year—I was number 12—people had started to develop an actual way to be a first responder and what to do; they had set up a coordination of surf lifesaving and the police to deal with a shark attack victim and I just happened to be the first person to test it in Port Macquarie, which I am very thankful for because the response time for me was eight minutes from the phone call. I was very fortunate to have people on the beach observe the attack and make the phone call to triple-0. In regards to my situation, I am very fortunate.

My attack is very much similar to the poor gentleman who got attacked in Kiama three days ago—it is exactly the same attack. The only difference between that gentleman and me is that I retained the flap. That is the only difference—it could be just luck. Measures to prevent shark attacks, including strategies adopted in other jurisdictions: although I do not believe in the conspiracy theories that I have heard from certain people what I did notice was the change in behaviour in people. I sat up on the headland for four to six weeks after my attack and I watched surfers in the surf. The first weekend I saw people no more than 20 metres off the beach, no more than two metres apart and, in general, about 30 metres from tail to tip in terms of other people—they were scared, they were timid, and as soon as anyone got two metres further out than everybody else they went back into line. Then the next week I saw people branch off to the end—it got wider. Over that series of weeks I saw a change in behaviour in those people who surfed at Lighthouse Beach. After every week they got further apart and it went back to normal within about a six-week period. That is what I observed, because it was keen for me to understand that.

In regards to the actual process, it was claimed to me that the behaviour in a human would be that in the first instance there is shock and people dramatically do not want to go into the water. Again there is this hypervigilant stage where over a period of those four to six weeks they are very selective in their use of the ocean. But after that six-week period they went to what this conspiracy theorist thought was a complacency stage, while I think maybe it is more just normal behaviour, maybe they go back to the normal behaviour. I saw the introduction of the shark reports page and the dorsal apps and I use it. In my particular case one of the surfs I had was the first surf I had had not thinking about sharks—I was in the water with the surgeon who worked on

me—and as I came out of the water, I got to the car, I opened the car up, got the mobile phone, turned it on and Sam Morgan had got attacked in Ballina and it was like, wow, that was devastating to me. Being so recent after my attack it had a profound effect on me and again I noticed in myself a change of behaviour as I went through that whole process again. Every time that we see an attack I generally see in the behaviour of people that they go through that short period of shock, they go through a six-week stage of hypervigilance and they carry on.

But with the shark reports page I am starting to see it is more and more likely that people stay within a hypervigilant range; their behaviour by that shark report, by seeing the actual report—whether it was in WA or whether it was in Queensland or whether it was in South Australia—that someone saw a shark, they are more selective in their approach to going for a surf in Port Macquarie. So I think that in terms of the actual prevention of shark strategies maybe it is impacting human behaviour. Maybe one of the greatest things that could happen as a result of this is that by the use of these applications people are making a personal choice and they are being more selective in their approach. It does not mean that they are going to stop surfing; it just means that they might think it is not bowling like it should be, it is a bit choppy, "I might not go for that surf there". That is just maybe the way it is, and if that is the case in regards to saving more lives then that would be a cost-effective method.

I also believe there needs to be a greater education about the human side of it in regards to the social impact. You can see 185 articles on shark research but there is only one article on trauma. So in conjunction with Macquarie University and Dr Nick Titov we have looked at doing a study of shark attack victims and that is part of the Bite Club—we say, okay, let us do a study on them and see if there is a difference in regards to trauma. In my particular instance I was involved in a fatal car accident when I was younger; I lost my father. I had to pull him out of the vehicle and attempt to resuscitate him for 40 minutes until an ambulance turned up. After my shark attack I had flashbacks of the car accident, not the shark attack. I can still articulate it very well but in my situation it dredged up old trauma. It gave me an opportunity to think and wonder maybe there is a universal trauma; maybe it is not the cause, maybe it is the individual.

I have now met many people who have been affected by shark attacks and I have seen a wideranging difference in their behaviour as a result of their shark attack and I have not seen a commonality. If anything, what I have seen is that if you had previous trauma in your life the shark trauma is really just an amplification or a megaphone to pre-existing issues that you have with your trauma. It might be poor life decisions. I have met someone who was not treated well younger in his life and then he was a rescuer of someone and then as a result of trying to rescue that person from a shark attack all of a sudden his mood changed, but it was really an amplification of all the issues he dealt with when he was younger. In my case I am hypervigilant when I drive because it dredged up the fact that I was impacted by a car on the road. So I am much more hypervigilant when I am using a vehicle. I think that needs to be further investigated in studies and I think that, with due course and proper assessment, when we come to preventing shark attacks we need to probably put some emphasis on the human side of it and the human behaviour as a result of shark attacks and also see the comparison in regards to a motorcycle incident.

In my attack I received great benefit from being a part of a patient study with the University of New South Wales rural health clinic where I did a number of lessons and workshops where I presented to the doctors that it is important that although they actually present to you as a patient, more importantly the patient observes their behaviour just as much as they observe ours. It is important to understand that just because you are at the end of your shift and you have had the shits with the nurse beside you and you can see it in your behaviour, it is impacted by the patient. By sitting in that bed—and you are sitting there for 24 hours a day and you are only attended to for one hour—you have got 23 hours to sit there and observe everybody else's behaviour. What I found was that in regards to my attack the one particular issue is media. In my attack you become a superstar for 72 hours until they finally get hold of someone who is a family member and so forth and all they want to do is project a monster, they want to say okay here is a hero, there is a rescue, it was a damaging issue and that you are in a stable condition.

I worked very closely with Lynn LeLean from the Port Macquarie Base Hospital and in that situation we developed that the media would not go away unless you gave them something. So we did an initial statement—basically, age, gender, stable condition, that was it. But that did not stop it. I had Channel 7, Channel 10, Channel 9 parked outside my house harassing my family out the front there, waiting for that picture moment to put on the TV news that night. I was heavily affected by codeine at the time but I thought I gave an adequate response on my Facebook page. I basically said that it is no different from you trying to cross the street or of being in a car on a highway, that what happened to me is just one of those things that happens.

Fortunately for me, I have a history in martial arts and being a security guard and observing people's behaviour and witnessing trauma and so forth and even my experience in my car accident—I have been there and I have done that. So in my particular case it did not really affect me that much. I managed within 11 days later to get back up and get on with life. What I found was there were two major reactions to people—you could choose to be agentic, that you could rationalise something terrible had happened to you but you realised that life needed to get on; or you could be victimic, that you could not control what had happened to you and it was actually as a result of someone else's actions, that someone else had to blame. I find at the moment that people who have that agentic behaviour seem to get over it much quicker and those who are victimic don't—maybe some don't want to.

I suppose in regard to my opening statement you can ask me any questions. I have obviously experienced a lot of things in terms of media and a whole bunch of other things. I think in a nutshell it is very hard to try and condense that and put it in a 20-second soundbite. Hopefully I have conveyed generally an approach to what has happened to me so far.

CHAIR: Mr Carr, from what you have just said is quite profound. The Committee sincerely appreciates your honesty and the courage you have shown in being here today. Thank you. You spoke about personal choices, being more selective in one's approach and greater education. You said, "It is just not one of those things that happens; it is extreme bad luck." What do you think members of the community should be doing to not find themselves in your situation?

Mr CARR: I have seen the SharkSmart guidelines produced by the Government; I think they are fair and reasonable. At the end of the day, a continuation of that to children in primary and secondary schools and surf lifesaving organisations are a great avenue to disseminate that information. Also in regard to fear of sharks, we have been working with the MindSpot Clinic at Macquarie University. We are developing a tertiary document, "Overcoming the fear of sharks". It basically outlines the risks involved and directs them to the SharkSmart guidelines and also, if they are indirectly or directly affected, where to go to and who to see. They do not necessarily need to come and see someone from Bite Club, unless they want to see the scar on my bum or whatever they want to do. But at the end of the day, if they feel they need a level of compassion and so forth by all means we can offer it.

Bite Club in itself has changed dramatically since I have been involved. When I was first involved to be honest there was a pro-cull aspect to it—sharks needed to be reduced. That policy has been around for 60 to 70 years, why would I try and impose on that? What I saw was that the human aspect had not been dealt with. So we said maybe the actual mission statement of Bite Club is to be a peer support group and advocate for the actual treatment of the shark attack victim, rather than actually being involved in the shark debate. I have not seen any benefit in seeing a disinterested scientist actually give a statement to a media organisation. I have not seen any benefit when I saw Craig Ison's betrayal on *The Project*, in his hospital bed with the equipment in the background and a reporter asking him 48 hours after his attack how he felt about the shark debate.

In regards to my situation, the community would probably most benefit from allowing that personal choice and personal decision to be made by that individual and education. Even though we are aware of certain items that have been created in the SharkSmart guidelines, at the end of the day it is their choice and if you follow that process you will mitigate your chances of being attacked by a shark but it won't prevent it. It is just like being in a car and having a car accident. I drove for 4½ hours down here today; I could have had a car accident at Gosford. That was the choice I made and touch wood it doesn't happen. At the end of the day, I think the community just needs to disseminate the education of that situation. Port Macquarie has never had shark mitigation measures in its whole life. We had two fatalities in the 1940s and all because they were actually swimming next to a fish cleaning bay. Was that a poor decision? Probably.

I have been at the marina and watched the Golden Lure. I would not go swimming at the bar in the middle of the Golden Lure in January when they are dragging a shark or a massive marlin in. Bull sharks exist at the end of the breakwall all the time. It doesn't necessarily mean that you are going to get attacked by one; it is a confluence of many factors. Lachlan Smith, who actually reported my shark attack from the beach, saw the shark swimming around in the gutter, thrashing around before I got attacked. Thank God I got attacked because Shane De Roiste, the person who was beside me, is a lot smaller than I am. All of a sudden the shark decided to go out because it looked better, but changed direction when I kicked my flippers over the wave. It was just pure random chance, which is what happens.

I have also seen in the community social exclusion on social media of people who have an opinion. If you have an opinion on sharks all of a sudden an issue arises between whether you are pro-cull or pro-conservative. I have not seen any benefit in that at all. So my advice to the community is that if you have an opinion on that, that is fine, but also back it up with some sort of peer review or some sort of research. Do your research and make the statement or keep it to yourself. It is probably worse than religion. I have never seen anything like it; it is so polarising. If you are learning something then don't talk about sex or religion; don't talk about sharks. It has not been helpful for anyone, whether you are a victim or whether you are a marine scientist or anything like that at all.

I have seen Barry Bruce in a state. I am sure he presented here today but when I actually tried to approach Barry Bruce as Bite Club he thought I was toxic and that had the most profound effect on me. Why the hell would I be toxic? I was the one who got attacked by the shark. Then I realised that he had been harassed by some people who had been attacked by sharks on a conspiracy theory basis and they were bombarding him and subjecting him to trauma by just sending him emails.

Mr CLAYTON BARR: Pro-cull emails.

Mr CARR: That is correct. He should not be subjected to that either.

Mr CLAYTON BARR: I want to ask you a question about economic activity as a consequence of the attack. I want you to think about the type of economic activity you engaged in as an active surfer before and now as you have returned to the surf. Have you noticed any changes in your economic activity—where and on what you spend your money in the surf industry—as a result of this attack?

Mr CARR: Yes, I bought a shark deterrent device and another board to go with it. I used it once, got electrocuted on the elbow and put it back in my garage.

CHAIR: How did you get electrocuted?

Mr CARR: It is an electrical current device on the body board.

CHAIR: Can you explain a little bit more about that.

Mr CARR: It is a SURFSAFE device developed in Western Australia. I bought the board and he gave me a reduced price on the actual device and we put it in the board. I stood at Watonga and watched guys go surfing for about six weeks and all I wanted to do was go for a surf. It took me eight weeks because I had to have two surgeries on my arsehole to make sure it was all sorted. I actually physically ripped the drain out and got out there. I was itching to get back out there. My behaviour in terms of wanting to go for a surf had not changed—if you a surfer, you are a surfer. At the end of the day, if you want to go for a surf then you will always want to go for a surf. If you are a surfer from a young age and you have been brought up like that, you understand the risks involved and you want to go out and surf. In regards to my behaviour, it had not changed; as to my economic behaviour, I bought more boards.

CHAIR: Can you tell us a bit more about the board. Did anyone else use that model of board?

Mr CARR: Yes, other people have used it. So they have had success. The actual bloke who developed the technology did not install it. He wanted to but he couldn't make it because obviously he is in Western Australia. So I got a local bodyboard maker to install it in my board. The day that I went back in the surf I threw up five times on the beach. It was supposed to be the first surf two days later with Prime7 as part of my media story—

CHAIR: Could you tell us a little bit more about the board because this is the sort of technology being talked about in mitigating measures.

Mr CARR: I obviously gave him an opinion on that. I said, "Don't get me wrong, I would never have entered the water without it. That one single surf was what it took for me to get back that confidence."

CHAIR: Do other people use the product?

Mr CARR: It is being rejigged. They are going to change the name, they are going to change the way they do things based on the advice I gave them simply because if one of the electrodes is actually out of the water then your arm is the conduit for the resistance of the circuit.

CHAIR: Did you get much of a shock?

Mr CARR: It is like a nine volt battery on your elbow.

I said to him in that regard it is a great mental tool. A shark deterrent device is a great mental tool, and I keep it as simple as that. I do not see it as a shark deterrent device; I see it as a mental support mechanism to get you back in the surf. If you are actually a surfer, once you regain that confidence of where you were and the enjoyment of getting barrelled and doing tricks on waves, you don't need it any more. You just need to get over that initial trauma, so I find that it is a great mental tool.

Mr CLAYTON BARR: I do not know if you have a partner or children, but do you go to the beach more or less often now? Do you encourage kids? Do you go on surf trips as part of your regular holidays?

Mr CARR: Yes. We did two really good things with our children. We told them that their father had been bitten on the fart gun. Children are children. I don't need to give them adult concerns and issues; they love sharks. I have been bombarded with library investigations by my children at the town library to get every available book on sharks. They think Rodney Fox is a deadset legend. At the end of the day, as a pioneering guy in regards to actually providing a voice or a story to a shark attack victim he has probably had a good win. So in regards to our behaviour about going to the beach, we go just as often as we normally would.

At first, yes, I was hesitant to do so but because I have been involved in surf lifesaving for a long period of time—I have been a surf lifesaver. I have rescued naked people in three metre swells on Mad Monday—I was properly drunk myself—because there was no way I was going to let that guy die. I got on a rescue board and paddled out and got him. I did not think about sharks back then; I did not think about sharks the day before I was attacked. I think about sharks every time I go surfing now and after about 1½ hours my intuition kicks in and I want to go home. Maybe it has changed in that regards. Economically I have actually bought more boards. I actually want to go on a surfing trip to Indonesia because I have got no problem with dying in an exotic location, but I do not really want to die in a choppy swell on a Saturday afternoon at the front of my local break.

Mr CLAYTON BARR: There are no white pointers in Indonesia.

Mr CARR: That is exactly right.

Mr CLAYTON BARR: I now want to ask Mr Munro, who is on phone, a question. In terms of your exposure and involvement with people particularly around Bite Club, is there anything to report on changed economic-based behaviours as a result of these attacks?

Mr MUNRO: Not really, and that might be surprising to some. Surfers, as Dale is indicating, are pretty stodgy characters. They are true to their sport and it is going to take a lot. I guess sometimes even the death of a fellow surfer does not really deter them. They are obviously taken back by it all and would love to bring that life back, but they will push on and do whatever they want to do. In the case of our area here, with three to four very severe attacks—one fatal—it slowed everything down in terms of surfboard sales and aligned products. Economically in that case, yes, it did but it is coming back to normal now. I am still surveying people and from my research it is almost back or is back to an even keel again. The accommodation, houses and what have you, they did falter a little before Christmas, then over Christmas and the holiday period everyone seemed to come through it okay. Right now from my feedback it is back to an even keel, as I said before. We just had a slight glitch in our economic situation here but it is back on track now.

Mr GREG APLIN: Mr Carr, thank you for a comprehensive and most articulate personal presentation that was very informative for the Committee. Given that you have said that you are a life saver and have been a life saver, and given your own experiences now, will you describe in your own words whether you think life savers and lifeguards are adequately trained and resourced to provide first aid in the sort of instance you went through, or even in more serious instances? I am interested in your take on the trauma of resulting—obviously personal for the victim but also for those attending as the first aid responders. Is there adequate training to assist them through that process following what might be a fatal attack?

Mr CARR: So I have kept a keen eye in regards to the training of Surf Life Saving. I am well aware of the senior first aid portion of it and resuscitation. St Johns has a very good program in regards to massive trauma to a limb and blood loss. A closer association between St Johns and the Surf Life Saving clubs would probably be a benefit, so maybe a one-off education program or even a pamphlet or an update. Surf life savers get retrained every 12 months so there is adequate opportunity in the next number of years to get access to all those surf life savers. Do we need to educate them more on bait fish awareness? It is extremely difficult to sight a shark from where you are.

A lot of beaches in Port Macquarie and on the east coast of Australia do not have high bluffs or cliff faces to have a great aspect to sight that sort of behaviour. But you can see bait fish balls quite easily. If anything, I think the status quo is adequate. I think they do quite a good job. It was just because it seems to be the topic of the decade in regards to the social media aspect of it, I think it would be appropriate to actually do a specific program to identify tourniquets, major loss trauma, cardiac arrest. The paramedics are obviously well equipped. In my case I had three paramedics who were fantastic—Milton, Tracy and Andy. They were outstanding. Also the response in regards to mobile phone usage people are getting attended in a first responder situation very, very well.

Mr GREG APLIN: You mentioned you were working on a program. Is that intended as a training mechanism?

Mr CARR: Okay in regards to hospital policy on those affected by a major incident like a shark attack—it is important I say "like a shark attack" because in regards to the resources used by NSW Health in regards to a shark attack it is really a drop in the ocean compared with those with chronic heart disease and so forth like that. They spend far more money on those prolonged issues rather than on a shark attack victim. The one particular thing in my case was they employed six additional security staff to prevent media people coming in and getting a hold of me. They put me in ward 1 because it was the furthest room away from the external perimeter of the building. They caught a gentleman with a long sighted camera lens in the tree outside ward 12.

People actually presented themselves as a relative. People came into my other partner's, friends and family saying that "Yes, Dale is going to do a press conference tomorrow morning." The behaviour of the media in those first 48 hours is no different from the five seconds I suffered as a shark attack. I read a paper in regards to the media, psychological perspectives, and the responsibilities. It was a paper that was first developed by the Australian Psychological Society in regards to children experiencing violence on the television and then changing their behaviour. In 2013 they shaped it better in regards to issues, in regards to what would be more relevant to asylum seeking and so forth and the boat people. I think maybe in the years 2016 and 2017 a reintroduction with a closer emphasis on the recommendations of that paper would be far more benefit to this inquiry.

It gave recommendations on how the media should act in regards to dealing with trauma. What I am starting to see in people who were actually deeply affected by shark attacks is if there is an agenda in a media representation or a segment it has a profound effect on the people who have already been affected. The *4 Corners* program I was part of recently was a great representation of many different aspects but at the end of the day the one thing you learn—especially I have learnt the hard lesson and I have had two hour consultations with legal counsel from channel 9 and channel 7 over many different opportunities in terms of media—is I am happy to be the scapegoat for a lot of other shark attack survivors because I have got the mental capacity to handle it. I am happy to blaze my way through media relationships and attend hearings like today so that the person who has to come before it in the future does not have to go down that new blazed path.

In regard to trauma, I have worked with NSW Health and we are looking at maybe a 48-hour to 72-hour blackout for that patient and for those people. Unfortunately you are bound by the Enclosed Lands Act. There are things in regards to the fact that a media representative is allowed to attend the front door of a residence, with a camera in hand, to ask you the first question about whether you would like to be interviewed or not. They have the right to do that. That could be just as traumatic for the shark attack victim as the fact that they have been attacked by the shark. In regard to trauma it is in many forms—it is the sighting. Everyone here would obviously know Peter Benchley in regard to the *Jaws* movie.

People think that sharks roar. In my particular case it was silent and it was cold. The shark did not come out with a "dern, dern"; it did not bite me with a roar. It was that swift I did not even have pain. When I actually talk to other people, no-one experiences pain in that first two hours as adrenalin kicks in. In regard to

trauma, there are many aspects post shark attack that have just as much as a profound effect on trauma as the actual trauma itself.

Mr ALISTER HENSKENS: Earlier you spoke about—I am paraphrasing now—once a surfer, always a surfer and of the desire to get the next wave even after you have suffered a trauma like you had. Obviously prevention is better than cure. It is possible for apps and the like to identify and warn surfers that these are not good conditions to go for a surf but knowing the kind of addiction, if there is a good surf a surfer is likely to ignore that and go anyway. Do you have any insights into whether there is realistically much that can be done from a preventative point of view to ensure that those types of warnings have a greater impact?

Mr CARR: I have had an opportunity to speak to the Department of Primary Industries who in this particular case is charged with the welfare of individuals who choose to swim in the ocean in New South Wales. It has a policy in regards to shark attack mitigation which is a meshing program and they are developing a smart buoy system. There will always be that one surfer who wants to go surfing at 7 o'clock at night because of economic factors, because when he was a kid he could go surfing at 2 o'clock but now his job finishes at 5 o'clock in the afternoon. You will never ever stop that, and I think that is important. Irrespective of my situation surfers will always be surfers. In regards to the insight of it, I think in general there will be a change in behaviour that will mitigate it. I think that what we have seen so far in the year 2015 to have 15 unprovoked attacks in such a short period of time, I think you will better define the situation but you will never be able to fully prevent it.

I think that by increasing the social science aspect to shark attack mitigation rather than the marine science. A lot of people think that science is a belief. Unfortunately that is not true. Science is a tool. I am an educated structural engineer and I was a big fan of physics when I was at university. You must have the imagination and the creativity to hypothesise something and then with science either test it to see whether it is true or not. A lot of policy that I have seen has been based on marine science but not social science. I think in this particular instance with the inquiry the work that we are doing in regards to better understanding those who have been attacked by sharks will be a great and useful tool for those people who are charged with our welfare, like the Department of Primary Industries to better suit or better modify the existing policy that is in place. It has been there over a long period of time. I think that moderation needs to be applied in regards to prevention of it.

I do not think there is a magic bullet in a simple word. I think that it is the individual that needs to be recognised. That maybe the treatment of the individual in regards to prevention, you know, do you actually change human behaviour to solve the shark attack mitigation issue rather than solve the shark numbers or habitat or region? Again I reiterate a separation of powers would probably lead to less attacks in regards to people doing more science devoid of criticism, shark attack survivors being devoid of being polarised by their opinion, and that policy makers have an equal opportunity to resources from both sides. I think that by changing human behaviour to a certain extent will be a preventative action, just as effective as dealing with the marine science.

Mr CLAYTON BARR: Mr Munro said that there had been a glitch in the economy of the coast but it seems to have recovered. Would you expand on those comments about the glitch in the economy and then the broader recovery that you have a sense of these days?

Mr MUNRO: I am not sure I quite understand that question. There was an impact on the economy after several attacks. The first instance was a fatal one and one would think it would have started then but it did not. Everyone was in shock, of course, but we are a tourist destination area here and people had not started to cancel their bookings and what have you. The surfboard industry was the first to be affected probably almost immediately. There were less boards being sold and less surfing accessories as such. As I have already said, that has fully recovered to my knowledge. I am not canvassing local board manufacturing outlets and what have you.

But it was later in the year around October we started to hear that there were accommodation cancelations. That is what I class as turning a glitch through to the end of January, I guess, but by the time that time had passed the accommodation places seem to have been able to fill the gaps of the cancellations in the main, but not totally. Like I said earlier, it does seem to be now that it is back on an even keel. I am not sure if that answers your question.

Mr CLAYTON BARR: What about your observations of people and their use of the water? I appreciate that a surfer is a surfer, will always be a surfer and will always go surfing. But between the hard core surfer, the life-dedicated surfer, and the complete non-surfer, in the middle there has to be a range of people

who are just recreational surfers and do it for fun. Are they still choosing to do it for fun or do they err on the side of caution and not go surfing?

Mr MUNRO: Err on the side of caution most definitely. I do not think that will change. I think people have come to realise that there are more people going into the water with population growth and that we are living in an area where the water temperatures are increasing and are maintaining—they are waning very little between seasons. There are surfers who are being very cautious as well, especially young families, you know, the guy started surfing at 10 and now he is 30 and has three kids and he cannot afford to just race out after work or on the weekend. He is thinking about it as well. I have plenty of cases that I think of right now of people I know in that situation.

As time progresses though more and more people are going back to the beach with their families. Because we are so close to the Queensland border, and they have nets as we know, there are definitely families going up to the Gold Coast more often now to go surfing. As I said, I think most sensible people are going to err on the side of caution. Surfers are surfers for sure, and we take on surfing in an ocean that is the domain of marine life, with sharks being one of the main predators. It has to be accepted, and we do accept, that there is a risk involved.

We are looking more at things now. For instance, our main beach here is right next to a river. We have always surfed there, even after rain when there was a run out of river water which was discoloured. Now I will not, and I know a lot of other people will not, go in the water then. We have realised that that is not a smart thing to do. So even if the surf was as good as it ever gets, and there will always be someone who will go out, most people do stop and think about it.

To give a recent example, we held a club round on Saturday at the very beach at which Sam Morgan and Tadashi were attacked. Unfortunately, we had to stop by mid-morning because there was the sighting of a shark. It was a 2.5-metre long shark, and we assume it was a bull shark. Fortunately, we had aerial surveillance that picked it up. After 30 minutes we were given the all-clear that it had moved on. Two hours later another shark was clearly seen, and we cannot say for sure if it was the same shark. It had come right into the break. The first sighting was five metres behind the break. In this case it had moved into the area. Obviously I cleared the water immediately, and Surf Life Saving Australia assisted. Of course we could not clear the water of everyone but definitely we react very quickly now.

In days of old we knew the sharks were there. Occasionally we would see a shark and most times stay in the water. But the approach now, at least for most intelligent people, is to clear the water. I saw the look on the guys faces, some older guys and some young guys, when they saw or realised there was a shark right within their ranks as such in the break. They were shocked and immediately left the water. Again, I do not think that train of thought or that approach to sharks being in the water is going to change. It is an ongoing situation.

Mr CLAYTON BARR: Finally, Mr Munro do you have any contact with your surf schools up there and can you make any comments about their operations?

Mr MUNRO: No, I know all the operators. I do know that they are all still operating. They tell me that they are vigilant with regard to taking pupils out into the ocean. There is one school here that takes them inside the river. All I can hope and all I can say is that they are doing the right thing there. They seem to be all busy again. There was a slight drop off in their classes and what have you but they are now back to full strength. There are frequenting the same places and using the same beaches. As far as I can see, the duty of care is as good as it should be. There is never going to be a situation where they can guarantee 100 per cent that they are not going to have something happen, as with surfers going into the water. I think they warn their pupils. They have a duty of care to do so. There is a risk. I am not on the beach to watch what they do in terms of training, coaching and the rest of it but I am sure that they are doing the right thing.

CHAIR: Thank you, Mr Munro and Mr Carr for taking the time to appear before the Committee. We sincerely appreciate it. I wish Mr Carr a very safe trip back and all the best in everything he is trying to do. Mr Munro, I thank you for appearing via teleconference, and I thank you both for appearing before the Committee. The Committee may wish to send you additional questions in writing, the replies to which will form part of your evidence and will be made public. Are you happy to provide written replies to any further questions that we may put?

Mr CARR: Yes.

Mr MUNRO: Yes.

CHAIR: I sincerely thank you for your time today. I thank Mr Carr for sharing his personal experience. I wish you both every success. That concludes our proceedings for today.

(The witnesses withdrew)

(The Committee adjourned at 4.20 p.m.)