

Environmental Initiatives and Consumer Behaviours in the Australian Surfing Industry

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Abstract

This research project examines environmental initiatives and related consumer behaviours in the Australian surfing industry, and also explores global examples of innovative and exciting ideas emerging as disruptive advances. The production of the vast majority of petroleum-derived surfing equipment – such as surfboards and wetsuits – relies on non-renewable resources and produces harmful chemicals that place a potential burden on future generations. An item that hasn't been recycled, or is unable to be recycled, will simply not disappear by itself, and the resulting pollution has the potential to have damaging effects on the health of humans and wildlife. The rising concerns about sustainability over the last few decades – with all environmental issues, not just surfing – is recognition that the current pathway that we are on is certainly unsustainable.

This study draws together research on the manufacturing process of surfboards, wetsuits and surf wax, which have been identified as key items for the basics of surfing and form the basis of investigation in this report. Questionnaires were conducted of both users and production workers to determine their knowledge of, and attitudes towards, the potential environmental harms affecting the industry. Interviews were conducted with key industry players to discuss their concerns for the environment, perceptions of industry problems, and possible solutions.

The research project concludes that further research and development is required into technological advancements in plant-based alternatives for current fossil fuel derived products, along with continued development of innovative ways for material reuse.

Australian surfers, on the whole, do care about the environment and regardless of their level of earnings, would pay extra for environmentally friendly surfing products. Widespread change could come from 'nudge' mechanisms, collective change from networking and collaborations, and introducing stringent industry standards, although regulation is seen to be a preferred path from surfers and surfing industry workers alike. The overriding theme is that almost all people surveyed or interviewed agree that now is the ideal time to rewrite a new and improved story for Australian (and global) surfing equipment to evolve, as people want this and are ready to pay for it.

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1. Introduction

Surfing, with all of its associated history, culture and folklore, has generally been romanticised as an unperturbed pursuit that surfers have in unison with nature. Author Steven Kotler (2006) suggests that “since the ocean was the place where life began on this planet, the act of riding on a wave allows the surfer to momentarily connect with this living memory. In Jungian terms, surfing gives the surfer access to the collective unconscious of the planet” (p. 188).

The design of surfing equipment, along with the materials and technology used, has not fundamentally changed much since the 1950s. Almost a million surfboards are produced globally each year; typically shaped with a foam core and finished with various coatings of fibreglass and then polyester or epoxy resins (Cogdell, 2004). This combination of oil-based materials emits harmful poisonous fumes from volatile organic compounds, and the resulting products can take millennia to break down in landfill sites (Dick-Read, 2007). In addition to the ecological damage, surfboard shapers (those who craft the boards with tools by hand) have suffered from exposure to the toxic properties of working with largely unregulated materials. One example is shaper Josh Dowling, whom after 15 years of using epoxy resins, ceased operations after being diagnosed with psoriasis from having repeated contact with the resins (Nettle, 2017).

Yet much of the necessary equipment required to ride waves consists of toxic materials, and is often created with harmful industrial manufacturing methods, resulting in products that leave little consideration to the subsequent ecological damage. This is highlighted by research undertaken by Hill and Abbott (2009) which looks into the contradictory relationship concerning surfing and the environment, proclaiming that while technological advances have drastically changed surfing, it has significantly impacted the natural environment. It could be argued that surfing is dependent on a healthy and thriving ocean; therefore, it is reasonable to assume that surfers – and those who influence the surfing industry – are aware of their impact on the environment.



Figure 1. *1000 Surfboard Graveyard* by Rodney Campbell (Thompson, 2014).

The fundamental purpose of this research project is to inspire further discussion to act as a catalyst for surfing to improve its interaction with the natural environment, learning from the past and looking to the future with an open mind. One of the key aims is to encourage closed-loop systems – i.e. to reduce the need for materials sourced from mining and drilling – and to discuss associated behaviours and obstacles, with a view to refining the industry rather than topple it.

This research will look at innovations and game-changing strides towards sustainable practices in the surfing industry and assess how far things have progressed since the birth of the first polyurethane surfboard in 1958 (Cavette, 2017). The research will also study key challenges to the mainstream adoption of environmentally friendly materials. Consumer behaviour forms part of this research, as new innovations emerge in the surfing industry they will most likely need to be appealing and affordable to change consumer's dependence on products that have the potential to harm the environment.

The structure of this research project begins with an insight into Australian surfing culture, with an acknowledgement that any future development in surfing is wise to learn from its roots to determine why and how we have arrived at this present state. This research will examine the existing range of materials and production methods used to create surfing equipment, and the reasons why we should be concerned for the long-term sustainability of surfing. Consumer and economic forces will be explored to reveal what influence they have on the overall sustainability picture, and a look at present-day environmental initiatives and future outlook of the surfing industry. The research also involves dialogue with both users of

surfing equipment and its producers, in the form of a public questionnaire and one-to-one interviews.

2. Literature Review

The relevance of the literature review is born from identifying and critiquing past, present and future methods and behaviours that exist in the Australian surfing industry, thus analysing if, and how, the decision-making process may have an impact in future developments. Each section of this literature review was chosen to concisely represent sub-cultures in surfing that are significant to this study, namely areas that will collectively explain why the Australian surfing industry needs to learn from past mistakes, embrace any present incremental developments, and plan ahead for a sustainable future.

2.1 Reasons for Concern

Data was released in January 2017 from three international climate and atmosphere agencies, (the UK MET Office, National Aeronautics and Space Administration (NASA) and National Oceanic and Atmospheric Administration (NOAA)), which exposed the current global dilemma in addressing climate change. The findings revealed that 2016 was the hottest year on record since the recording of temperatures dating back to 1880. The same scientific research has estimated that temperatures have not been this warm for 115,000 years, and the planet has not seen levels of carbon this high in four million years (Carrington, 2016). Australian surfers have seen their East Coast shoreline suffer with coral mortality up to 50% in parts of the Great Barrier Reef, ecological loss that is worse only in Japan where 75% of their largest reef has damage from coral bleaching. Australia's Great Barrier Reef is an environmental victim of warming oceans but also a contentious key asset to the Australian economy, as it generates almost \$6bn each year from two million visitors (Slezak, 2016).

In an interview with the ABC (2017), Dr Chris Wilcox of CSIRO explains that plastics generally break down faster in surf zones due to the physical abrasion and sunlight. Dr Wilcox adds that dense plastic could last in the surf for up to 600 years, whereas a thin plastic

bag getting knocked around in the surf could last just months, not to mention the environmental impact of that bag on the local biodiversity (Weule, 2017). It has been calculated that 83% of worldwide samples of drinking water tested positive for microscopic plastic fibres (Lui, 2017).

A typical surfboard is made up of a polyurethane foam blank, then laminated with a fibreglass coating and a polyester or epoxy resin (Krueger, 2014). Californian not-for-profit Sustainable Surf (2013) lists the various hazardous chemicals that form the ingredients of a modern surfboard; such as acetone, isocyanates, styrene, and volatile organic compounds (VOCs), all of which are especially harmful to the board shapers with the exposure to raw materials. Polyester resin, as told by Sustainable Surf, contains styrene which is federally listed in the USA as a known carcinogen, in addition to the acetone which degrades into methane – acknowledged as a potent greenhouse gas. Carbon fibre is used in many modern surfboards for its strength and durability properties; however, the material has a very large carbon footprint due to the high amount of energy needed to produce it (Sustainable Surf, 2013). The oil-based combination of ingredients in a typical modern surfboard combine unfavourably to emit poisonous fumes of toluene diisocyanate (TDI) or methylenediphenyl diisocyanate (MDI), both are types of harmful chemicals, and although likely to break down with ease in breaking waves, will not change in landfill for millennia (Dick-Read, 2007).

The landscape of surfboard foam technology took a historical shift in direction due to the closure of Clark Foam in 2005, which at the time was providing 90% of polyurethane surfboard blanks in the USA and 60% of worldwide supply (Clark Foam, 2016). What followed from the ending of Clark Foam's market dominance was a trend of newer materials and technologies, chiefly the introduction of expanded polystyrene foam (EPS foam) and epoxy resins. EPS foam is generally produced in factories where there are advanced ventilation systems; it is slow to biodegrade but can be recycled, it emits 50-75% fewer VOCs than polyurethane foam, and the resulting reduction in toxic properties means it is less harmful for the surfboard shapers who are handling EPS foam (Sustainable Surf, 2013). EPS foam has the advantage of being lighter than traditional polystyrene and polyurethane foam; though it is prone to absorb more water, though recent technological advancements have improved this, and it is more difficult to shape by hand because of its fragile composition. As a result, EPS blanks are moulded in machines, hence the term 'pop out' surfboard (Surf Science, 2017).

The majority of wetsuits used for surfing are made of neoprene, a synthetic material created by scientists at Du Pont in 1930 and is derived from petrochemicals which are heated and pressured in a process called vulcanisation (Du Pont, 2017). There is also a type of geoprene, discussed later in this chapter, made from limestone, so essentially all types of neoprene is a product of either mining or drilling for finite natural resources (Dodds, 2016). Even surf wax, a relatively small part of surfer's possessions, typically contains paraffin, petroleum jelly, synthetic adhesives and chemical fragrances (Davies, 2009). Surf Science reveals that 95% of surf wax on the market contains some form of petrochemical, with the resulting debris having a direct impact on reefs, beaches and connected ecosystems (Surf Science, n.d.).

Recycling services for used surfing equipment are largely limited and is a difficult process due to the mixed combination of foams, resins and fibreglass in traditional surfboards, and vulcanised rubber and additives in conventional wetsuits. Bill Hickman (2011), regional manager of the Surfrider Foundation in Southern California, explains that foam debris is particularly troublesome, as there is a high chance that the foam will break down into smaller pieces which do not biodegrade. EPS foam, which is seen as a forward step in eco-friendly material design, is paradoxically more susceptible to erosion, thus counteracting its purported green credentials.

Potential issues arise from the lack of transparency from some of the leading advocates of sustainability. In Scott Laderman's book, *Empire of the Waves – a Political History of Surfing*, he states that Patagonia has successfully merged capitalism and environmentalism; with the result being that consumers believe they are 'being green' by purchasing their products. Patagonia initially became known for their outdoor clothing, but later branched out to include a range of environmentally friendly surfing equipment. Much of their clothing, Laderman continues, is produced in China, Sri-Lanka, Thailand, Vietnam and most recently Bangladesh in 2012 which had the world's lowest wages at the time of writing (2014, p. 143). Patagonia came under scrutiny in 2015, when video footage was released showing the cruel process involved in sourcing merino wool used as base layers and insulation for their clothing (Graham, 2015). The footage, filmed in Argentina, showed the skinning and abuse of live lambs which was publicly condemned by the People for the Ethical Treatment of Animals (PETA), and subsequently led to Patagonia acting quickly to cease sourcing wool from suppliers Ovis 21, just four days after the media reported it.

While the makers of clothing and equipment such as Patagonia have been vocal on their drive for sustainable initiatives and developing an ethical brand, there seems to be a lack of consistent transparency and accountability. Patagonia has since revealed they had not audited the sheep shearing facility and was unaware of the animal welfare practises taking place, (Graham, 2015). However, an example such as this can create fresh opportunities for tighter regulations and accountability with supply chains. Patagonia, contrary to the aforementioned concerns, is a significant promoter for environmental and social change, demonstrating resolutions and invention with their position on over-consumption.

2.2 Historical and Cultural Influences

Early surfboards were invented in the Polynesian islands of Tahiti and Hawaii dating back 1000 years ago, known locally as *papa he'e nalu* in Hawaiian language, typically made from local wood and were often 15 feet long and very heavy (Surfboard, 2017). The Aloha Surf Guide (n.d.) states that natural materials and methods were used, such as using coral or stones to sand their locally sourced wooden sea-craft, and tree bark sap and nut oil to treat, colour and preserve their surfboards. These could be seen as pre-cursors to the modern materials that are used for surfboards, resins and surf wax prior to the industrial revolution.

In November 1956, teams of lifeguards from the USA, Hawaii and New Zealand travelled to Australia for a surf lifesaving carnival in Avalon, NSW – their surfboards made of balsa wood with a layer of fibreglass (Bombora, 2009) signalling the introduction of new performance-enhancing materials. The visiting Hawaiian surfers sold their lightweight surfboards at their farewell appearance at Collaroy beach the following month.

In the late 1950s, surfing had a social stigma attached to the sport, as discussed by Andrew Warren in *Surfing Places, Surfboard Makers* (2014, p. 50), the local media labelled surfers as 'dirty, jobless and lazy junkies'. Laderman reinforces these claims as a similar cultural stereotype was being painted in the USA, with surfers being branded as 'hooligans and troublemakers' who engage in antisocial behaviour (2014, p. 137). Warren adds that the beaches of Sydney charged forward in the 1960s on a resurgent tide of change, with Sydney becoming the surfing capital of Australia with workshops (for making surfboards) popping up all over the East Coast in the decade ahead (2014, p. 50).

"I wish that when they asked us: 'What is surfing?' I would have said it's a spiritual activity, and not just a sport, because that's what put us on the wrong track."

~ Nat Young (Litmus, 1996)

The 1960s Californian surf culture arrived and appealed to young Australians who wanted to be different. *Bombora: The Story of Australian Surfing* pronounced the influence of Nat Young and his breakaway from a surf culture that was in the midst of change. After winning the world surfing title in 1966 and 1970, he took a personal stance against 'the establishment' and moved to Byron Bay to engage in surfing, farming and 'getting stoned' (2009). Nat Young formed part of a movement of young surfers who wanted to escape the city and 'straight life' of suburbia. The narrative in *Bombora* suggests that Australian surfing culture in the 1970s began to break away from regular mainstream society, forming its roots as a laidback and soulful activity. Nat Young's statement created a counter culture that embraced a connection with nature that would have a lasting effect on mainstream Australian life as we know it today (*Bombora*, 2009).

Australian surfing in the 1980s, as highlighted by Warren (2014), began a global boom of big business with the dominance of major Australian brands; Billabong, Quiksilver and Rip Curl, all of which were formed in Australia but then became worldwide household names. Warren also identifies the 1980s as the decade when surfing became commodified, globalised and packaged in mass production. It was not until the mid-1990s when automated surfboard manufacturing presented the industry with its next operational evolution. The monopolised trends of the 1990s have resulted in cheaper offshore manufacturing methods (Warren, 2014), in a market dominated (at the time) with mass produced boards made of polyurethane foam and polyester resin; chiefly poor materials when considering the product life cycle of a surfboard. Laderman reveals that the former CEO of Quiksilver, Bob McKnight, acknowledged in 2006 that "We're all guilty" and that "Making apparel is not exactly the most environmentally friendly industry." And just a year later, Quiksilver were deemed "incapable" of compliance with Chinese labour laws at their apparel factories, noted by Laderman, was a country that had laws that were notoriously weak, which made Quiksilver's non-compliance even more displeasing

Surfboard technology hasn't changed much since the 1950s. Alex Dick-Read (2007), founder and editor of *The Surfers Path* magazine, explained that by then 90% of modern surfboards (roughly one million per year) were still produced using polyurethane blanks, usually covered

in fibreglass and coated in polyester or epoxy resin. However, in recent times the surfing industry has been introducing and merging new materials, cutting-edge technologies and better manufacturing processes.

Dr Gregory Borne, director of Plymouth University's (UK) Sustainability and Surfing Research Group, has described the benefits that surfing has on local culture in communities when managed properly (2017). Borne suggests that beyond riding a board, surfing can encourage sustainable livelihoods, tackle problems such as marine pollution, promote tourism in an area, positively affect individual's behaviour, and secure the associated economic benefits. In a study on the economic benefits of surfing on coastal towns and communities around the world, Samuel Wills and Thomas McGregor (2016) used night-time light emissions as a measurement tool for economic activity in each local area (<5km). The study reveals that high quality waves boost activity relative to comparable locations with low quality waves. The ecological damage of surfing is not measured as Wills and McGregor's study is purely from an economics perspective, although they mention that by assessing the value of surf breaks, it yields a stronger argument to conserve them from any marginal coastal erosion, pollution or even long term rising sea levels.

The rebranded World Surf League (WSL), formerly known as the Association of Surfing Professionals (ASP) prior to its name change in 2014, is developing the globalisation of the sport with its professional stage for the world's best surfers. The WSL could have inadvertently improved surfing's chances to communicate to the masses, by creating a unified media platform (WSL offers free online streaming of events) to deliver a modern-day vehicle for change. In May 2016, the WSL stated their future intentions by purchasing the Kelly Slater WaveCo which is an artificial wave pool created by eleven-times World Champion, Kelly Slater (Sanders, 2016). In 2018 the California-based wave pool will historically become part of the WSL championship tour, as it becomes the first artificial wave to be surfed at this level and will be powered 100% by renewable energy (Dick-Read, 2017).

2.3 The Surfer as a Consumer

Renowned author and surfer Nick Carroll, speaking on the subject of surf culture in an interview with the ABC, believes that modern surf culture is full of mythologies about itself, one of those myths is that for several years surfers were truly environmentally minded (ABC,

2017). This view is echoed by Jock Serong (2017), editor of Great Ocean Quarterly and contributor at Surfing World and Australian Surf, who suggests that there is a presumption that surfing connects humans with the natural world. Serong believes that coastal development is possibly the biggest visible mark left by surfers and is worth considering – accordingly to the man who runs Surfing Australia, Andrew Stark – that approximately three million people in Australia consider themselves as surfers (Surfing Australia, 2018), so the collective influence of their behaviour is likely to leave its mark on the environment. In an interview with The Guardian in 2017, Serong is quoted as saying “surfers are creatures of convenience, lured by comfort and the prestige of brands into some environmentally dubious choices. Surfers burn vast amounts of petroleum in search of waves; cars, planes and even jet skis criss-crossing the globe in pursuit of an experience which, ironically, requires no propulsive fuel. Surfboards and wetsuits are among the most toxic of sporting goods, made predominantly out of that same petroleum. Surf wax is filthy stuff. A committed surfer might throw out a board, two wetsuits, a kilo of wax and four leashes a year, and their only destination is landfill” (Serong, 2017).

In July 2017 the WSL published an article on its website highlighting the need for surfers to care more about the ocean (WSL, 2017). The article included quotes from professional surfers such as Jordy Smith, Johanne Defay and Matt Wilkinson, all of whom remarked on the current crisis of plastics in oceans and trash washing up on beaches. While the premise of this pro-endorsed initiative raises awareness of the scale of the problem, there is no sign of an action plan to change the behaviour of a surfer or those who contribute to the consumer’s demands. Serong and Carrol’s comments suggest that surfing sees itself as an activity which is environmentally benign, while simultaneously the equipment used is environmentally harmful.

A look at recent survey data regarding climate change and renewables would suggest that Australians (assuming this includes a section of the three million Australian surfers from the Sweeney Report) actually do care about the environment. The Climate Institute’s national survey, *Climate of the Nation*, published in June 2017 and featuring 2,660 respondents from all over Australia, revealed that an overwhelming 96% of respondents said they wanted the primary energy source of Australia to be renewable. 71% agreed climate change was happening, however a less convincing 57% accepted that human activity was the main reason for climate change (The Climate Institute, 2017). These findings loosely point towards

recognition and intent for change in light of environmental concerns, with a caveat that human interference may not necessarily be responsible, thus giving justification to continue existing behaviours that may be harming the planet.

Laderman (2014, p. 134) suggests that surfers often fail to recognise that the petrochemical-derived products they use to engage in outdoor activities contain a “toxic stew of industrial chemicals”. Part of the quantitative study for this research report includes a questionnaire survey that aims to measure whether respondents are aware of the materials, production methods and disposal options of their surf equipment, to compare findings with current industry views.

Cynthia Krueger, surfer and writer for adventure specialists Mpora, suggests that surfers are traditionally attuned to coastal environments, but not necessarily aware of the toxic materials and processes involved in producing their equipment (2014). Krueger claims that surfers are not always aware of a typical surfboard lifecycle, a progression that means it usually ends up in landfill, where it decomposes very slowly and leaves behind a carbon footprint from the presence of petroleum products, packaging and associated transport. Direct risks to the ocean include the escalation of sea levels due to the warming effects of extra CO₂ and higher overall levels of acidity in the ocean (CSIRO, 2015). These consequences are likely to affect wave formation with higher tides and the erosion of coral reefs that typically drives a moving swell into a wave that can be surfed (Krueger, 2014). By highlighting the risks of losing a local surf break, Krueger addresses the problem from a different angle to provide the negative outcomes of human-induced climate change. This approach provides unclear results due to limited research on the response from surfers (2014).

In light of Nat Young’s rebellion against modern society and the resulting rise of individualism emerging in surfing communities in the 1970s (Bomboara, 2009), consumer behaviour may lean towards having freedom of choice, rather than a restricted and monotonous range of products to choose from. Theories of consumer behaviour is discussed in Richard H. Thaler’s book *Nudge*, where the method of *libertarian paternalism* states that people can mutually have the right to choose what they want, within parameters set by choice architects (2008, p. 5). Thaler suggests that political harmony can be achieved by using libertarian paternalism principles to safeguard the environment, and also advocates using this approach for better overall governance of ecological issues on a national scale (2008, p. 14).

Ariel Bogle, associate editor of Mashable, discusses how Australian surfers could choose from a broader range of surfboards, if innovative home-grown entrepreneurs gain momentum with their progressive initiatives. Sydney based start-up Disrupt Surfing is offering custom-made surfboards cut from their own 3D printing machine, which reduces the wastage from mass-produced foam offcuts. Vader Surfboards, also based in Sydney, offer a similar service that cuts custom-made boards from a Computer Numerical Control (CNC) shaping machine. Another example of technology offering surfers customised options is Gold Coast based surfboard manufacturers Boardcave, with their online comparison system that matches surfers with the ideal surfboard for their height, weight, skill-level and fitness (Bogle, 2015). These tech-driven examples are offering modest sustainability gains by cutting out offshore production and its associated carbon footprint from extensive transport and problematic materials. It is assumed that a customised surfboard that has been designed with technological precision will last longer if it matches the customers' requirements and physical features. It is hoped that innovations such as those demonstrated by Disrupt, Boardcave and Vader will act as an impact on the industry to be virtuous with their business values. However, virtue signalling of so-called green credentials could actually benefit the Australian surfing industry if it helps the market for sustainable goods to grow, thus driving prices down and subsequently produce a commercially viable product.

2.4 Market Forces

In a move that demonstrated the seriousness of law-breaking in surfboard manufacturing, Clark Foam was forced to cease operations in 2005 due to problems with meeting environmental regulations (Owers, 2017). This may have inadvertently had a positive impact on the industry, as an event that marked the beginning of an innovative era that explored new construction methods and different materials. New possibilities lay ahead at the interchange of an already well-established industry. By 2010 the combined economic activity generated from the global surf industry totalled more than \$7 billion annually from surfboards, wetsuits, accessories, surf clothing and surfing media producers (Weisberg, 2012). However, just over a decade on from Clark Foam's capitulation, two of the biggest Australian surf brands, Billabong and Quiksilver, began to struggle with financial losses. Johanna Nicholson, of the ABC, reported that Billabong reported annual losses of AU\$300 million in 2012, and then a year later had even bigger losses of \$860 million. Nicholson adds that another surfing

heavyweight, Quiksilver, filed for bankruptcy in 2015 following escalating debts and a series of failed acquisitions. The most high-profile example was Quiksilver's sale of Skis Rossignol for \$50 million in 2008, posting a loss of over half a billion dollars after initially purchasing the company for \$560 million in 2005 (Nicholson, 2017).

In an act of eco-preservation and damage-reversal, Quiksilver and Coca Cola teamed up in 2007 to host the Big Bali Eco Weekend, held in Bali which is well-known for its influx of Australian tourists. The purpose, according to the Quiksilver website, was to "Raise awareness for the cause and celebrate the efforts of those working hard to correct the island's environmental issues." (Quiksilver, 2017). Quiksilver is demonstrating how this annual event, which features initiatives such as safeguarding local seas turtles and a beach clean-up, can work as a positive marketing strategy driven by sustainability values. Conversely, the same Coca Cola that was helping Bali clean up its beaches, was also lobbying against bottle deposit return schemes in NSW (Needham, 2014) as the state government rolled out its *Return and Earn* scheme. Coca Cola's stance mirrors the lobbying seen against similar government recycling schemes in the UK, successfully halted by the plastics industry (Rodionova, 2017). The global production of petroleum derived plastics, many of which form part of a typical collection of surfing equipment, is having a devastating effect on Australian oceans with a third of global marine debris sourced from the beverage industry alone (Greenpeace, 2016).

Amid the ebbs and flows of Quiksilver and Billabong, one major Australian surf brand that appears to have kept its head above water is Rip Curl; founded in 1969 in Torquay, Victoria, and is still owned by the original founders ('Rip Curl', 2017). Paul Richards, general manager of Rip Curl UK, said in an interview in 2007 that they support environmental integration into their whole company (Dick-Read, 2007). Richards adds that Rip Curl donate to charities such as Surfers Against Sewage (marine conservation charity working with communities to protect oceans, waves, beaches and marine life) and to Patagonia's *One Percent for the Planet* scheme, and in 2007 they boasted that 12 percent of Rip Curl's total range was made from organic or recycled materials. Fast forward ten years and Rip Curl is in decent fiscal health, remaining as a privately-owned entity with annual profits in 2016 of AU\$18.4 million (Smith, 2017), and still offering modest environmental initiatives such as recycling programs and solvent-free wetsuits (Burton, 2017).

Patagonia, outdoor specialists and leading advocates for sustainability, claim to produce clothing that lasts decades, even generations. Leading the tide of change for corporate social

responsibility and environmental conservation, Patagonia has a number of progressive initiatives. For example, 1% of their annual profits are donated to environmental and grassroots charities, and also their Common Threads Partnership pledges to repair clothing and even buy back customer's pre-used garments. Unusable clothing is recycled to make new fabric, with drop-off stations available at every store (D'Souza, 2014). Further details of Patagonia's initiatives are discussed later in this chapter.

Smaller surfboard manufacturers such as Treehouse (based in Bulli, NSW), design and shape custom made surfboards using progressive, sustainable and durable materials (Owers, 2017). Treehouse uses materials such as; Entropy bio-resin, flax fibre cloth (textile derived from flax seed plants), and hoop pine timber (native to northern NSW and QLD). Treehouse also uses EPS foam as the core of their surfboards, made locally in Sydney, is free of toxic isocyanates, and their off-cuts (i.e. wastage/excess) are returned to the manufacturer and is fully recyclable. One of their surfboards is shown in Figure 2 (found in Treehouse, n.d.).



Figure 2. Treehouse surfboards, a small brand that produces surfboards locally in Bulli NSW, have been *Eco Board* sanctioned (Treehouse, n.d.).

Firewire is one of the world's largest producers of surfboards, and since 2014 have been the only global surfboard manufacturers to have all of their products satisfy the Eco Board certification (Firewire, 2018). The Eco Board project is an environmental standard created by the non-profit organisation Sustainable Surf and is also discussed later in this chapter. This appears to be the first time that a surfboard manufacturer, the size and stature of Firewire, that has committed to producing every one of their surfboards with environmentally friendly materials. A typical Firewire surfboard has a foam blank made with either recycled or bio-based (plant) content and is coated with a bio-based resin (Housman, 2014). While Firewire's surfboard components still contain elements of petroleum-derived materials, it is a big improvement on traditional surfboards made exclusively from polyurethane foam and polyester resins. "The surfboard industry is a long way from sustainable manufacturing," announced Firewire CEO Mark Price, "but we still have a moral, ethical, and, hopefully, a soon-to-be commercial obligation to make our products as eco-friendly as possible, without sacrificing performance" (Firewire, 2017).

The rise of socially and environmentally aware brands is growing, during a dominant era of traditional bigger brands whom many are yet to flex their eco-credentials. The past decade has shown signs of disruption in the market, with a wave of future-thinking brands, products and initiatives that are willing to charter new territory. The closure of Clark Foam and the subsequent change in foam and resin composition, along with the modest yet consistent growth of progressive brands, such as Patagonia, Firewire and more recently Outerknown, gives evidence of a resurgent market built on surfers who care about the environmental and ethical purpose of a brand. The landscape of Australian surf brands may experience a shake-up in 2018, with the most recent example being the purchase of struggling Billabong by Boardriders, who already own Quiksilver and other smaller brands such as Roxy, Element, DC Shoes and Von Zipper (Nettle, 2018). The amalgamation of Quiksilver and Billabong could damage small-to-medium sized surf brands if this strengthens Boardrider's market dominance. Equally, this could be a fresh opportunity for disgruntled surfers, dissatisfied with a diminishing focus on grassroots and localised values, to join a renewed drive away from capitalist-leaning habits.

2.5 Environmental Initiatives

Technology and development has played a large part in modern advancements of foam, fibreglass and resin. Surfboards have transformed from the original wooden slabs seen in Hawaii hundreds of years ago, to a high-performance product that can be easily custom-made for surfers to suit their size, weight, skill level and choice of materials. In a shift that almost goes full-circle, surfboards are now being made from bamboo, hemp and balsa, and finished in stronger (some plant-based) less toxic alternatives (Owers, 2017).

An example of progressive surfboard design is demonstrated with Firewire's range of Timbertek surfboards, illustrated in Figure 3 (found in Firewire, n.d.), establishing a simple yet innovative use of materials that would serve as a major improvement from an ecological perspective. Grant Newby, timber craftsman and Gold Coast based surfboard shaper, founded the original concept that was later sold to Nev Hyman's Firewire brand (Roennfeldt, 2013). Newby's design comprised a lightweight EPS foam core, with sustainably-sourced Paulownia timber that is vacuum-bagged over the EPS blank. Newby's original concept used pure lanolin oil that was applied directly to the timber, acting as a protective sealant and, inadvertently, would become sticky upon contact with salt water, deeming surf wax unnecessary. In an interview with Surf Careers, Newby later revealed the reason why lanolin was omitted. "They [Firewire] couldn't get their head around the lanolin on the outside. Someone in their American office thought that, if somebody's paddling around on this thing that smells like a sheep maybe they'll get eaten by a shark, so they use entropy epoxy resin on the outside" (2013). Paulownia wood, as used in Firewire's Timbertek range, can grow up to 20 feet in one year. Once the trees are harvested, they can regenerate from their existing roots (Firewire, n.d.), indicating that there is every possibility that all high-performance surfboards could be built from sustainably sourced materials.



Figure 3. Diagram of Timbertek components (Firewire, n.d.).

Sustainable Surf, a not-for-profit organisation based in California, boasts an eco-labelling system to grade surfboards on their materials and production methods. In an interview with *The Surfers Journal*, co-founder of Sustainable Surf, Michael Stewart, stated his ideal intentions that suggest going full-circle: “What I would like to see actually happen is something close to the ethos of the original surfboard that was a wood plank, and if you lost that board it would wash up and someone else would find it and be stoked and go surf it. At the very least they biodegrade” (2013). Sustainable Surf’s Eco Board standard is based on delivering key principles; a measurable low carbon footprint, the use of renewable and/or upcycled materials, and production processes that minimise toxicity during manufacturing. Essentially a surfboard with the Eco Board label, as shown in Figure 4 (found in Sustainable Surf, 2017) verifies that it has a foam blank made with (at least) recycled or bio-based content and is finished/glassed with a resin that is (at least) partially bio-based (Housman, 2014).



Figure 4. Eco Board classifications (Level One and Gold Level) by Sustainable Surf, 2017.

A collaboration between UK-based organisations Homeblown, Eden and Sustainable Composites, unveiled a surfboard as reported by the BBC in 2006, which consists of a core blank made from 40 per cent vegetable foam, is sheathed in hemp-cloth rather than fibreglass, and is glassed in a revolutionary 96% vegetable-based resin (Alexander, 2006). In a bid to reduce the amount of foam sent to landfill, Waste to Waves is a consumer-driven initiative devised by surfing brand Reef in collaboration with Sustainable Surf, which encourages people to drop off any unused pieces of foam to be recycled into new foam (Reef, 2013). 100% biodegradable surfboard blanks have been developed by manufacturers BIÓM, with their BioFoam blanks made of non-GMO sugarcane which goes through a process of polymerization and is expanded into an organic form of foam (BIÓM, 2018). Another example of innovative biodegradable foam is from New York-based packaging company, Evocative, who produce a unique type of foam derived from mushrooms. Justin Housman of Surfer Magazine, on sampling Evocative's product, reported that agricultural waste is mixed with a vegetative form of mushrooms called mycelium, which is pressed into moulds and then left for a few days to harden. Finally, the organic foam is heat-treated to stop any further mycelium growth, after which the material is ready to be used (Housman, 2014).

The surf industry has seen improvements in the material used for finishing and glassing surfboards, with alternatives for resin that have stronger properties and is less toxic, such as California-based Entropy resins. A pine-oil based epoxy resin was formulated by Entropy in 2006, combined with carbon nanotubes (carbon rods 1/50,000 the width of human hair) to create a new material that could resist cracking, relative to other bio-resins whose content would compromise on strength (Forbes, 2008). Stu Nettle, surf writer at Swellnet, presented readers with an Australian developed bio-resin called Eco-X by Kinetix, with at least 20% of

the product sourced from renewable plant, animal, marine or forestry stock (Nettle, 2017). Since first publishing the article in September 2017, Stu Nettle provided an update stating that the bio-based content of Eco-X has since increased to 26%.

Patagonia has shaken up the wetsuit market with their Yulex range, which offers a different approach to the traditional neoprene dominance. Yulex is made from natural rubber derived from Hevea trees which are certified by the Forest Stewardship Council (FSC), although only 0.5% of the world's natural rubber is sourced from FSC certified sources (Patagonia, 2018). The Yulex range of wetsuits contains 85% natural rubber, with 15% synthetic rubber polymer. In a bid to improve its future sustainability credentials, Patagonia is targeting wetsuits made from 100% plant-based materials and is pursuing the goal of using their own independent energy source for its current and future manufacturing facilities, by using biomass for power and base themselves from off-grid manufacturing sites (Maharjan, 2014).

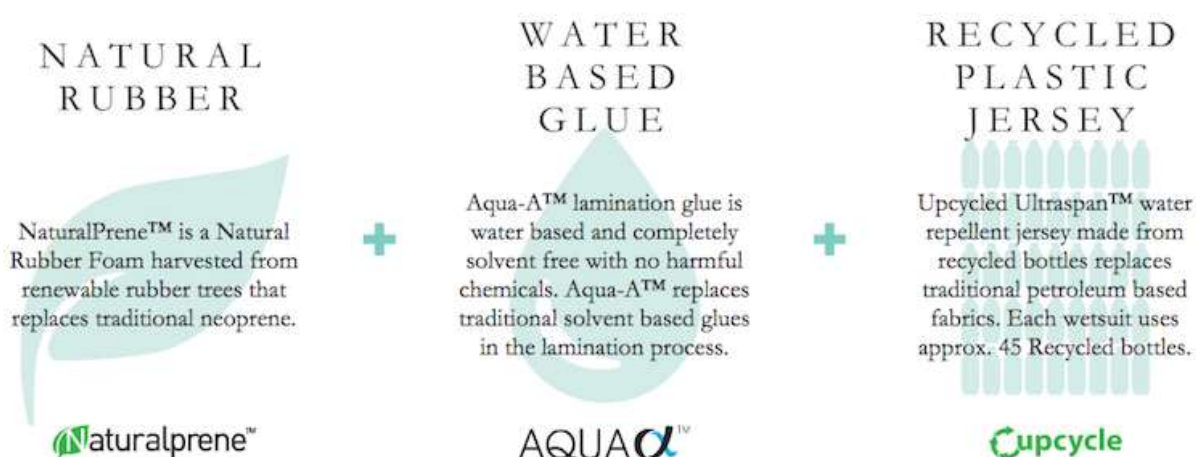


Figure 5. Properties of the Eco-Seas wetsuit, collaboration between Sheico of Taiwan, and Queensland-based surf brand Vissla by Herbranson, 2016.

Taiwan-based wetsuit manufacturer Sheico, also uses natural rubber from the Hevea tree, see Figure 5 (found in Herbranson, 2014), but can also boast extra credentials such as the use of water-based adhesives, recycled plastic for the inner fabric, and embossed branding rather than solvent-based printing (Herbranson, 2014). French brand Picture Organic have developed a wetsuit that consists of 85% Hevea tree rubber and 15% synthetic chlorine-free rubber partly sourced from plants (Carve, 2017). Japanese manufacturer, Yamamoto,

produces a limestone-based alternative called Geoprene, with brand representatives stating that current limestone supplies far outstretch the oil-based resources required for making neoprene (Balch, 2017). As an alternative to oil, limestone is nevertheless still mined using high energy-demanding extraction methods. The limestone is furthermore processed by crushing, heating and adding chemicals to produce acetylene, which is necessary for creating a limestone-based substitute for neoprene (Dodds, 2016).

A key part of a surfer's equipment is surf wax, historically produced using petroleum-derived paraffin, as detailed by Chase Scheinbaum (2016) of surf media outlet The Inertia, however there are now substitutes for paraffin such as coconut oil, soybean oil, beeswax and tree resin. Sticky Bumps surf wax contains decomposed seashells and biodegrades in a process where bacteria and fungi emulsify it back into the ocean, as illustrated in Figure 6 (Sticky Bumps, 2018). Scheinbaum suggests that American brand Matunas has created a surf wax which is a rare petroleum-free wax, made using only ingredients from a family farm including jasmine root, clay and apricot tree sap. Even the packaging is made from recycled paper and is printed with soy-based inks.



Figure 6. Sticky Bumps surf wax properties by Sticky Bumps, 2018.

Billabong was one of the first major surf brands to introduce a range of boardshorts in 2008 made from recycled plastic bottles. The process involves breaking down used plastic bottles into flakes and pellets, which is then converted into a stretch fabric and finally a thin yarn that's used to produce the final product. Billabong claim to have on average 25 bottles per pair of boardshorts, with over 60 million plastic bottles collected and used as of 2014 (Sanasie and D'Arcy, 2014). However, a paper published in 2011 in Environmental Science and Technology stated that each time a clothing garment goes through a wash and spin cycle, a large number of plastic fibres is shed into the discharging water. Findings from the study revealed that water samples collected from various sites around the world contained microfibers that made up 85% of the human-generated materials in each sample (Browne et al, 2011). Most modern washing machines have no filter capable of trapping the microfibers (measuring less than 1mm in size) and neither do the treatment sewerage plants that remove impurities before discharging into oceans (Alberts, 2014).

Swedish retailers H&M is encouraging consumers to return their clothing items as part of the H&M Garment Collecting Initiative (H&M Group, 2013). Any type of clothing is accepted (even non-H&M items) which is then transported to a processing plant to be graded and hand-sorted. In Australia, H&M have incentivised this scheme by offering a 15% discount voucher for each 1kg bag of clothing received (Campbell, 2017). While H&M could also point to other positive outcomes from this initiative such as the creation of more jobs in transporting, grading, sorting and processing of donations, their actions have been labelled as greenwashing, masking the fundamental environmental damage caused by the mass production of clothing (Bain, 2016).

2.6 Future Thinking

Surfers now have a choice to seek out environmentally friendly products for most of their equipment needs, albeit sometimes looking beyond traditional outlets. Krueger explains that once consumers have bought an Eco-surfboard, they can also own a full collection of accessories if they know where to look. Krueger suggests buying a deck-pad made of cork (Eco Cork Tail Pad) sourced from the bark of living cork oak trees; use an organic eco-wax made with farm-grown ingredients made by Matunas; attach a recycled leash by Wave Tribe; transport your board in a bag made of hemp (Wave Tribe) or upcycled billboards (Rareform);

and complete your collection with a limestone or natural rubber wetsuit made by Matuse or Patagonia (Krueger, 2014).

Perhaps the most sustainable material currently used in surfboard production is balsa wood, with shapers such as Riley Surfboards (based in Miranda, NSW) and Sunova Surfboards (Mandurah, Western Australia) producing boards containing sustainably grown balsa wood. The Wood Database (2016) lists balsa as one of the fastest growing species of timber, reaching up to 10 metres tall with diameters of 20-25cm within just 3-4 years, and is not listed as a threatened species. Surfboards covered in natural cork, as created by French start-up Notox, not only replaces the need for resin but also eliminates the need for wax, as shown in Figure 7 (found in Notox, 2010). A similar approach to Notox's cork finish has been demonstrated by Grant Newby, mentioned earlier in this chapter, who uses natural lanolin to replace wax. Both cork and lanolin may seem unconventional in an industry dominated by chemical products, but these are just two examples of natural materials that can reduce the environmental impact of a surfboard.



Figure 7. KORKO range of surfboards by Notox, finished with natural cork (Notox, 2010).

In an interview with the Gold Coast Bulletin, Newby revealed that there are currently surfboards being made out of mushrooms, cork, sugar cane and even sea sponges (McElroy, 2017). Also, from the Gold Coast, farmer Meg McDougall has invented a bio-foam made from growing lemongrass that, once processed and waterproofed, produces a lightweight floaty structure due to the vascular system of the lemongrass plant (McCarthy, 2017). Organic foam, as a replacement for expanded polystyrene foam and polyurethane (PU)

blanks, is not a recent phenomenon, as reported in *The Guardian* in 2005 when UK-based Sustainable Composites claimed they were developing a new type of bio-foam made from processed potato peelings, which matched the lightweight properties of PU foam (Morris, 2005).

The same mycelium advances produced by Evocative, mentioned earlier in this chapter with their mycelium foam blanks, has been developed further by Han Wösten, a professor of microbiology from Utrecht University in the Netherlands. Wösten and his team have grown fungi as a sustainable substitute to plastic and rubber, both being materials that are commonly used in surfboards and wetsuits. The process involves taking fungus and allowing it to degrade with agrarian waste, which produces a mycelium that matches the strength properties of PVC and polyethylene (Nalewicki, 2017). Developments in this area have even led to strong, waterproof, mould and fire-resistant mycelium products being used in construction, as mycelium bricks have been successfully tested in outdoor locations (Bonnefin, 2017). Further testing would be required if mycelium was to be used in direct contact with saltwater, because its existing uses (with regards to surfing equipment) is currently restricted to bio-foam blanks that would be protected by a water resistant outer layer.

Materials of the future could include the use of bioplastics, which according to Professor Peter Halley (2018) at the University of Queensland, have the potential for replacing 90% of all plastics presently used. Professor Halley adds that there is a wide range of industries already using bioplastics that are totally biodegradable, such as medical, automotive and household applications. A team of scientists at Harvard University in the US have developed a bio-glue inspired by slugs, that could potentially be used in conjunction with bio-plastics and bio-foams, for example as an adhesive in wetsuit seams or surfboard construction/repairs (Gallagher, 2017). The revolutionary bio-glue was discovered as Harvard scientists studied the process where a slug secretes defensive mucus which is three times stronger than any other medical adhesive. It follows movements of the body and most importantly, sticks onto wet surfaces. Inspiration from nature doesn't stop at slugs, as scientists at the University of California have researched and tested the rock-hard shell of sea snails (also known as abalones) for uses that include the potential for developing military body armour. As documented in *The Fundamentals of Nanotechnology*, Hornyak et al (2009) reveal that the abalone shell consists of layers of interlocking calcium carbonate 'tiles' maintained by shock-absorbing protein adhesives, that allow forceful impact without breaking. This impervious

high-strength product of nature could be replicated on a synthetic level using bio-based materials as a replacement for petroleum-derived resins currently used in surfboard manufacturing. Furthermore, scientists have discovered self-healing plastics and White et al (2014) have created a material that can self-heal areas of up to 3cm in diameter. With these discoveries in mind, the future could possibly deliver self-repairing bio-resins (with abalone-like strength) to replace epoxy and change the face of surfboard design forever.

If surfboard materials of the future are to be waterproof and biodegradable, then the discovery of a new plant-based coating (earmarked to be used as a waterproof shield on boxes that transport fruit) could provide a sustainable answer. Albert Tietz and Les Edye, scientists at the Queensland University of Technology, have developed a substance that is derived from growing lignin. As reported in the Australian academy of Technological sciences and engineering (ATSE), lignin is extracted from a type of grass that has the correct type of vascular composition to repel water, remain rigid and is 100% biodegradable (ATSE, 2014). Borrowing pre-existing features of nature could even provide a solution to the issue of compromised strength, where plant-based alternatives are used. Mark Kelly, CEO and founder of Global Surf Industries (Australia's biggest distributors of surfboards) revealed in an interview with Swellnet, that one of their surfboards contains coconut husk as a strengthening cloth that sits between layers of fibreglass (2011). Kelly adds that their coconut husk system has one of the highest break ratios (the maximum stress that a material can withstand before it breaks) ever seen in surfboard production.

Wetsuit technology, as discussed earlier in this chapter, is utilising materials such as natural rubber, limestone and recycled plastic in the passage to minimise its environmental impact. Rubber is now being extracted from Russian dandelions grown in Kazakhstan (Gould, 2015) in an attempt to lighten the demand from Asian rubber trees. It appears that wetsuits of the future could feasibly rely on plant-based materials, with evidence of a decline in petroleum-derived resources demonstrated by key advocates for sustainability in the industry. In 2015, Patagonia's range of Yulex wetsuits contained a ratio of 60% natural rubber and 40% polychloroprene (petroleum-derived neoprene) (Solspot, 2015). However, there has been a big improvement over a two-year period, because as of 2017 the ratio is now at 85/15% in favour of plant-based content (Patagonia, 2017). Researchers at the Massachusetts Institute of Technology have even looked into reducing the amount of material needed in the production of wetsuits, as shown in Figure 8 (found in Chu, 2016). Rubber strands that mimic the

function of a beaver's fur provides a mechanism to trap air between the individual strands once the material is plunged into water. MIT's rubber material is feasibly not environmentally friendly due to its synthetic rubber composition; however, the reduction in material bodes well for the future and could be implemented in a system that includes plant-derived rubber or bioplastics.

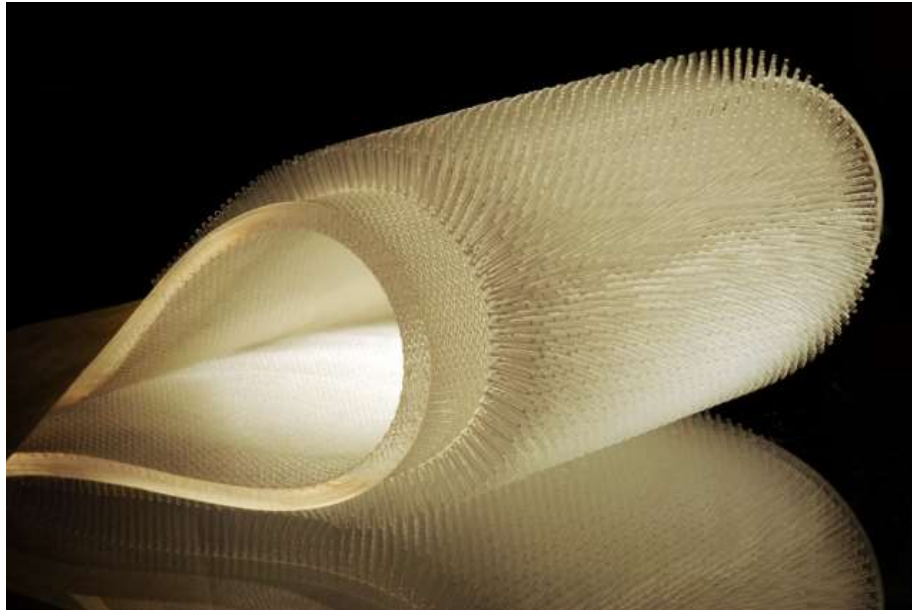


Figure 8. MIT's solution for reducing material quantity. (MIT News, 2016).

If Australia is serious about the regulation of toxic materials present in its surfing products, they could look to California and the Netherlands for positive examples of how governments can take critical action in the fight against environmental reparation. The Californian state government introduced regulations that took effect in 2014 to phase out chemicals used in manufacturing products, replacing them with safer substitutes or eliminating their need in the first place (Rossi, 2014). The Dutch government has taken a similar stance with regards to energy and transportation, with pledges in place to phase out coal-fired power plants and ban gas and diesel cars by 2030 and make all of Amsterdam's buses electric by 2025 (Grover, 2017). If the future of Australian surfing equipment was to be based on plant-based materials that require a new dawn of agriculture, then lessons could be learned from farming initiatives such as those in the Netherlands. The National Geographic reported that Dutch farmers are growing twice the number of crops using half the size of land in unprecedented methods of

sustainable farming (Viviano, 2017), demonstrating the reality of mainstream crop growth that is required for growing plant-based materials and even bio-mass for generating energy. A familiar substance known to surfers could even hold the key to replacing fossil fuels, as seaweed is now being cultivated as a source of biofuel due to its natural ability to absorb carbon dioxide, phosphorus and nitrogen (Fehrenbacher, 2017).

2.7 Conclusion of Literature Review

This review has explained how equipment used by Australian surfers has evolved over time in terms of the design and materials used. The review has also looked at areas of potential harm that the aforementioned equipment can have on the environment – existing and impending, how a host of brands and competitors world-wide have experimented with alternative materials and production methods, and the issues they have faced in shaping the future of the surfing industry.

Firewire's Mark Price stated that "At some point in the future, sustainability will become one of the driving product attributes needed to succeed in the market" (Firewire, 2017). Time will tell as to whether Price's statement becomes reality, although brands such as Patagonia, Vissla and Outerknown have already chartered new ground with their environmentally-minded products and initiatives, driving an impetus that can apply pressure on others to join the sustainability movement. Confidence can be taken from progressive examples of wetsuits (Patagonia's Yulex range) and surfwax (Matunas farm-grown wax) that appear to have taken strides to ensure their materials and ingredients are approaching almost entirely plant-based or non-petroleum content. However, it appears surfboard developments have made strides with individual elements such as simply the foam or the resin, rather than offering a complete surfboard with all parts made of non-toxic materials. While the development of environmentally-friendly individual components should still be seen as progress, it remains to be seen whether collaborations can be forged to allow a complete bio-surfboard. For example; a bio-foam blank grown by Evocative's mycelium lab, wrapped with a layer of GSI's coconut husk, encased in Firewire's paulownia timber or natural cork by NOTOX, and sealed with QUT's lignin discovery or Harvard's bio-glue.

Mark Price advises that if manufacturers do the right thing and put it out there [with regards to sustainable initiatives] then people *will* support it (2017). Producers of surfing equipment,

Price adds, should be thinking long-term with regards to absorbing costs of newer sustainable materials, and he warns that everyone in general needs to start having a much longer-term view of the world. Price may need to stick to his word, considering that Firewire aim to produce zero waste by 2020.

On reflection of the sub-chapters in this literature review, while there appears to be some innovative developments in the surfing industry, the large surfing brands of Australia seem to be slow on adopting new technologies and materials. The Quiksilver and Billabong merger (as of January 2018) means it may be a while before surfing brands driven by sustainable or ethical values can claim market dominance. The relevance of this literature review is emphasised by the under-developed themes that influence Australian surfing (culture, consumers, and economics) to the extent of which their interconnections is also underestimated. The main research study, of which the findings are presented and discussed in a later chapter, aims to provide information and analysis that will help fill some of the knowledge gaps in surfing and sustainability.

3. Research Methodology

The recreation of surfing confronts a significant problem. Much of the equipment contradicts surfing's image of being environmentally aware. There are key questions such as how much surfers and equipment suppliers (a) know about these environmental concerns and (b) consider options for improving the situation. This chapter aims to gather the necessary information to answer these kinds of questions and is broken down into sections categorised into; ethics, research objectives, population sample, data collection methods and reporting plan, as diagrammatically illustrated in Figure 9 (produced by author, 2018). The research gathering process involved questions applied in two ways: (i) a questionnaire survey provided in a traditional distribution process and (ii) an interview survey involving additional questions not in the base questionnaire. Finally, the author is self-critical about how well these processes were conducted and what might have been done alternatively to improve things.

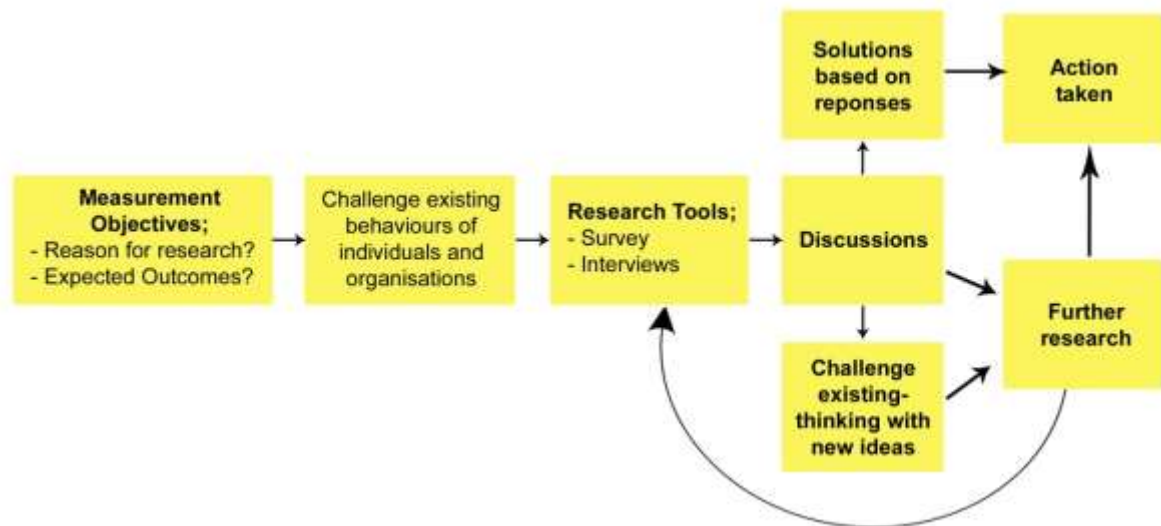


Figure 9. Research Objectives Diagram. (Produced by author, 2018).

3.1 Ethics

All interviewees received an information sheet, as shown in Appendix 2, prior to the interview taking place; this outlined the aims of the research, notes regarding confidentiality and any possible risks, confirmation that participation is voluntary and that respondents should be over 18 years old, details of the interview itself, details of the storage and disposal of all gathered information (in UNE’s centrally managed cloud storage facility), contact details of researchers, contact details from the Human Research Ethics Committee (HREC), and the official approval number from HREC. Interviewees were briefed with an introductory script, as shown in Appendix 3, which explains why the interview is being conducted and what it entails. Participant’s consent is granted by asking a number of questions to comply with the HREC requirements.

Survey participants were asked to read the information sheet which preceded the actual survey, which follows the same process for the interviewees as mentioned above. Implied consent for survey participants is clearly specified at the start of the survey, with a note stating that their consent is given upon starting the survey.

All interviewees and survey participants could view confirmation within the information sheet, affirming the approval of this research project to go ahead by the Human Research Ethics Committee of the University of New England (Approval No. HE17-193, valid to 23/08/2018).

3.2 Research Objectives

Questionnaire Survey

The expected outcome from the design and distribution of a questionnaire survey (shown in full at Appendix 1) is to produce information that is representative of members of the Australian surfing public, set within the target group detailed later in section 3.3 (Target Population). The questionnaire aimed to reveal a range of behavioural responses, personal opinions and ranking of issues to be compared and analysed to gain a better understanding of current concerns. It also challenged respondents to think about a selection of variables (such as the range of products available, materials used to produce them, and the cost of a product to the consumer) and whether they would change existing habits or behaviours given different hypothetical scenarios. Part of the questionnaire survey looks at what other (non-surfing) sustainability-related habits respondents take part in, so that data can be compared to see if those who are environmentally-aligned outside of surfing, are actually transferring those same values when choosing surfing equipment. Outcomes were intended to assess whether responses varied systematically according to such elements as respondents' ages. Such analysis might identify further issues/concerns that could be the focus of further research.

Interview Survey

Interview surveys with key industry players, identified in section 3.3 (Target Population), form the second part of the research, to either support and/or challenge any past, current and future initiatives in the Australian surfing industry. The interviews also discuss opinions on, and connections between, equipment supplied and their production processes, consumer preferences, market demand and consumer behaviours, all in a sustainability context.

Both of the author's research tools (questionnaire survey and interview survey) were designed so that future research could replicate this study in identical, similar or different conditions. Further information could be gathered on the basis of this type of questionnaire survey, with different variables and scenarios used, and similar interview surveys with other key industry players or with a different angle of questioning (such as a greater focus on economics in a sustainability context).

3.3 Target Population

Questionnaire Survey

Survey recipients were required to meet all of the following three pre-requisites to proceed:

- a) Have surfed, or is a non-surfer working in the surfing industry
- b) 18 years of age and over
- c) Resident, or previous resident, of Australia (i.e. to exclude tourists).

Those who surf and/or work in the surfing industry were targeted in order to reflect current behaviours and attitudes from a personal engagement perspective, so that data can be analysed to reflect a diverse section of the surf culture in Australia. Recipients have to be 18 years or over as the study aims to reflect the adult surfing population in Australia, and finally participants require being (or have previously been) a resident of Australia in order to present data that is relevant and current to the Australian surfing industry. The questionnaire strategy is illustrated in diagrammatic form in Figure 10 (produced by author, 2018).

The questionnaire survey population was determined by collecting an extensive list of Australian surfing organisations; clubs, manufacturers and distributors of surfing equipment, surf retail outlets, surfboard shapers, surf media and publishing outlets, surf schools and surf forecasting services. Acquaintances and colleagues who either surf or work in surfing were also approached due to the ease of local survey distribution, however the author took into consideration that this may not be representative of the wider surfing community and they may respond with friendship bias, or conversely, they may be extra careful in their responses to be especially helpful to someone in their local community. Survey participants were selected from all States in Australia where there are surfing beaches and/or surfing-related

businesses/organisations. Approximately 300 people were contacted with an invitation to complete the questionnaire survey (contact made mainly by email, also in-person distribution and some phone calls to explain/support initial email contact), with an assumption that this number could rise if organisations share the survey with their colleagues or friends who match the pre-requisite criteria. The questionnaire recruitment email is shown at Appendix 5. Collection of the population sample was obtained by online research, recommendations, and personal connections. The number of proposed survey recipients (300) was calculated based on the number of relevant organisations that were looked up and deemed to be suitable for contacting. There was also a small number (approx. 20) of ‘cold calling’ introductions (i.e. no prior interaction with those people, thus deeming the distribution of a survey as spontaneous) that were approached on the Northern Beaches in Sydney to members of the surfing public. It was assumed that all survey recipients would reply honestly to satisfy the pre-requisites (Australian resident, over 18 years old and either surf or work in surfing); to be honest and thorough with their responses, and that they represent a diverse selection of demographics. These assumptions are based on the trust and goodwill of the respondents who received the questionnaire survey and cannot fully represent honest and accurate data due to the unpredictable nature of human responses.

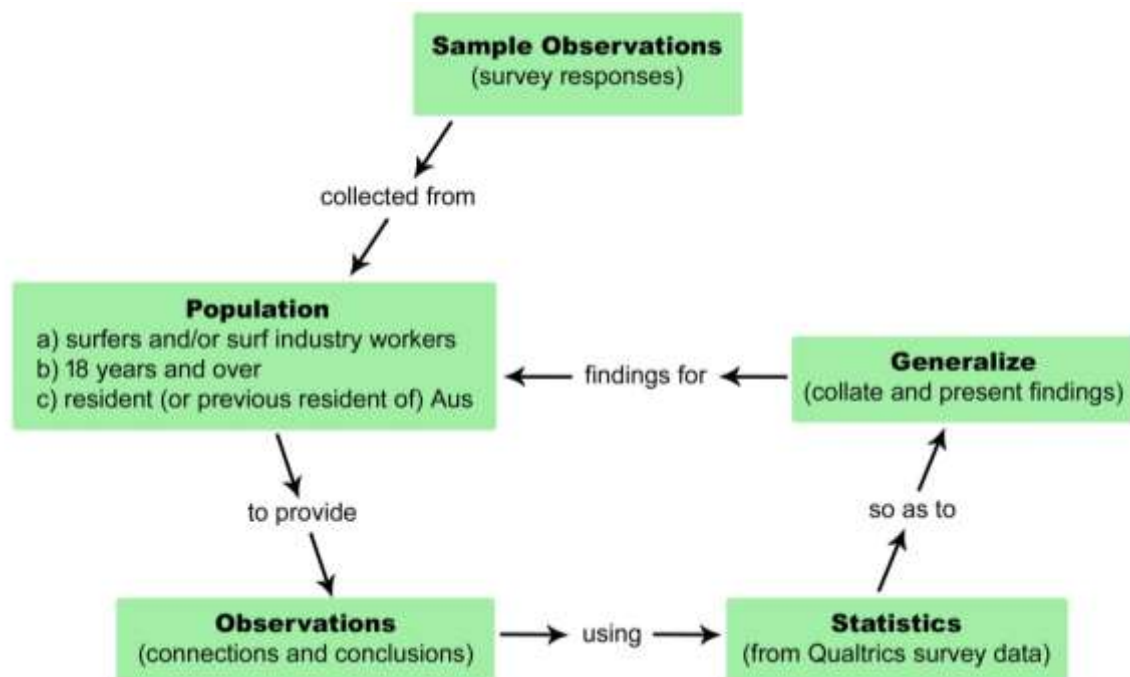


Figure 10. Questionnaire Strategy Diagram (Produced by author, 2018).

Interview Survey

Suitable and willingly interested and available interviewees were contacted due to their association with surfing and experience in industry methods and associated consumer behaviours. One of the key aims of the interview process was to reveal a possible trend of like-minded thinking, or conversely tell a story of conflicting views that might be stalling progressive leaps in the industry.

Interviewees were selected from participants working in three key dimensions of the surfing industry:

- 1) Manufacturers, distributors and top-level management;
- 2) Authors and academics whose writings cover the surfing industry; and
- 3) Surfboard shapers (independent and mainstream) and industry innovators.

Potential bias and assumptions could be made if the interviewees are perceived as being preferential candidates, based on the fact they have been personally chosen by the author. The people chosen for interview were approached personally by the author and were deemed as reputable people and organisations, as they perform a perceived major role in producing and selling surfing equipment, or industry commentators and respectable shapers.

Dane O'Shannasy (CEO of Patagonia Australia and NZ) and Mark Kelly (CEO and founder of Global Surf Industries) were identified as key people from a distribution and management perspective. Patagonia is a leading advocate of sustainability, so it was assumed their values and actions would align with the subject of this research. Global Surf Industries is Australia's leading producers and distributors of surfboards, so it was logical to speak with Mark to hear his views on the current state of the industry, and what could be done to address environmental solutions from the perspective of a large-scale manufacturing process.

The interview candidates shown below are authors and academics whose writings and research have involved various aspects of surfing:

- Dr Sam Wills: research associate in economics at University of Sydney
- Dr Andrew Warren: lecturer at Wollongong University and surfing/geography author
- Dr Scott Laderman: professor at Minnesota University (USA) and author.

The following interview candidates are surfboard shapers (a mix of independent and mainstream) and innovators in the field of materials and technology:

- Grant Newby: surfboard shaper and creator of 'TimberTEK' technology
- Tom Wegener: award winning surfboard shaper, movie maker, academic
- Dave Porter: surfboard shaper and workshop facilitator at Treehouse Surfboards
- Louise Dever: investor and distributor at Eco Surf Supplies
- Nev Hyman: surfboard designer, entrepreneur and innovator.

3.4 Data Collection Methods

Quantitative: Questionnaire Survey

Participants were presented with a questionnaire survey comprising 35 questions (see Appendix 1). The Qualtrics software platform, used for creating the questionnaire and analysing the results, reported that 145 surveys were started, and of those there was 116 fully completed, equating to an 80% completion rate. The survey aim was to provide responses that are directly linked to research objectives; to present findings on the current state of affairs in the Australian surfing industry, specifically consumer behaviours and attitudes in a sustainability context. The questionnaire contains a combination of descriptive, relational and causal questions in order to:

- Measure current behaviours and attitudes towards surfing and sustainability (descriptive);
- Explore the relationship, if any, between the answers about such behaviours and attitudes (relational); and
- Investigate the effect of one issue or topic on another (causal).

All of the survey questions are confirmatory (close-ended) with the purpose of providing clear results for statistical analysis and comparisons. The questionnaire was created using Qualtrics software and presented in a self-made website hosted by the website building platform, Weebly, as shown in Figure 11 (Produced by author, 2018).

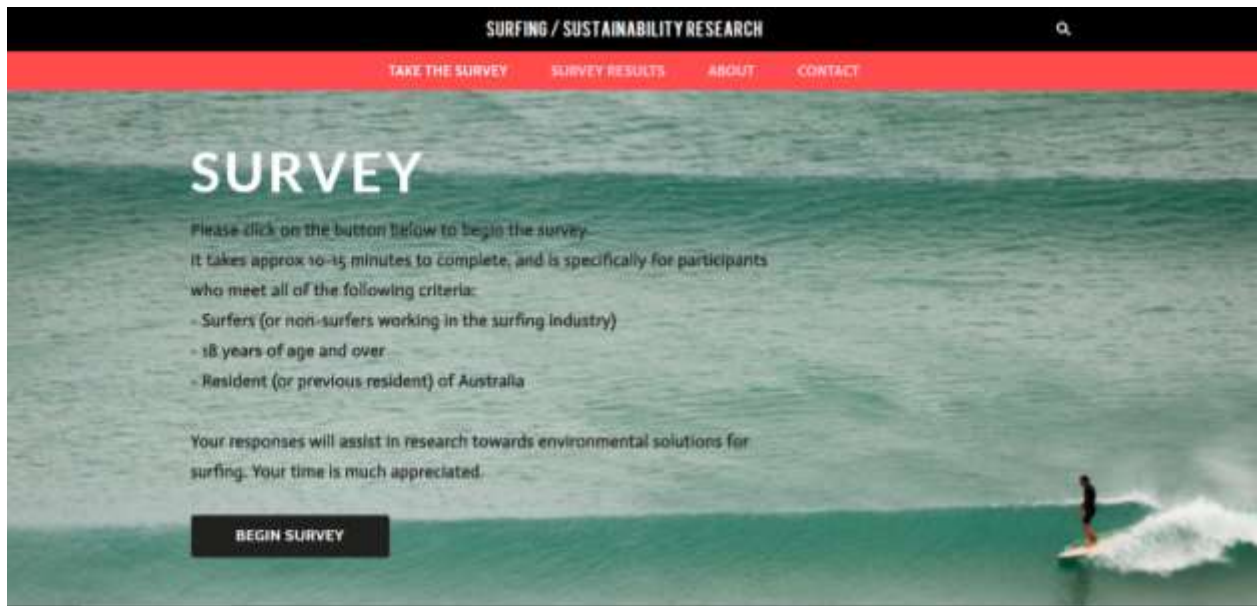


Figure 11. Screenshot of the questionnaire survey homepage created in Weebly (Produced by author, 2018). Website can be accessed at: <https://surfingsurvey.weebly.com/>

The decision was made to post the survey results online via the same Weebly webpage, to retain the respondents' anonymity. A web link to the results was added at the end of the survey on the final page. Respondents were advised that the questionnaire would take 10 to 15 minutes to complete, based on timed testing and factoring in a few delayed responses. The active online survey was accessible for three full calendar months in September, October and November 2017. Final survey data will be stored on the Cloud UNE online data storage facility.

Printed business cards were produced and distributed personally to surfers and surf industry workers, ensuring that potential recipients were approached during daylight hours in a polite and non-intrusive manner, equipped with UNE student ID and a mobile phone. Emails were sent to relevant surfing organisations with a polite introduction, attachment of ethics approval, and a link to the survey website.

Use of a printed survey form was initially considered, but this method was deemed unnecessary given the widespread availability of internet access in Australia. Favourable consideration was given to the speed and ease of employing the Qualtrics online platform, rather than manually printing, distributing and then inputting data from physical surveys.

Survey questions were structured around the following six themes:

1. Determining whether respondents work in the surf industry or not;
2. Eliciting opinions on proposed environmental solutions;
3. Establishing consumer preferences when choosing surf products;
4. Evaluating awareness of the environmental impact of surfing products;
5. Exploring attitudes and behaviours on environmental topics, especially in an Australian context; and
6. Establishing the demographics of survey respondents

Qualitative: Interview Surveys

The one-on-one interview questions are exploratory (open-ended) and were planned and conducted to support or challenge any data from the questionnaire survey, and also offer insight on any past, present or future thoughts from the interviewees' particular area of expertise. Ten interviews took place from an initial twelve targets, with the two extra candidates failing to materialise due to their observed lack of interest and limited availability. See Appendix 6 for the list of interview questions used for this part of the research. The decision was taken to ask different questions for the interview surveys as the answers would be lengthier and with personal/qualitative responses, as opposed to the questionnaire survey which provided quantitative data for analysis. Interviews were conducted by means of telephone (six interviews) or by email (three interviews), with the exception of one instance where the interview was face to face. The interviews that were emailed provided the least amount of information and it felt like these were the least authentic of interchanges. The telephone interviews provided longer dialogues that would often branch out into more interesting topics that were not originally planned for discussion. The only face to face interview that took place was the most successful in terms of the quality of content, and a genuine feeling of the interviewee projecting honest ideas and anecdotes. In hindsight, it could have been a more accurate exercise if face to face interviews were prioritised, and telephone interviews were arranged only if the former was not possible.

All potential interview candidates were initially contacted by email (see Appendix 4 for interview recruitment email) to check if they were interested in contributing to the research, and also to check on their availability to proceed. Recorded interviews were done by setting a mobile phone on loud-speaker with a voice recording app on an iPad. Recordings were transcribed using the website 'Voicebase' and then copied into a Microsoft Word document. Interviewees were advised at the start of the interview that the recording was taking place, and this was also mentioned in the *Interviewee Information Sheet* that was distributed prior to the interview taking place. The interviews typically took approx. 30 minutes each, with the shortest being 20 minutes, and the longest being 45 minutes.

3.5 Reporting Plan

The author's website contained four separate pages; the original survey, a description of the research objectives, contact details, and finally a page dedicated to the questionnaire survey results. Survey responses were processed using the same Qualtrics software that was used to create and distribute the survey, in the form of automatically generated bar graphs and numerical statistics. Questionnaire results can be viewed at:

<https://surfingsurvey.weebly.com/survey-results.html>

Patterns and connections were noted and discussed upon analysis of the raw survey data, which was later supported by the interview answers to form a balanced and informative synthesis of information. The final stage of the research collection and analysis involved the interpretation of all gathered statistics and opinions, merging them all together to develop potential conduits for change.

The central limitation with this study was the relatively small number of survey participants. There are also limitations to technique such as possible biases in the questionnaires; due to participant's geographical bias, knowing beforehand what the study comprised, and possibly providing responses they consider the interviewer was looking for or providing responses that do not support actual behaviours.

4. Research Findings

The following sub-sections 4.1 and 4.2 provide key findings and analysis from the questionnaire survey results. Sub-section 4.3 compiles the key arguments, ideas and comparisons from the interview findings. Further comparisons that have been considered alongside external factors (namely the author's literature research and the interviews) – is noted in the Discussion chapter which follows.

4.1 – Lifestyles, Personal Values and Demographics

This section explores relationships and patterns between the survey participants' lifestyle choices and personal values, versus their responses on various sustainability and surfing issues. Cross tabulations have been used to compare responses and present key findings from the survey.

Do those who recycle, own Keep Cups, or contribute in their local community, also advocate for sustainability in surfing?

From the 99% of respondents who reliably take out their weekly recycling (89% very often, 10% fairly often), over half of those (52%) rarely or infrequently consider the environmental impact of a surfboard (materials used and production methods). The same group of reliable recyclers seemed slightly more aware of the environmental influence of wetsuits, with a balanced array of answers with no stand-out concerns. However, a slightly higher response (55%) of the recyclers rarely or infrequently considers the environmental impact of surf wax.

Similar findings came from the 85% of respondents who often use a Keep Cup or reusable water bottle; as 49% of those infrequently or rarely consider the environmental impact of a surfboard. Once again there was a balanced response for the consideration of a wetsuit's impact on the environment, and finally 53% of the drink container users who infrequently or rarely consider the environmental impact of surf wax.

From the 57% of respondents who claim to have an active involvement in their local community, 42% stated that they rarely or infrequently consider the environmental impact of a surfboard. Of those community-minded folk, 35% rarely or infrequently consider the

environmental impact of a wetsuit, and 45% rarely or infrequently consider the environmental impact of a surf wax.

From this examination of particular respondents (i.e. the recyclers, drink container users and community helpers), an assumption could be made that roughly half of these sustainably-minded respondents rarely or infrequently consider the environmental impact of surfing equipment.

Is there a relationship between a participant's views/values on sustainability and proposed environmental solutions for the Australian surfing industry?

The analysis between these similar themes provided little surprise, as almost all respondents who believe the natural environment should be protected would also like to see a pro-active approach from government, manufacturers and surfing governing bodies. The only exception came from a question which asked respondents whether they agreed (or not) that the Australian surfing industry is presently doing fine with regards to materials and manufacturing processes. Of those who feel strongly about the natural environment, 59% of indifferent respondents felt that they neither agreed nor disagreed when asked if Australia is doing just fine as it is with the materials and manufacturing processes presently being used.

Assessments from Male vs Female

The bar chart shown in Figure 12 demonstrates that female participants – when asked how they feel about proposed environmental solutions – are generally more inclined to strongly agree that these actions and incentives could be successful. The case in point is that 82% of female participants that were surveyed, strongly agree that the Australian government could provide financial incentives for manufacturers who are producing greener surfing equipment, compared to 56% of all male participants who were asked the same question.

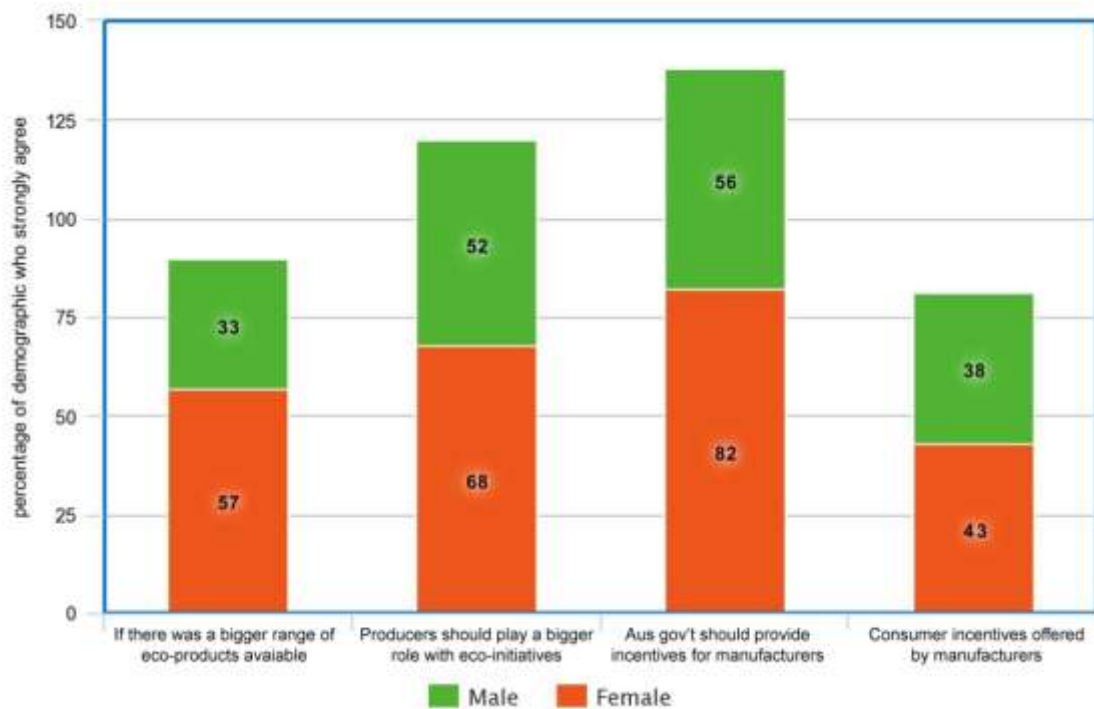


Figure 12. Male vs Female responses to hypothetical environmental solutions.

Source: author's statistics generated by Qualtrics

Does age influence responses?

75% of respondents who are 56 years and older, strongly believe it is important to protect and replenish our natural environment during our lifetime and for future generations, compared to 94% of 26 to 35 year olds. Every other age group, minus the 56 year olds and above, also responded in the high 80th percentiles as strongly agreeing, which appears to suggest that younger participants are more concerned with sustainability. This perspective is further reinforced with 80% of 26 to 35 year olds strongly agreeing that the Australian government should have financial incentives made available for manufacturers who are producing environmentally friendly surfing products, compared to just 30% of those in the 56 years and over bracket. This trend continues as demonstrated with 29% of 18 to 25 year olds who, before making a choice on purchasing a surfboard, very often consider the environmental impact of its materials and production methods, compared to just 5% of the participants who are 56 years and over. However, this trend is reversed when participants are asked how familiar they are with the materials and production methods involved to produce a surfboard. Just 21% of all participants in both the 18-25 and 26 to 35 year old brackets are either

extremely familiar or very familiar with the materials and production methods, compared to a much higher 55% of the 56 years old and over. This seems to suggest that while the younger survey participants *care* more about sustainability, it doesn't necessarily mean they are aware of how a surfboard is produced, and thus what sort of impact it has on the environment. This section of the survey data suggests that older participants – who are statistically more aware of how a surfboard is made – paradoxically see this as less of a sustainability issue.

Does a participant's level of income impact their spending on eco-products?

Survey participants were asked how much extra they would spend, as a percentage, on environmentally friendly surfing equipment. Analysis of the higher earners (those who annually earn \$70,000 or over as an individual) revealed that almost half of them (48%) would pay 10% extra, and a further 26% of the higher earning participants would pay 20% extra, illustrated in Figure 13. All other participants who earn anything up to \$70k annually seem to be more willing to pay up to 20% extra as shown in Figure 14. This data suggests that higher earners are actually less willing to pay marginally more in comparison to participants in the lower earning bracket. Higher earnings could correlate with older respondents as generally people earn more as they get older, and conversely younger respondents may be earning less due to their inexperience in their field of work.

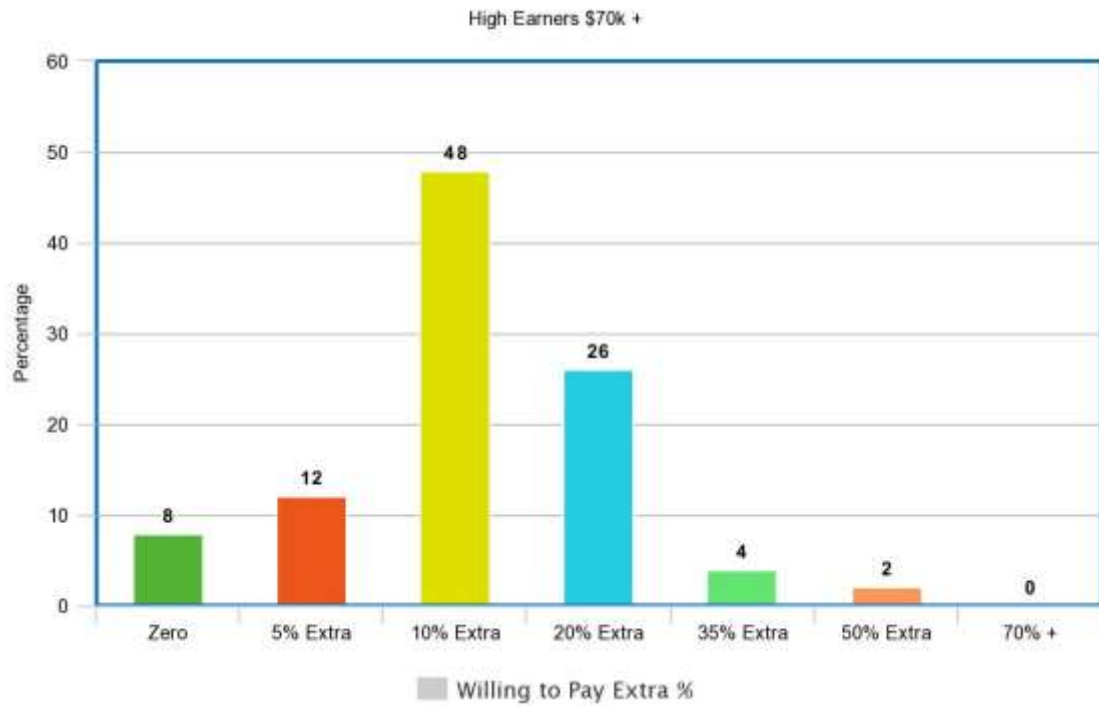


Figure 13. How much extra would participants who earn \$70k and over pay for eco-products.

Source: author's statistics generated by Qualtrics

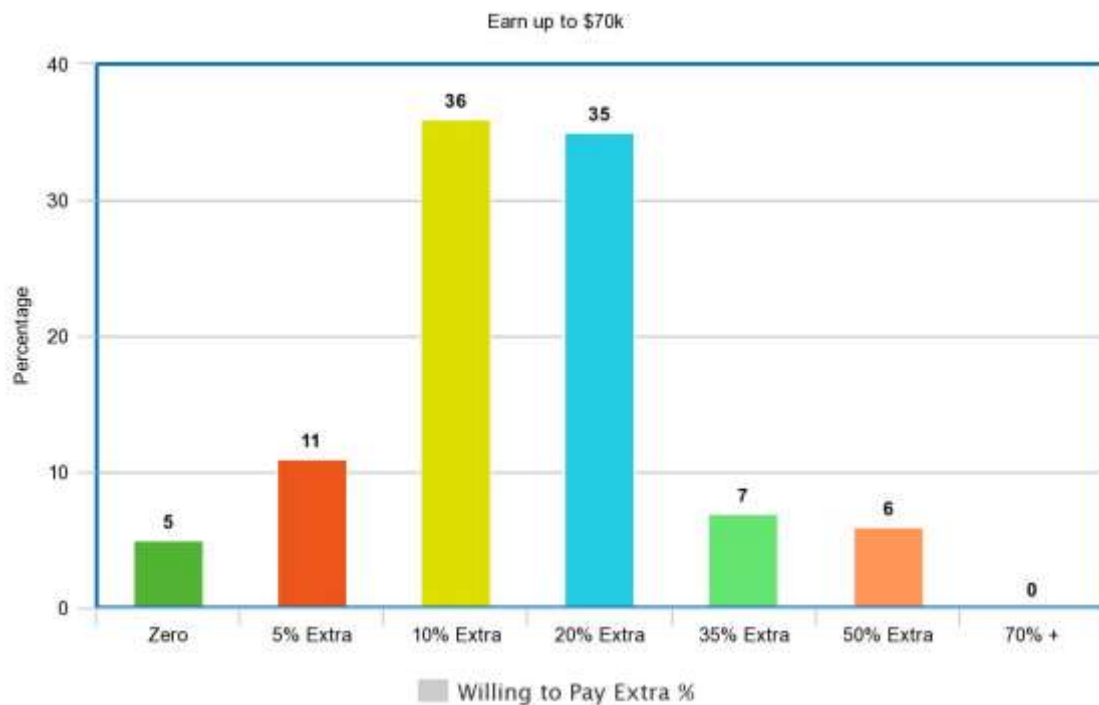


Figure 14. How much extra would participants who earn less than \$70k pay for eco-products.

Source: author's statistics generated by Qualtrics

4.2 – Basic Breakdown of Survey Responses

Proposed Environmental Solutions

75% of participants from the author's survey either agreed or strongly agreed, that if there was a bigger and better range of environmentally friendly surfing equipment available (such as surfboards and wetsuits) it would make their decision easier to choose eco-friendly products, as shown in Figure 15.

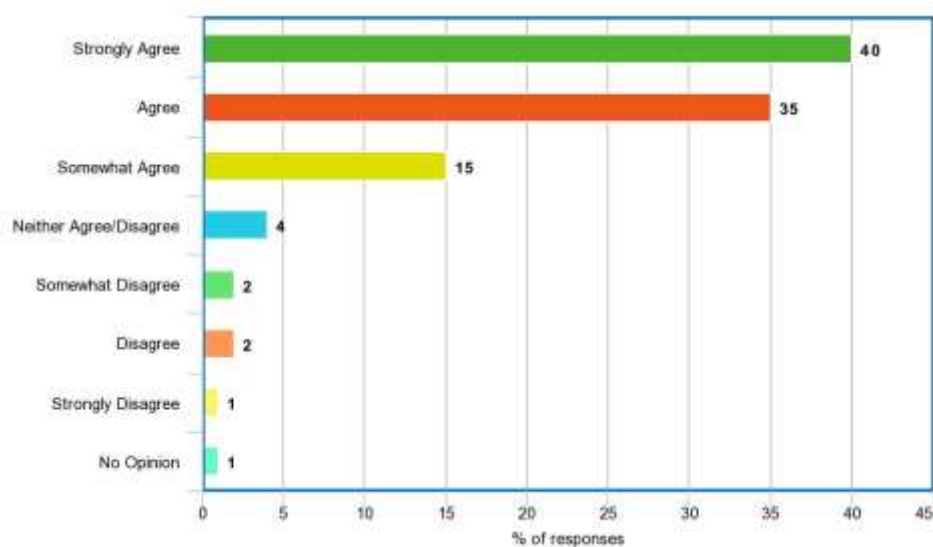


Figure 15. Percentage of surfers that would consider eco-products if there was a bigger range to choose from. Source: author's statistics generated by Qualtrics.

Focusing on the producers of surfing equipment; an overwhelming 89% agreed (57% strongly agree, 32% agree) in favour of producers/manufacturers playing a bigger role in driving environmental initiatives such as biodegradable packaging, return/repair schemes, and the use of plant-based materials (e.g. natural rubber in wetsuits), as shown in Figure 16.

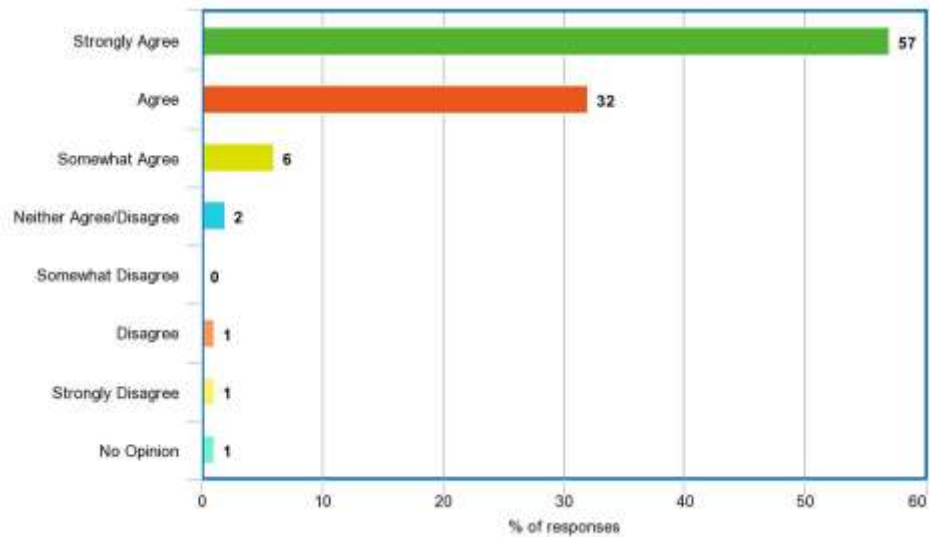


Figure 16. Percentage of surfers wanting manufacturers to play a bigger role in sustainability. Source: author's statistics generated by Qualtrics.

As many as 84% either strongly agreed or agreed that the Australian government should have incentives such as 'eco business grants' made available for manufacturers who are producing environmentally friendly surfing products. A total of 3% disagreed in some form against this, leaving the remaining 13% as impartial, as shown in Figure 17.

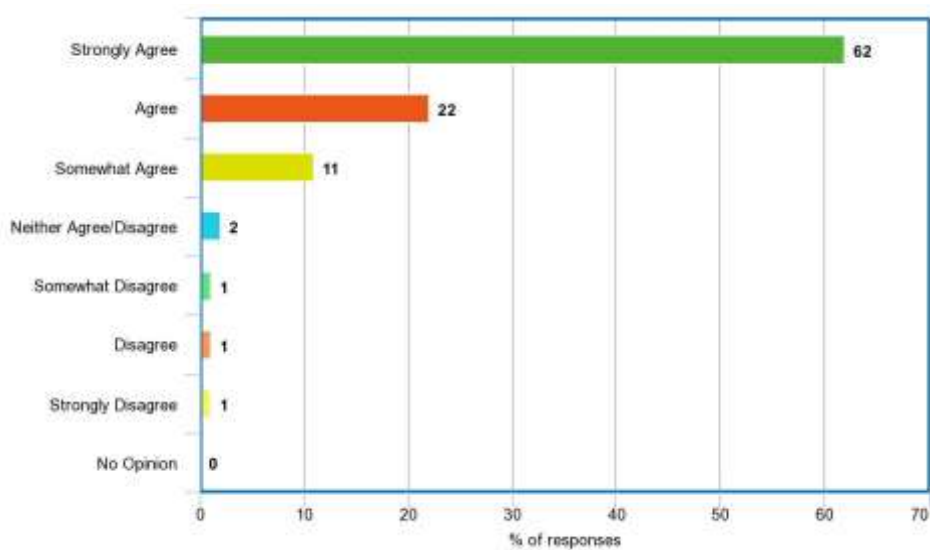


Figure 17. Percentage of surfers that want the Australian government to offer better incentives. Source: author's statistics generated by Qualtrics.

75% either agreed or strongly agreed that consumer incentives from manufacturers (such as receiving credit upon final return of an item, or the option to have a product repaired when returned) would help them choose environmentally friendly surfing products, as shown in Figure 18.

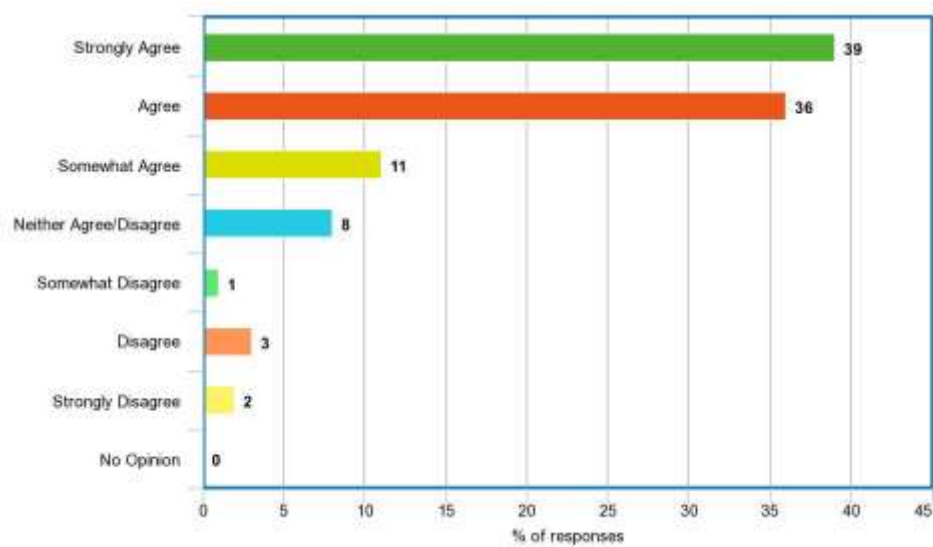


Figure 18. Percentage of surfers whom consumer incentives would help them buy eco-products. Source: author's statistics generated by Qualtrics.

The majority of responses, when asked how much extra participants would be willing to pay for environmentally friendly surfing equipment, replied between 5 to 20% extra; with 10% being the most popular answer (42% of responses), followed by paying 20% extra (27%) and 5% extra (14%), as shown in Figure 19.

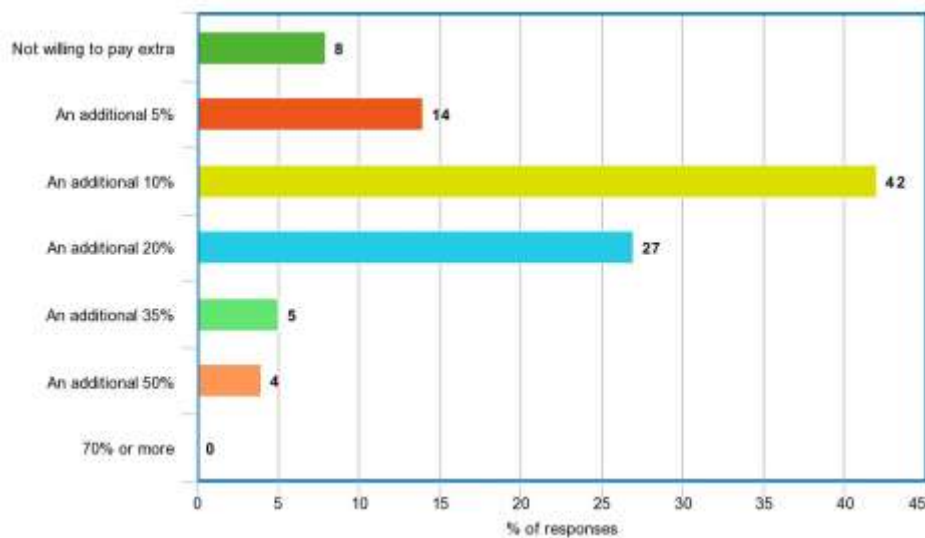


Figure 19. Percentage of how much extra surfers would pay for eco-products.

Source: author's statistics generated by Qualtrics.

Consumer Preferences

The precise wording of the following statements (such as the above heading 'Consumer Preferences') can be found in Appendix 1 – the questionnaire survey form.

With the focus on surfboards, wetsuits and surf wax, participants were asked whether (before purchasing said items) they consider the environmental impact of their materials and production methods. Responses for surfboards presented a balanced selection of answers with no stand out reactions; however, at 34%, the top answer stated that a third of participants rarely consider the environmental impact of surfboards. Very similar answers of a balanced nature came from the same question directed at wetsuits, with the top answer revealing that just over a quarter of participants (27%) rarely consider the environmental impact of wetsuits. There are slightly different results from the same question but this time focussed on surf wax, as an even bigger percentage (38%) say they rarely consider the impact of surf wax, which may not be surprising due to the perceived insignificance of surf wax as a subsidiary part of a surfer's resources.

Participants were asked to consider a number of characteristics when choosing a surfboard, wetsuit and surf wax (performance and durability, affordability, materials, location of shaper, brand of surfboard), and then rank the characteristics in order of preference. The stand-out

answer for all three items of equipment is by far *performance and durability*, with 65% of respondents stating this preference for surfboards, 60% for wetsuits, and a slightly lower 52% for surf wax. The next most popular answer – which came in second for all three items – is *affordability*: with 18% (surfboards) of answers as second preference, 24% (wetsuits) and 16% (surf wax).

Awareness of Environmental Impact

The focus is still on the same three groups of equipment (surfboard, wetsuit, surf wax), as participants' level of familiarity was questioned with regards to the materials and manufacturing processes involved in producing said items.

Participants were asked how familiar they are with the materials and production methods used in traditional foam core and resin surfboards. Results were fairly balanced which indicates that most respondents somewhat understand the process behind making a surfboard, with the highest answer being moderately familiar (29%)

In comparison to surfboards, noticeably different results presented themselves when asked about the materials and production methods used to make a typical neoprene wetsuit. The bulk of answers were moderately familiar (25%), slightly familiar (25%), and not familiar at all (33%), indicating much less awareness.

The results for surf wax proved to be the least known entity out of the three items. Nearly half of all respondents answered not familiar at all (42%) possibly due to the arbitrary nature of surf wax as more of an accessory, rather than an object of interest such as a surfboard or wetsuit.

Participants were asked how familiar they are with the product lifecycle of surfing equipment (i.e. the effects to the environment if an item is not suitably disposed or recycled). Results were more balanced than the previous three questions; however, the top answer was again not familiar at all (27%).

Attitudes and Behaviours

This aspect of the inquiry analyses participants' responses to statements by the survey author – to determine attitudes and behaviours to a range of environmental topics, governance issues and expectations in Australia. Participants were asked what level they agree or disagree with

five of the statements provided, and also how often (or not) they engage in the behaviours outlined in the other three statements that complete this section.

The first two statements concentrated on direct environmental declarations. An overwhelming 99% either strongly agree (88%) or agree (11%) that it is important to protect and replenish our natural environment (e.g. oceans and beaches) during our lifetime and for future generations, followed by 1% who somewhat agree, which leaves no respondents whatsoever who disagreed or were even unsure of the statement. In a similar, but not quite as strongly one-sided swing, 91% either strongly agree (64%) or agree (27%) that Australia should be a world leader in finding solutions to environmentally friendly surfing equipment. Once again, not one respondent disagreed with this statement.

The next three statements are less direct, with the focus being on ambition, collaborations and economics. When asked whether Australia is doing just fine as it is, with regards to the materials and manufacturing processes used to produce surfing equipment, the bulk of responses were unsure or just either side of this halfway opinion. The next statement was whether collaborative efforts between key groups in the Australian surfing industry (such as the top surf brands, designers/shapers, and members of the local surfing community) would assist in achieving greater sustainability goals. Results showed that 77% agree with a collaborative approach (36% strongly agree + 41% agree), and 13% somewhat agree. When questioned on whether economic benefits (such as new jobs and further investment in environmentally friendly surfing equipment) will flow from Australia taking action on progressive sustainable solutions, 58% agree (23% strongly agree + 35% agree) and 20% somewhat agree. Both of the aforementioned statements concerning collaborative efforts and economic benefits registered a collective total of five responses that disagree.

The last three statements in this sub-category reveal to what extent participants are taking action (or not) in preserving the environment. Most participants are in some way involved in their local community e.g. volunteering, supporting local businesses, attending local initiatives such as Ocean Care Day, acknowledging Earth Hour, or buying from local farmers markets. 25% responded as contributing very often, 33% fairly often, 23% sometimes, 11% infrequently and 8% rarely, collectively comprising a balanced array of responses. 99% of participants separate their household waste into recycling bins every week for collection (89% very often and 10% fairly often) leaving just one response as negative. When asked if participants own a reusable beverage container (e.g. Keep Cup or metal water bottle) and use

it as their main means of hydration on the go, 64% responded with very often, 21% fairly often, 11% sometimes, and 4% rarely or unable to respond, proving that nearly all survey participants at the very least possess such an item, with most using it on a regular basis.

4.3 – Interviews with Key Figures from the Surfing World

This section will present significant and interesting highlights from discussions with key industry players in the surfing industry, to identify patterns of similar (or contrasting) opinions and ideas, and to inspire further discussions on sustainability and how it influences surfing.

On the Subject of Surfboards, Wetsuits and Resins

Dave Porter, of Treehouse Surfboards, decided to shift away from using traditional materials in a bid to be more environmentally friendly, and believes there is a future where surfboards can be made without materials derived from fossil fuels; however, he thinks it could be a long time before this happens. He suggests that in the next five to ten years we will see all sorts of new and improved alternatives to existing materials.

Four things are required to succeed in creating a ‘green’ surfboard, according to renowned shaper and author Tom Wegener, who was named Surfing Magazine’s shaper of the year in 2009. He says that it has to ride as good as a modern surfboard, it has to be made of environmentally friendly materials, it has to be cheaper than a modern surfboard and lastly it needs to have a pro-surfer riding it. Wegener, when explaining challenges in competing with mainstream surfboard sales, states that artisan surfboard shapers are up against a “conservative wall of white tri-fin surfboards”.

Porter, who started using environmentally friendly foam in his Treehouse surfboards in 2006, is pleased with the current market acceptance of EPS foam, stating that it’s a positive step away from using PU foam, and this area (of foam technology) will only get better. He echoes Wegener’s view on the challenges in making and selling environmentally friendly surfboards, that in order to fully gain acceptance they have to match prices that consumers expect to pay and reach the same standard of high performance as mainstream surfboards. Porter believes that the key to successfully cracking the market is mass acceptance, but he also warns that

“consumers expect flex boards, white boards, and typical tight parameters” suggesting that performance is vital in winning people over. He is also satisfied with the progress of bio-resins, highlighting that the bio-content is constantly increasing and that sustainably produced surfboards are now looking ‘normal’ but still appeal to the market. Bio-resins in the past, he continues, have been off-colour, but now resins are much better as demonstrated by global surfboard manufacturers Firewire who now use these as standard.

Mark Kelly, CEO and founder of Global Surf Industries (GSI), has twenty years of experience in innovation and distribution of surfboards, and suggests that there are many environmentally friendly options out there with regards to surfboards, but not all are commercially viable. To explain this, he points to a material that GSI have developed, which is multi-stranded fibreglass that contains annegra (a type of high performance fibre) and carbon, that took two years to develop. In our interview, Kelly pointed to a sample of the fibreglass material of which they produced 7km for using in surfboard production. However, if this quantity of an eco-friendly alternative was produced, he warns, it would presently cost too much and makes things commercially difficult.

Wetsuits, according to Kelly, are doing better with environmental advancements than surfboards. This is demonstrated in the range of natural rubber wetsuits (as mentioned in earlier chapters) carving out a sustainable trend which Patagonia’s Yulex range is spearheading. When questioned on the subject of natural content versus synthetic materials in their wetsuits, Dane O’Shanassy, CEO of Patagonia Australia and New Zealand, expects to continue the reduction in synthetic materials (currently 15% in a Yulex wetsuit), but also focus on other areas like yield (producing natural products), fair trade (support for the workers that manufacture items), and durability of products.

Conversations on Consumers

Andrew Warren – author of *Surfing Places, Surfboard Makers* (2014) and lecturer of Human Geography at the University of Wollongong, insists that consumers are often overlooked, particularly the power of consumers. Surfing is a much more diverse community in recent times in comparison to its roots as a fringe sub-culture, Warren continues, citing that we now have former Prime Ministers [Tony Abbott] in the surfing line up, as surfing used to be viewed as a pastime for “useless bludgers and druggos” which has since seen a

transformation that he believes is appealing to a new consumer base. Present-day surfers in Australia, in his opinion, *do* care about the environment, but there is a blurry overlap in translating how actual consumer behaviour can match those inherent thoughts. In contrast to Warren's view, Tom Wegener believes that mainstream surfers do not care enough about non-toxic surfing products to change current behaviour. The latter suggests that surfboards made from petroleum-derived resins and foams will be the mainstream paradigm for a very long time and doesn't see that changing anytime soon.

When asked about the key factors in influencing consumers' purchasing decisions to encourage people to choose environmentally-friendly products, O'Shanassy says that Patagonia is seeing a growing number of people who are seeking more sustainable and ethical products, and he believes consumers are doing their own research. He stresses that this increased popularity in sustainability means that it is getting harder for companies to greenwash, and Patagonia has noticed that people are prepared to pay a bit more for a more sustainable and ethical product, as long as performance is not compromised. Conversely, Gold Coast-based surfboard shaper Grant Newby thinks that generally surfers are likely to be more reluctant to pay more for sustainable products, but he adds with caution that this depends on the type of consumer or their age. Newby believes there may be people who want to buy environmentally friendly products but cannot afford it, citing many factors to consider. He warns that labour costs play a big part in the slow progress in driving prices down for sustainable products, explaining why the bigger brands look for cheaper production costs abroad. Equally, Newby points out that consumers who may criticise this approach [of mass-production out-sourced overseas] have to ask themselves "where their car they drive, or other products that they enjoy in their life is from, [which has] most likely been mass produced in another country". On the overall subject of challenges facing manufacturing, he thinks that all industries and consumers will be facing challenges, chiefly to remain competitive in attempts to be more environmentally friendly.

Sustainability and Economics

From Dave Porter's experience at Treehouse, the majority of customers aren't willing to pay much more for sustainable products, and he believes that price ultimately drives the market. Porter believes that cost is one of the main barriers stopping shapers from going eco-friendlier:

“[The] price of surfboards hasn’t really risen in the last fifteen years, not relative to the price of inflation or the rising costs of materials, so the profit margins are getting smaller for independent, small-scale shapers. Eco-friendly materials generally cost more, which doesn’t make things easier. Surfboard manufacturers are aware that consumers won’t pay more, and it’s a race to the bottom to try and out-compete each other on price and keep costs down.”

Porter initially thought people would pay extra for something more sustainable, particularly with surfers having “an intrinsic link with the ocean”, but his experience has shown it doesn’t seem to be the case. He adds that surfers are probably adopting sustainability at a faster rate (compared to other sports) but it’s still ultimately driven by price. According to Andrew Warren, there is a core group of surfers who uphold sustainable values and they would be willing to pay more for environmentally friendly products. Warren reiterates Newby’s observations, that there are a lot of surfers who might not be able to afford this luxury of buying sustainable surfing equipment. Warren adds that cost is the biggest hurdle in making further progress in developing sustainable products, recounting his experience of attending workshops in Hawaii and California that involved sustainable surfboards being made with hemp cloth (as an alternative to fibreglass), which ultimately struggled to break into the mainstream market due to cost issues and the competitive nature of surfing. He further adds that consumers might say they are willing to pay more for environmentally friendly products, but whether that happens when they are on the ground in a store, faced with many options, remains to be seen. Tom Wegener is sure that the cost and ease of obtaining a product plays a big part to play when consumers are making up their mind, and he adds that in his experience, most surfers will not pay more if it’s ‘green’.

Nev Hyman, surfboard designer and innovator, recounts that consumers used to be reluctant to pay more, but Firerwire is now the same price, more or less, than a lot of top surf brands out there. Hyman founded Firewire (previously known as Nev Surfboards and Nev Future Shapes) in 1981, and the brand is known throughout the surfing industry for its advancements in materials and technology. Hyman reveals that customers were initially paying \$800 - \$1000 for Firewire’s range of less toxic surfboards (when other boards made with traditional materials were \$600 at the time), so they brought their prices down to make their products more accessible. Hyman adds that the PU surfboard shapers have to create enough profit

margins so that they aren't "living like dogs", suggesting that there are a lot of shapers working hard to make surfboards (using traditional materials and production methods) with very little profit. Hyman's retelling of how they substantially lowered the cost of Firewire's surfboards is echoed by Mark Kelly's opinion on equal pricing. Kelly thinks that consumers in general (not just surfers) are not willing to pay more for eco-friendly products. He believes that the price has to be equal or better for it to realistically work. Louise Dever, investor and distributor of sustainable surfing goods at Eco Surf Supplies on the Sunshine Coast, states that the realisation is that early adopters [of eco-friendly products] are a small percentage of manufacturer's revenue. Dever adds that once it is more 'cool' to be eco-friendly, and when more eco-friendly materials become cheaper, she believes the majority of consumers will get on board. O'Shanassy has made it known that Patagonia has calculated it outlays about 30% more to produce a sustainable and socially responsible item, versus a typical mainstream product, in order to meet their environmental and social standards.

The Impact of Market Forces

Newby considers that local shapers – who he believes are the ones doing most experimenting – do not have the resources to make a bigger impact. This is an opinion shared with a few of the interviewees, with Wegener suggesting that the mainstream may have to adopt what the fringe surf brands are doing to become more interesting. Dever agrees, revealing that any new eco-friendly initiatives are mostly made by small manufacturers who have little reputation. Wegener adds that one of the main barriers to the market being slow to adopt 'green' innovations, is that mainstream surf brands and the pro-surfing realm do not value sustainability, even if they say they do. From his research (Wegener has written a PhD on sustainability and surfing), he has noticed that despite the mainstream's non-interest in 'green' products, there is still a culture that embraces new types of surfboards and new genres, and he quotes "the overall surfing umbrella has so many niches and emerging sub-cultures that value innovation, which allows more new niche products to evolve, but the ecological side is so small." Warren points out that the Australian surfing industry is seeing the collapse of some corporatized-surf brand models, which presumably refers to the recent struggles of Quiksilver and Billabong, and contemplates whether this opens up space for smaller, grass-roots organisations to develop alternative ways.

Mark Kelly, with his experience in distribution processes, believes that better waste reduction is less talked about yet is an effective example of how companies can become more competitive, providing an example of an unnamed surfboard factory that tightened control in this department over a three-year period. He adds that it is sometimes best to look at things differently as a way to stay competitive and still satisfy the relevant sustainability requirements, and also suggests that the The Surf & Boardsports Industry Association (SBIA, an Australian governing body of surfing) could have sustainability higher on their agenda.

Upon discussing the subject of market disruptors, Nev Hyman refers to Kelly Slater's new clothing brand – Outerknown – which the former believes is an ethical brand with transparency, which he sees as refreshing versus, for example, cheap Kmart clothing. Slater has chosen an expensive but ethical path that should be congratulated, Hyman continues, and although he might be ignoring 80% of the market he prefers to follow an ethical path. Surf historian and author of *Empire in Waves* – Scott Laderman – is confident that some brands, possibly referring to the larger brands, could feasibly take an economic hit in order to adopt environmental initiatives, but also highlights that it is a necessary step in making progress in this area. Hyman reiterates this view, admitting that it requires a lot of capital injection to develop new technologies on a large scale, and recalls that it involved a lot of pain to get Firewire to the stage where it currently sits, and that a lot of smaller brands discover it is not financially viable to go down this path. However, Mark Kelly suggests that Patagonia is a shining light if people need inspiration for sustainability. Kelly points out that GSI, (of which he is the founder and CEO), allows all their staff to work from home to lower their carbon footprint, and adds that one of their surfboard factories is going “full solar” to enable a range of products that will be produced with renewable energy.

Regulations and Environmental Standards

Dave Porter would love to see an improvement in formal environmental standards in the Australian surfing industry as he considers that it's largely unregulated and there is very little information out there on toxic materials. On the subject of governance, he believes that taking some action to safeguard the environment would herald positive results:

“[It] would be great to have a set of guidelines to stick to, to make their manufacturing process more sustainable. Then more shapers would jump on board

with that, but currently it's down to shapers to take those steps themselves without help. Government needs to understand the [surfing] industry, perhaps a joint agreement between government and surfing to ensure safe regulations can be figured out."

Porter believes that the Australian surfing industry seems disconnected (i.e. not working together to tackle major issues) and suggests it would be a positive step forward if there was a greater collective approach in developing environmental initiatives. When questioned on the barriers that could be preventing mainstream producers of surfing equipment from going eco-friendlier, Laderman believes that manufacturers have found it profitable *not* to be greener, quoting "there are currently very few penalties, or disincentives, for ignoring the environmental consequences of manufacturing equipment, the costs are typically born socially, not by the manufacturer." Warren suggests that government incentives (with regards to improving sustainability) could prove tricky when you look at how a lot of surfboard production is outsourced. Warren adds "how would governments deal with regulating the fragmented international mode of production, [this is] an interesting and complex question." He believes that consumers care enough about the marine environment, pollution, plastics, and safeguarding the coast, but questions how that actually translates into consumer behaviour. Warren suggests that there could be a governing body that scrutinizes and certifies products in the surfing industry, adding that there could be a role for government in that context. Kelly doesn't think that it is the government's role to regulate, but they could help by promoting and subsidizing environmental initiatives in the surfing industry that encourages sustainable outcomes. Long term sustainability, Kelly believes, would be better served from surfing manufacturers initiating things themselves, rather than having someone "chipping in to prop them up." Kelly suggests that interventions do have a place in providing solutions and cites an example of PVC foam being banned in the EU.

O'Shanassy states that there are challenges in maintaining environmental standards while remaining competitive, but this is core to Patagonia's mission and one of the driving forces that create their USP (Unique Selling Proposition). He adds that Patagonia positions itself on eco-innovation and eco-activism, citing that the more they do, the more they can benefit. Louise Dever believes there should be tighter production guidelines, but they also need to be achievable and not put the manufacturer out of business. Dever suggests that if regulators can get already-established brands to change, rather than go out of business, that would be a

better route to follow. Dever adds that government assistance could inspire new businesses to try and start up sustainably-minded enterprises.

Opinions on Materials, Technology and the Future

Warren agrees that there is a risk for surfing brands to take a leap on eco-friendly materials, but it is a necessary step – not just for surfing – but all forms of commodity production to eventually move away from existing practices. Dane O'Shanassy believes there are two key drivers for the low adoption of non-toxic materials;

“1 - Cost. Whether it is a scale issue or quality, the cost remains higher than less responsible materials.

2 - Consumer demand. Whilst this is changing rapidly in our experience, there is still low awareness of the personal and community benefits.”

In 2005 Hyman recognised that something had to change (material-wise) in the surfing industry. He states that slowly but surely the industry *is* making changes, however Nyman warns that 70% of the industry is still relying on polyurethane surfboards, which he says is undoubtedly toxic, with most pro surfers still using these boards. Hyman puts it simply: “the goal of every surfboard manufacturer should be to create the most environmentally friendly surfboard possible.” It's up to the manufacturers, says Mark Kelly, to invest in research and development to pursue initiatives, but on the contrary he questions whether there are those willing to invest in research and design with the possibility of not getting a return on it. Newby echoes Kelly's view that not enough focus is happening on the research front, and not enough experimentation with other materials; however, Newby adds that a lot of companies are doing what they've always done because it's cost effective. Newby tells of how he uses cork as an outer layer on some of his surfboards, and not needing wax due to its natural tactile and gripping properties. Newby has also discovered that natural lanolin oil can be applied to his paulownia-finished boards, which soaks onto the outer face of the timber then becomes sticky when it comes into contact with salt water.

Mark Kelly's dream surfboard, when asked about his ideal outcomes, would be biodegradable or compostable, and it would be really interesting to see, he adds, how 3D printing could influence this concept. Kelly contemplates that if a hypothetical biodegradable

surfboard could be designed to be dismantled in layers, then it would increase the surface area and make it easier and quicker to break down. Kelly predicts that, after a stunted introduction to the manufacturing scene, 3D printing will come back stronger and play a big part in the production of surfboards. Louise Dever, when asked whether there is a future for mainstream surf products (namely surfboards and wetsuits) made of non-toxic materials that are 100% clean from processing of fossil fuels; “Absolutely – we humans are smarter than ever and have more and more technological evolutions arising every hour. Let’s use it for good and longevity.”

Interview Conclusions

Grant Newby believes there is certainly a future for sustainable surfing equipment, but he argues that it is a moot point if “people continue to drive their petrol-fuelled cars to the beach or jump on a flight to Bali.” Surfing and sustainability go hand in hand, Mark Kelly states, and surfers spend a lot of time in the ocean, so he believes they should care about the water and how it affects the overall environment. Kelly admits that if large-scale producers of equipment, such as his own company GSI, can implement the right technologies and materials, then change could happen much quicker from a sustainability perspective. With regards to the future, Nev Hyman adds (while recollecting a recent surfing outing with his children) that surfers are privileged to have such a fantastic activity in their lives, which means we should have a responsibility to be advocates for the environment.

Louise Dever suggests that those in the business of surfing need a framework for incorporating sustainability. She backs the need to work with the willing, and to support and encourage the ones who have made the change or looking to make the change soon. Dever adds that she doesn’t wish for manufacturers to go out of business but urges them to begin making small changes. On a similar theme, Kelly advises that the best approach could be to continue supporting the development of alternatives for resins, foams, and other individual components, rather than trying to “make a quantum leap and having the answer right away”. Kelly uses the example of cars; from the internal combustion engine, to the hybrid cars that have now led to electric cars, and possibly a future where cars are fully powered by solar energy – with each step we are getting closer to a more sustainable end product.

In response to the question of what the ideal future would be for Patagonia, O'Shanassy wants to inspire change in the business community to help reverse the environmental crisis, and for Patagonia to provide tools for the community to work at grassroots level for the protection of wild environments. Kelly predicts a future where a big enough entity will adopt new technologies or methods, then he believes everyone else will follow suit. Change can happen, Kelly has confidence in this, and he believes that companies with distribution responsibilities are the ones who will influence change the most.

In consideration of the overall content from all interviews, it seems the lack of cohesion in the surfing industry is noticeable. There appears to be an absence of strong leadership across the sector, particularly from surfing associations and key manufacturers, to drive surfing's green credentials forward. It also seems apparent that the marketing element of environmental initiatives in surfing is weak. Self-regulation seems to be more favourable with the interviewees than government control.

5. Discussion

Positive Action is Preferred, but Who Delivers These Changes?

The author's research findings largely suggest that the majority of survey participants *do* want to see action being taken on sustainability issues in the Australian surfing industry; however, a conclusion can be drawn out from other indirect responses that may suggest otherwise. Data suggests that there is low awareness in the public domain of the materials and production methods used in modern surfing equipment; conversely it appears consumers are happy for manufacturers to change their methods, and government to implement regulatory measures, so while personal habits are not showing any historical evidence of changed behaviour, there is an impetus for those who have the power to be leading by example.

Comparisons in the author's survey data can be echoed with some of the survey results from The Climate Institute's *Climate of the Nation* poll in 2016, featuring over 2000 participants. Most Australians, according to the Climate Institute's poll, want stronger action on climate change; 77% of people questioned now accept that global warming is now happening, 65% of people questioned would like to see Australia leading the world with finding environmental

solutions, 60% agree that human activity is contributing, and 90% believe the government is responsible for taking action (The Climate Institute, 2016). It appears that surfers, perhaps more than others, deeply care about sustainability as proven with the overwhelming response to the question of whether it is important to protect and replenish the natural environment, and similar comparisons with the belief that the government is responsible.

If the onus is on manufacturers and/or the government to implement change, then it is worth considering that Patagonia has calculated that it costs about 30% more to produce a sustainable and socially responsible item, as revealed in the author's interview with Dane O'Shanassy, CEO of Patagonia Australia and New Zealand. The author's survey responses have deemed that the majority of consumers would pay somewhere between 10 – 20% extra for an environmentally friendly item, which falls somewhat short of Patagonia's outlay of 30%, this suggests that better materials and production methods (in a sustainability context) would need to be significantly lower in cost to be widely adopted by mainstream manufacturers.

Advocating for Improved Industry Standards and Collaboration

A few of the interviewees expressed a desire to see an improvement in environmental standards in the Australian surfing industry, particularly those who are making and selling surfboards, which suggests that there would be little resistance to this type of change occurring. Surfboard shaper Dave Porter is confident that shapers would jump on board if government regulations tightened practices in the industry, and Porter's suggestion of a joint movement between government regulators and the surfing industry could be fruitful. This leads onto another warmly accepted idea from interviewees, which is a greater collective approach and to move on from the existing disconnected and decentralised industry. Surf historian Scott Laderman stressed that there are currently very few penalties, or disincentives, for dismissing ecological consequences in the surfing industry, which highlights a key issue that, once regulated in whatever form of penalties, this could potentially be a game changer. This view is echoed by Andrew Warren who suggested that a government-led industry body could scrutinize and certify products, which could achievably build upon the success of the American developed Eco-Board standard (mentioned in the Literature Review chapter) and has since been integrated into Australian surfboards such as Hyman's Firewire and Porter's Treehouse. These views are backed up by comparable outcomes from the survey; indicating that government and/or industry self-regulation, incentives, and improved industry

collaboration are all high on the wish list of Australian surfers and those working in the industry.

From a Consumer Perspective

Conclusions can be drawn from respondents' answers which reflect their awareness and behaviours, as responses reveal that most participants are generally aware of the harm caused and are certainly very keen to see an industry transformation. This is evident in that the majority of survey answers heralded results of between just 5 to 10% who disagree or are unsure when it comes to developing a better range of eco-products and supporting sustainability-driven initiatives and incentives. The implications of this seem to suggest that, yes, survey participants believe there is an environmental problem, but overcoming it is hindered by the narrow range of products that are identifiably environmentally friendly.

The survey results revealed that, from a consumer's perspective, performance and durability is by far the most considered factor when purchasing a surfboard. Interview feedback from Dave Porter and Tom Wegener endorses the importance of performance, emphasising that eco-surfboards will gain full acceptance when they reach the same standard of high performance boards. This may suggest why there is a relatively slow uptake of environmentally friendly surfing equipment in the modern era of consumerism, with performance and price being the two key requirements in convincing customers to part with their money. O'Shanassy of Patagonia is confident that consumers are prepared to pay a bit more for a more sustainable and ethical product, however he agrees with the majority of interviewees and survey respondents that this applies only if the performance of a product is not compromised. As mentioned previously, Hyman states that it took Firewire a lot of capital injection to have success with a surfboard that ticks many of the sustainability boxes, which is a lesson worth noting for anyone else attempting to tread the same path. Hyman is understandably less pessimistic as other interviewees, perhaps because of Firewire's achievement and Hyman's perseverance. A possible tactic to setting production standards could see an organisation, for example, of Patagonia's size collaborate with other leading suppliers to lead the way in sustainability.

The analysis of survey respondents' attitudes and behaviours reveals that the vast majority do care about the environment, at least in a verbal statement, but does this translate to actual changes in behaviour? The data suggests that this does not correlate with links to surfing

equipment, as demonstrated with low responses in the questions probing awareness and behaviours. This could suggest that people are less inclined to change when it comes to being directly affected, such as sacrificing performance and durability of a purchased item or going out of their way to help in the community (as reflected in average-level engagement responses), but respondents are more comfortable to take smaller and/or low-cost steps to help the environment e.g. buying a reusable drink bottle or taking out the recycling. This suggests that higher-level action or intervention (government, manufacturers, or industry bodies) would be better placed to advise and ultimately regulate materials and production processes, if the general public cannot be convinced or trusted to influence the market at this stage. Some form of strategic intervention could be influential in breaking a cyclical system that consists of;

- a) Consumer demand for affordable high-performance surfing equipment
- b) Low cost mass-produced equipment made of toxic materials
- c) The resulting growth of major manufacturers/brands and subsequent diminishing of innovative smaller shapers/brands.

The culmination of this process ensures that, even if consumers do have good intentions to safeguard the natural environment, these intentions are overwhelmed by a selection of high-performance and affordable products. Opinions of surfers and surfing industry workers are clearly agreeing on some kind of market disruption to break, what seems to be, an out-of-date process that is up for renewal. One comprehensive solution could be the regulation of materials and production methods, stringently enforced to ensure that consumers are presented with a wide range of equipment, produced using the cleanest and most advanced materials available, and mass-produced with the least amount of emissions and energy required for production.

Research Scrutiny and Considerations for Further Research

Feedback was positive from face-to-face encounters with the questionnaire survey candidates and also with the interviewees (including phone calls and video calls). One particular piece of criticism, with regards to the survey, expressed concerns that the survey contained stated preferences as opposed to reveal preferences. This could be considered as fair criticism as there could be a perceived underlying bias due to the subject matter and personal objectives

of the author's research. Another criticism accused the survey questions of not going deep enough into detail, from an interview candidate who works in the surfing industry in Australia. Upon requesting further clarification of why or how the survey is at fault, this particular respondent expressed their extreme dissatisfaction of the current state of the surfing industry, suggesting that 95% of surfboards are created by machines and that the industry cares more about money than environmental issues.

The process of approaching survey candidates face to face provided experience in dealing with a select few who did not seem keen to fill out the survey, due to disagreeing with the content and questioning if such research is necessary. This might have rendered the results biased as perhaps sustainability-minded people were more inclined to participate, thus raising the issue that overall results may not represent a balanced section of Australian surfers. One particular candidate replied aggressively and asked what the point of the research was. In retrospect, if the survey could be designed and presented in the most neutral way possible, and perhaps even with an incentive (i.e. completed survey participant selected at random to receive a prize) could ensure that a genuinely varied mix of demographics can be analysed. One survey participant suggested providing an open comment field at the end of the survey for comments, which in retrospect may have been useful to extract details for further research.

Due to limitations in the length and depth of this report, further research could look at more in-depth cross tabulations where demographics are broken down and analysed in detail. In hindsight, the number of survey questions could have been reduced to focus solely on one or two key areas. Since conducting this research it seems clear that key areas of focus could be centred on the cost and performance of surfing equipment, as the survey data has proved that these are the two most prominent factors when choosing items. Further research could be conducted to gauge the perspectives of under-18s, in order to see what future generations are thinking and analyse their behaviours and attitudes. Other avenues of research could look at data on the sales of environmentally friendly products, in surfing and perhaps in other industries to measure a comparison. Research in the form of a natural experiment, as something that could prevent potential bias from the researchers, could provide an objective measurement of how people actually feel about sustainability in the Australian surfing industry. The research process has, with the benefit of hindsight, raised concerns around the method of data collection; as respondents who filled in the traditional survey might have had

different perspectives to those interviewed face-to-face, a factor which could possibly challenge the reliability of the methods and results.

6. Conclusion

Innovations

The surfing industry is amid an interesting transition, achieving small success stories in backyard innovation but simultaneously experiencing slow advancements on a mainstream scale. The surfing industry is emerging from a stagnated period of progress, stretching back to the introduction of the first polystyrene core surfboards in the 1950s, up until the closure of Clark Foam in 2005 (Rhodes, 2018). Pioneers from the global collective of surfing have presented advancements such as plant-based materials or partial bio-based materials, bio-resins, plant-based alternatives for neoprene and innovative ways of material reuse, all of which paints a fascinating vision of the surfing industry in the coming years. In an interview with the ABC, Professor Andrew Holmes from the University of Melbourne has stated that the world may have to move towards fully biodegradable plastic alternatives made from plants, however Professor Holmes cautions that there may not be enough arable land to grow new materials when we also need to grow more food (Weule, 2017).

The uptake of so-called Eco-surfboards has been slow, as history shows that in 2006 a team of British surfers and manufacturers successfully merged a plant-based core, laminated in hemp cloth and bio-resin (Alexander, 2006). So why, 12 years later, do the major surfing brands continue to produce items that are just as damaging to the environment now as they were in the late 1950s. Optimism can be drawn from initiatives such as the collaboration between two California-based organisations in 2015, Arctic Foam and Solayzme (the former specialises in foam core blanks and the latter is a bio-tech company) who have created a new bio-foam born from algae oil (Hepler, 2015). Surfing scientists are even contributing with data collection to support climate change, demonstrated by surfer and Southern Cross University researcher Renaud Joannes-Boyau who has developed a 'Smartfin' that works as a normal fin underneath a surfboard (Turnbull, 2018). The Smartfin is equipped with a GPS,

Bluetooth chip, circuit board, rechargeable battery and sensors that enable measurement of ocean parameters such as temperature, location, wave characteristics and motion.

Interventions

The Australian government can take inspiration from the UK who has implemented industry targets in an attempt to shift behaviours. As reported in the New Scientist, the Waste and Resources Action Programme (WRAP) is a UK-based non-profit organisation working alongside government and industry to reduce carbon emissions, water use and household waste from the clothing industry by 15% every year from its conception in 2012 through until 2020 (Ceurstemont, 2018). This case, albeit clothing, is an example of how a government can work together efficiently with industry governing bodies to improve sustainability targets, delivering the regulation power of government with the insight and experience of industry experts. Research student Nick Power, from Virginia Beach in the US, wrote the Surfer's Guide to Sustainability (2010) after studying environmental action and sustainability, producing a report in which he explores various sustainable initiatives in surfing. Power's study concludes that the surfing industry is primarily the most responsible for taking action to support surfing in becoming more sustainable, however the survey and interviews conducted for this research offers a different view. The research findings from this report suggest that the government should be the main instigator of standards for materials and production methods. Ultimately, tighter overall regulation can ensure that everyone adheres to an enforced solution that ticks all of the necessary sustainability boxes, with solutions that do not compromise performance and affordability in the short term.

Gregory Mankiw – Professor of Economics at Harvard University – suggests that a carbon tax is a reliable method to divert bad activities that have negative side effects on the environment and other people in society (Before the Flood, 2016). Mankiw believes that a carbon tax nudges people in the direction of doing the right thing. Nudge mechanisms could be applied to shift behaviours of surfers to encourage them to choose environmentally friendly surfing equipment. Nudge mechanisms could also influence manufacturers to adopt cleaner production methods and incorporate plant-based materials, by limiting ecologically damaging processes yet still offering a choice between operations.

“I think trying to appeal to people’s social responsibility is really very, very hard, because people have complicated lives and they have lots of things to worry about. They don’t want to have to think about climate change every time they make every decision” (Mankiw, 2016).

Australia is approaching an unprecedented era due to China refusing to take international waste (Martinko, 2018), in a move which may cause short term disruption but could also fast-track policymaking for long term sustainability. This could be an opportunity for Australia to improve efficiency of their overall production systems and to rethink materials and wastage. Helen Millicer, principal at One Planet Consulting and a Winston Churchill Fellow, suggests the following action plan towards a circular economy, that could easily be applied to the surfing industry if a sustainability framework was to be formulated:

- In our homes and workplaces, we must change what we buy, selecting long-life products and packaging
- We need renewed action ensuring packaging and products are designed for recycling and repair
- The disposal cost of products and packaging should be included in the purchase or disposal price
- Both government and industry procurement and tenders should specify recycled content and repair
- We must develop government and industry strategies and partnerships for the circular economy in Australia (Millicer, 2018).

In addition to Millicer’s points; plant-based materials can be phased-in as part of a fundamental change in how surfing products are designed and produced, whilst concurrently phasing out conventional petroleum-derived materials.

In his book, *The Weather Makers*, Scientist and environmentalist Tim Flannery suggests that governments could assist both consumer and industry in their efforts, both locally and globally, in the fight against climate change (2005). Flannery advises that one of the most important changes is to ban the building or expansion of old-fashioned coal-fired power plants, and to embrace an ever-stricter regulation on the environmental efficiency of goods in

the marketplace. Flannery also encourages initiatives to encourage the use of renewable energy; with rebates and assistance to set up whatever necessary infrastructure is required at suitable locations.

The Australian surfing industry could look at the success of the American born Eco-Board rating, to ensure manufacturers strive to remain competitive and subsequently change their approach due to market pressures from others. One potential solution to environmental concerns could be an Australian adaptation of the Eco-Board standard in the form of a toxicity scale, where products are rated in a manner that is easily viewed and open for comparison and scrutiny. The recent state of competition (with regards to environmentally friendly products) seems to be low, which could potentially mean there is presently a slower uptake of innovation. If the marketplace competition for eco-products is bigger, then we could see that innovation in surfing becomes faster and more aggressive.

Leadership and Collaboration

If an intervention is necessary in restructuring traditional ways, then the Australian surfing industry should focus on government regulation, industry bodies and organisations, major brands, sponsors, or if it's a question of priority, perhaps it is leadership that should take precedent. Patagonia is providing consumers with arguably the nearest example of a sustainable and ethics driven business model, and now eleven-times world champion Kelly Slater is delivering ethically sourced clothing through his brand Outerknown. The research findings have shown examples of grass roots innovation from Nev Hyman, Grant Newby, Tom Wegener and Dave Porter, all of which have provided mini-revolutions for other shapers and designers to follow, and more importantly for the major brands to take notice of and incorporate into their range of products. Firewire is a fine example of taking backyard innovation onto a grander scale of manufacturing and for a bigger crowd of customers. Local shapers haven't changed much in their operational ways, and actually seem to take some enjoyment and pride in being disconnected from the global dominant surfing industry. Nevertheless, the speed of change is accelerating, and new advancements in materials and production methods are indicating a new era, driven by sustainability, that requires the backing of forward-thinking leadership. The World Surf League, with its role as global governing body of professional surfing, could set a precedent by regulating the type of equipment that could be used in competitive surfing competitions. Perhaps even, a cohort of

professional surfers could come together to campaign and demonstrate new approaches to equipment materials and production.

One solution that addresses the lack of cohesion in the surfing industry is to establish a collective gathering to discuss ideas, specifically how to build a strategy framework and then decide what action to take. Given the size of Australia, an online platform could provide a more accessible solution and is a low-cost option to launch quickly. Decisions need to come from a think-tank of key industry players, sourcing valuable input from all levels of surfboard innovation and design. The Surfrider Foundation, a non-profit environmental organisation that works to protect the world's oceans, waves and beaches, is a good example of a collective approach when tackling environmental issues in surfing, bounded by their CARE mission statement: Conservation, Activism, Research and Education. This research provides supported opinions that state the majority of responsibility will be required from suitable regulation and an improvement (or upheaval) of traditional industry methods, rather than well-intentioned individual efforts. This research also demonstrates that the vast majority of surfers in Australia are on the same wavelength, which emphasises the importance of seizing this opportunity to collaborate and develop solutions.

Consumers

Recent changes in consumption, particularly in the demise of plastic bags, straws and bottles, is contributing to growing pressure from the Australian public, ensuring a ripple effect that should eventually disrupt outdated modes of practice in surfing.

Key challenges remain in the mainstream adoption of environmentally friendly materials and the application of manufacturing processes that should continue to reduce their carbon footprint. Consumer behaviour is an area that is crucial for evaluation; as any new innovations that emerge in the surfing industry will most likely have to be appealing and affordable. As previously stated, Dane O'Shanassy of Patagonia believes the two key drivers in the adoption of sustainable products are cost and consumer demand. The majority of all demographics surveyed, rate performance and durability along with affordability as principal in their decision making. The survey findings also suggest that lower income earning Australian surfers will actually pay slightly more for a sustainable product than higher earning surfing counterparts. This could indicate the reason that higher earners aren't paying more for eco-friendly products, is because performance qualities of eco-friendly surfing

equipment are not yet on par with items made from traditional materials and production methods.

Daniel Wild, a research fellow at The Institute of Public Affairs, says the environmentalist movement has misunderstood the priorities of working Australians, and Wild offers the example of energy generation.

"The Finkel review found that up to one-tenth of income from lower income earners is going towards electricity bills now. I think the vast majority of working class people would be pretty indifferent between whether their energy is coming from wind or whether it's coming from coal. What they're mostly concerned about is that it's affordable." (Carey, 2018).

This comparison with findings from the Finkel report could show that Australian surfers do indeed care more about the environment and, regardless of earnings, would rather dig deep in their pockets to pay for an environmentally friendly product. Further research could identify and evaluate possible difficulties in modifying consumer behaviour, so that beneficial outcomes occur more speedily.

Final Words

The surfing industry is taking small steps towards sustainable practices since the birth of the first polyurethane surfboard in 1958 (Cavette, 2017). This research is revealing that there are varied views on how the future of surfing will evolve. From a sustainability perspective, the future depends on the quality of innovation, and whether consumers are adapting and embracing change. Small portions of the Australian surfing population are less-inclined to change yet collective opinion is strong when it comes to leaders taking action. This reinforces the idea of high-level action being enforced to satisfy consumers so that the surfing industry will embrace sustainability into its culture. 'Nudge' mechanisms could be an effective approach in shifting the behaviours of surfers towards the acquisition of environmentally friendly products, however, as with many profit-driven practices where environmental issues surface, regulation could be an easier path.

Climate change may not be alleviated at pace by collective individual behaviour. It is the top-level decisions on the regulation of materials, manufacturing processes and all of the associated responsibilities, which can only be made by governments and should have an

effective impact. However, collective pressure (as witnessed with the speed of change in the ensuing outlawing of plastic bags and single-use straws and bottles) can speed up the pressure on government to take action sooner, rather than waiting until the global environmental situation is so dire that any innovation is in vain. Surfers Against Sewage (SAS), a successful UK environmental group set up in the 1980s, rallied against raw sewage being discharged on British coastlines. Due to the ongoing activism and persistence from SAS, raw sewage in the UK is no longer allowed to be directly pumped into the sea (Dick-Read, 2007). Strategic pressure from groups such as SAS, Surfrider and Sea Shepherd is a vital component in making progress towards a greener surfing industry.

The Australian surfing industry is well-placed to embrace advancements of new materials, supported by the return of traditional resources (e.g. timber and plants) to demonstrate the feasibility of designing sustainable surfing products. Technological advancements are allowing manufacturers to produce surfboards that comprise of bio-foam blanks made of mushroom, sugarcane or lemongrass; protective outer layers of bioplastics, natural timber, cork, hemp or flax cloths; and glassed/waterproofed with bio-resins or even lanolin oil borrowed from sheep. This research report aims to be a catalyst for further action and it demonstrates that the majority of people are thinking the same thing. Industry folk, surfboard shapers and academics all agree that now is the time to implement strategies to ensure that the necessary changes occur very soon.

A framework for success should involve respected role models and leadership that maintains a future perspective when it comes to designing, thinking, planning and governing. A focus on heavy networking is key, investment in innovative tech to grow sustainably-driven brand competitiveness, and ultimately future acceptance. Other key elements to be considered is the planning around future regulation, collaborations of important industry influencers, and continual lobbying and pressure from environmental groups. This research has proved that there are manufacturers in the surfing industry who are interested in taking a new direction. Now is the ideal time to push forward while there is an increasing understanding of the need for a more sustainable and efficient system; activated by government, then industry and the community.

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8. Appendix

Appendix 1. Questionnaire Survey

I wish to invite you to participate in my research project, described below.

My name is Thomas Wilson and I am conducting this research as part of my Master of Sustainability degree at the University of New England. My supervisor is Professor Tony Sorensen.

Research Project	Environmental Initiatives and Consumer Behaviours in the Australian Surfing Industry
Aim of the Research	This research aims to explore existing environmental initiatives and consumer behaviours in the Australian surfing industry, in order to identify behavioural patterns and highlight areas of improvement.
Survey	The following survey will take approximately 10-15 minutes to complete.
Survey Questions	The survey questions will <i>not</i> be of a sensitive nature: rather they are general, and will enable me to understand attitudes and behaviours in the Australian surfing industry.
Confidentiality	No personal details will be gathered in the course of this survey. Participants may be anonymously quoted in the research if you consent to this.
Participation is Voluntary	Please understand that your involvement in this study is voluntary and I respect your right to withdraw from the study at any time without consequence and without needing to provide an explanation.
Use of Information	I will use data from a survey, and insight from interviews as part of my Master's thesis, which I expect to complete in June 2018. Content from the survey may also be used in academic journal articles and conference presentations before and after this date.
Upsetting Issues	It is unlikely that this research will raise any personal or upsetting issues but if it does you may wish to contact your local Community Health Centre or Lifeline on 13 11 14.
Storage of Information	I will keep all hardcopy notes and survey data in a locked cabinet in my home address in Sydney. Any electronic data will be kept on cloud.une.edu.au, UNE's centrally managed cloud server managed by the research team. Only the research team will have access to the data.
Disposal of	All the data collected in this research will be kept for a minimum of five years after successful submission of my thesis, after which it will be disposed of by deleting relevant

Information	computer files, and destroying or shredding hardcopy materials.
Approval	This project has been approved by the Human Research Ethics Committee of the University of New England (Approval No. HE17-193, Valid to 23/08/2018).
Researchers Contact Details	<p>Feel free to contact me with any questions about this research by email at twilso35@myune.edu.au</p> <p>You may also contact my supervisor, Professor Tony Sorensen, contacted by email at Tony.Sorensen@une.edu.au or by phone on (02) 6773 2880.</p>
Complaints	<p>Should you have any complaints concerning the manner in which this research is conducted, please contact:</p> <p>Mrs Jo-Ann Sozou Research Ethics Officer Research Services University of New England Armidale, NSW 2351 Tel: (02) 6773 3449 Email: ethics@une.edu.au</p> <p>Thank you for considering this request and I look forward to further contact with you.</p> <p>Regards, Thomas Wilson</p>

Implied Consent for Participants

- I have read the information contained in the Information Sheet for Participants and any questions I have asked have been answered to my satisfaction.
- I agree to participate in this activity, realising that I may withdraw at any time.
- I agree that research data gathered for the study may be published, and my identity will be unidentifiable as explained in the information sheet.
- I agree that I may be quoted using a pseudonym.
- I am over 18 years of age.
- In preservation of anonymity, I understand that no name or signature is required of me to give consent. By beginning the survey below, I am agreeing to participate in this study.

PLEASE NOTE: this survey is specifically for **surfers** and those **working in the surfing industry** who are 18 years of age and over.

RESEARCH AND ANALYSIS ON ENVIRONMENTAL CHALLENGES IN THE AUSTRALIAN SURFING INDUSTRY

This survey should take approx. **10-15 minutes** to complete.

INTRODUCTION

There is a body of research and information that suggests some elements of surfing equipment have been found to contain environmentally toxic components. A typical surfboard is made from polyurethane foam and polyester resin, both typically derived from highly processed petroleum. These materials can expose traditional shapers to toxins and chemicals, they cannot be recycled, and they decompose very slowly.¹ Progress has been made with the introduction of EPS and epoxy surfboards which is an improvement step, but still falls short of modern day sustainable targets.

The main objective of this survey is to categorize patterns of understanding and preferences that will lead to sustainable solutions for the surfing industry, an outcome that your carefully considered replies will potentially help realise. This research aims to influence all stages of the design, production, distribution, and use of surfing equipment – namely the main items of (but not limited to) surfboards, wetsuits and surf wax. The survey begins with specific questions to define respondents' knowledge of these issues and preferences for their management, followed by a basic range of questions to determine demographics.

This survey is an important part of a research project contributing towards a higher degree at University of New England, Armidale NSW. Participation in this survey is voluntary, any responses will be kept anonymous and collected for the purpose of analysis, and the information you provide will remain safely in the possession of the University of New England.

Part A – Questions to determine those who work in the surfing industry

Please respond by ticking the most suitable box(es) for each question.

1. Do you work in the surfing industry? (further clarification of roles is asked in Q2)

☐ Yes

☐ No

If you answered **Yes please continue with the following questions.**

If you answered **No please skip ahead to **Part B** on the following page**

2. Please choose those activities within the surfing industry to which you contribute from the list below. Please tick all the roles in which you participate.

☐ Professional / Competitive use of surfing products

☐ Product design

☐ Manufacturing and wholesale distribution

☐ Retail outlet

☐ Marketing

☐ Media reporting (newspaper, radio, TV, online)

☐ Financial sponsor of competitive events

☐ Education, training, and coaching

☐ Would rather not answer

☐ Other (please specify)_____

3. How long have you worked in the surfing industry?

¹ Sourced from www.sustainablesurf.org

- ☐ 0 – 4 years
- ☐ 5 – 9 years
- ☐ 10 – 14 years
- ☐ 15 – 19 years
- ☐ 20 years or more

Part B – Questions that seek opinions on proposed environmental solutions

Please indicate how strongly you personally feel about the following statements by ticking the appropriate boxes.

	strongly agree	agree	not sure	disagree	strongly disagree		No opinion
4. If there was a bigger/better range of environmentally friendly surfing equipment available (such as surfboards and wetsuits) it would make my decision easier to choose eco-friendly products.							
5. Producers of equipment in the surfing industry should play a bigger role in driving environmental initiatives – such as biodegradable packaging, return/repair schemes, and the use of plant-based materials (e.g. natural rubber in wetsuits) given the nature of surfing as an ocean-based activity.							
6. The Australian government should have incentives such as ‘eco business grants’ made available for manufacturers who are producing environmentally friendly surfing products.							
7. Consumer incentives from manufacturers, such as, receiving credit upon final return of an item, or the option to have a product repaired when returned, would help me choose environmentally friendly surfing products.							

PART B – continued

8. I would be willing to pay the following increase in price for environmentally friendly surfing equipment:

- ☐ Not willing to pay extra
- ☐ An additional 5%
- ☐ An additional 10%
- ☐ An additional 20%
- ☐ An additional 35%
- ☐ An additional 50%
- ☐ An additional 70%

PART C – Questions to establish consumer preferences when choosing surf products

The following statements follow a sliding scale of possible responses. Please answer as carefully as possible by ticking the most suitable box for each statement.

	Very often	Fairly often	Sometimes	Infrequently	Rarely		No opinion
9. When choosing surf-craft equipment such as surfboards or bodyboards , I consider the environmental impact of its materials and production methods before making a choice.							
10. When choosing a wetsuit , I consider the environmental impact of its materials and production methods before making a choice.							
11. I think about the environmental impact of surf wax before choosing which type of wax to purchase.							

PART C – continued

Questions 13-15 ask for your personal preferences of product features, when choosing the following three different products;

- 1) Surfboard
- 2) Wetsuit
- 3) Surf wax

- 12.** When choosing a **surfboard**, please consider the following characteristics of importance. Please rank from 1 to 5 (number 1 being the most important to you, and 5 being least important)

Its performance and durability	
Its Affordability	
Use of environmentally sustainable materials	
Location of manufacturer or shaper	
Brand of surfboard	

- 13.** When choosing a **wetsuit**, please consider the following characteristics of importance. Please rank from 1 to 5 (number 1 being the most important to you, and 5 being least important)

Its performance and durability	
Its Affordability	
Use of environmentally sustainable materials	
Location of wetsuit manufacturer	
Brand of wetsuit	

- 14.** When choosing **surf wax**, please consider the following characteristics of importance. Please rank from 1 to 5 (number 1 being the most important to you, and 5 being least important)

Its performance	
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Its affordability	
Use of environmentally sustainable materials	
Location of wax producer	
Brand of wax	

PART D – Questions to determine awareness of surfing products in an environmental context.

The following questions follow a sliding scale of possible responses. Please answer as carefully as possible by ticking the most suitable box for each question.

	Extremely familiar	Very familiar	Reasonably familiar	Slightly familiar	Not at all familiar		Unable to respond
15. How familiar are you with the materials and manufacturing processes involved to produce a traditional foam core and resin surfboard ?							
16. How familiar are you with the materials and manufacturing processes involved to produce a typical neoprene wetsuit ?							
17. How familiar are you with the materials and manufacturing processes involved to produce a typical block of surf wax ?							

18. How familiar are you with the product lifecycle of surfing equipment, and the effects to the environment if an item is not suitably disposed or recycled?							
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PART E – Questions to determine attitudes and behaviours on environmental topics, and Australian expectations.

The following questions follow a sliding scale of possible responses. Please answer as carefully as possible by ticking the most suitable box for each statement.

	strongly agree	agree	not sure	disagree	strongly disagree		No opinion
19. It is important to protect and replenish our natural environment (e.g. oceans and beaches) during our lifetime and for future generations.							
20. In light of Australia's surf culture and levels of participation in surfing, I think Australia should be a world leader in finding solutions to environmentally friendly surfing equipment.							
21. I think Australia is doing just fine as it is, with regards to the materials and manufacturing processes used to produce surfing equipment such as surfboards, wetsuits and surf wax .							
22. Collaborative efforts between key groups in the Australian surfing industry (such as the top surf brands, designers/shapers, and members of the local surfing community) would assist in achieving greater sustainability goals.							
23. Economic benefits (such as new jobs and investment in							

environmentally friendly surfing equipment) will flow from Australia taking action on progressive sustainable solutions.							
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PART E – continued

	Very often	Fairly often	Sometimes	Infrequently	Rarely		Unable to respond
24. I am involved in my local community e.g. volunteering, supporting local businesses, attending local initiatives such as Ocean Care Day, acknowledging Earth Hour, or buying from local farmers markets.							
25. At home, I/we separate the household waste into recycling bins every week for collection.							
26. I own a reusable beverage container (e.g. Keep Cup or metal water bottle) and use it as my main means of hydration on the go.							

PART F – Questions to determine demographics of survey respondents

Please answer as carefully as possible by ticking the most suitable box for each question.

27. What is your gender?

- ☐ Male
☐ Female
☐ Trans / Other
☐ Would rather not answer

28. What is your age?

- ☐ 17 or under
☐ 18 to 25
☐ 26 to 35
☐ 36 to 45
☐ 46 to 55
☐ 56 or over
☐ Would rather not answer

29. What is your highest level of education?

- ☐ No formal education
- ☐ High school / Secondary school certificates
- ☐ Further college studies
- ☐ Trade / Technical training
- ☐ University degree
- ☐ Post graduate degree e.g. Masters or PhD
- ☐ Would rather not answer

30. What is your employment status?

- ☐ Unemployed
- ☐ Student
- ☐ Part time employed
- ☐ Full time employed
- ☐ Home duties / Primary carer
- ☐ Retired
- ☐ Would rather not answer

31. What is your current income earning bracket? (per year)

- ☐ \$34,999 and under
- ☐ \$35,000 to \$74,999
- ☐ \$75,000 and over
- ☐ Would rather not answer

32. Where is your main field of work/study based?

- ☐ Mainly indoors
- ☐ Mainly outdoors
- ☐ Equal mix of indoors and outdoors
- ☐ Would rather not answer

33. What industry do you primarily work/study in?

- ☐ Environmental e.g. Agriculture, Forestry and Fishing
- ☐ Mining
- ☐ Construction, Trades and Manufacturing
- ☐ Retail, Hospitality and Food Services
- ☐ Transportation
- ☐ Technology, Scientific and Telecommunications
- ☐ Financial, Insurance and Real Estate
- ☐ Administrative
- ☐ Education and Training
- ☐ Health, Community and Social Assistance
- ☐ Arts and Recreation Services
- ☐ Homemaker / Primary carer
- ☐ Would rather not answer
- ☐ Other _____

34. How often do you usually go surfing? (assuming there are waves)

- ☐ Daily
- ☐ Few times a week

- ☐ Once a week
- ☐ Monthly
- ☐ Few times a year
- ☐ Never
- ☐ Unable to respond

35. What standard of surfer best describes you from the following options?

- ☐ Professional
- ☐ High level
- ☐ Competent
- ☐ Casual
- ☐ Learner
- ☐ Have never tried
- ☐ Unable to respond

~ END OF SURVEY ~

Thank You very much for taking the time to fill out this survey and help support further research on environmental issues in the surfing industry.

Results will be online at www.surfingsurvey.weebly.com/survey-results.html once all data is collected.

Appendix 2. Information Sheet for Interviewees

I wish to invite you to participate in my research project, described below.

My name is Thomas Wilson and I am conducting this research as part of my Master of Sustainability degree at the University of New England. My supervisor is Professor Tony Sorensen.

Research Project	Environmental Initiatives and Consumer Behaviours in the Australian Surfing Industry
Aim of the Research	This research aims to explore existing environmental initiatives and consumer behaviours in the Australian surfing industry, in order to identify behavioural patterns and highlight areas of improvement.
Interview	The proposed interview will take approximately 15 minutes .
Confidentiality	Any personal details gathered in the course of this interview will remain confidential, if you so wish. Participants may be quoted and identified in the research if you consent to this.
Participation is	Please understand that your involvement in this study is voluntary and I respect your right to withdraw from the study at any time without consequence and

Voluntary	without needing to provide an explanation.
Interview Details	<p>The proposed interview will take approximately 15 minutes.</p> <ul style="list-style-type: none"> - Upon agreeing to be interviewed, participants give consent for this interview to be recorded with an audio device. - Questions will not be of a sensitive nature: rather they are general, and will enable me to understand attitudes and behaviours in the Australian surfing industry. - Interviewee's name and contact details for the proposed interview have been sourced online. - You have been chosen due to your extensive knowledge and experience on the research topic. - The method of telephone interview has been chosen due to the distance in location from the interviewer, and also for the convenience of the interviewee. - Typical questions will include thoughts on the current status-quo in the surfing industry, what isn't working, and what could be improved. - The interview will take place in September 2017, at a time convenient to the interviewee's schedule and convenience. - The interviewee may prevent telephone contact, e.g. the use of a refusal form that can be returned to the researcher.
Use of Information	I will use data from a survey, and insight from interviews as part of my Master's thesis, which I expect to complete in June 2018. Content from the interview may also be used in academic journal articles and conference presentations before and after this date.
Upsetting Issues	It is unlikely that this research will raise any personal or upsetting issues but if it does you may wish to contact your local Community Health Centre or Lifeline on 13 11 14.
Storage of Information	I will keep all hardcopy notes and survey data in a locked cabinet in my home address in Sydney. Any electronic data will be kept on cloud.une.edu.au, UNE's centrally managed cloud server managed by the research team. Only the research team will have access to the data.
Disposal of Information	All the data collected in this research will be kept for a minimum of five years after successful submission of my thesis, after which it will be disposed of by deleting relevant computer files, and destroying or shredding hardcopy materials.
Approval	This project has been approved by the Human Research Ethics Committee of the University of New England. (Approval No. HE17-193 Valid to 23/08/2018).

**Researchers Contact
Details**

Feel free to contact me with any questions about this research by email at twilso35@myune.edu.au

You may also contact my supervisor, Professor Tony Sorensen, contacted by email at Tony.Sorensen@une.edu.au or by phone on (02) 6773 2880.

Complaints

Should you have any complaints concerning the manner in which this research is conducted, please contact:

Mrs Jo-Ann Sozou
Research Ethics Officer
Research Services
University of New England
Armidale, NSW 2351
Tel: (02) 6773 3449
Email: ethics@une.edu.au

Thank you for considering this request and I look forward to further contact with you.

Regards,

Thomas Wilson

Appendix 3. Telephone Script

Introduction

“Good morning/afternoon (**interviewee’s name**), my name is Tom Wilson, student at the University of New England in Armidale.

Thank you for agreeing to take part in a short interview to support my research project.

This interview forms part of a research project titled “**Environmental Initiatives and Consumer Behaviours in the Australian Surfing Industry**” and should take approx. 15-20 minutes to complete.

The purpose of this study is to examine recent environmental initiatives in the Australian surf industry; to see what is currently working and what could be improved. The study also looks at consumer behaviours in order to assess attitudes and habits when choosing surfing equipment.

I am attempting to obtain professional insight from you, (**interviewee’s name**), that will support other additional interviews and data from surveys, to provide a balanced and informative body of research.

Ethics approval has been granted by the Human Research Ethics Committee, at New England University in Armidale.

For further details, please refer to the **Information Sheet for Participants**, a copy of which was emailed to you prior to this interview.”

- Have you,, read the information contained in the Information Sheet for Participants and any questions you asked have been answered to your satisfaction? (Yes/No)
- Do you agree to participate in this activity, realising that you may withdraw at any time? (Yes/No)
- Do you agree that research data gathered for the study may be quoted and published using a pseudonym? (Yes/No)
- Do you agree to be identified in this research? (Yes/No)
- Do you agree to have this interview audio recorded and transcribed? (Yes/No)
- Would you like to receive a copy of the transcription of the interview? (Yes/No)
- Are you older than 18 years of age? (Yes/No)

Begin asking questions...

“Thank You very much for your time this morning/afternoon.”

“Goodbye”

Appendix 4. Interview Recruitment Email

Hi (interviewee's name),

My name is Tom Wilson, I am writing a research thesis as part of a Master's degree in Sustainability, titled: *Environmental Initiatives and Consumer Behaviour in the Australian Surfing Industry*.

I was wondering if I could conduct a short phone interview sometime within the next month. I would ensure that it is kept brief, approx. 15-20 minutes. The basis of my research is centred on environmental initiatives in the manufacturing and disposal of surfboards and other surfing equipment (wetsuits, wax etc.) and touching upon consumer behaviours, namely surfers and those working in the industry. I thought you'd be an obvious person to get in touch with, due to your progressive initiatives and sustainability values.

It would be fantastic to hear your thoughts.

Kind regards,

Tom Wilson

Appendix 5. Questionnaire Recruitment Email

Hi (participant's name)

My name is Tom Wilson, I am writing a research thesis as part of a Master's degree in Sustainability at the University of New England in Armidale NSW, titled: *Environmental Initiatives and Consumer Behaviours in the Australian Surfing Industry*.

I was wondering if you would be interested in taking part in a questionnaire survey that will take approx. 10-15 minutes to complete. The basis of my research is centred on environmental initiatives in the manufacturing and disposal of surfboards and other surfing equipment (wetsuits, wax etc.) and touching upon consumer behaviours, namely surfers and those working in the industry. Your responses will go towards a balanced and informative body of research that aims to provide a pathway to a greater understanding of the challenges facing surfers and the surfing industry.

Pre-requisites of this survey:

- You are over 18 years of age
- You have surfed and/or you work in the surfing industry
- Resident, or previous resident, of Australia.

If you are interested in completing the survey, please click on the link below and read the important information at the beginning, stated on the 'Information Sheet for Participants.'

<https://surfingsurvey.weebly.com/>

Kind regards,

Tom Wilson

Appendix 6. Interview Questions

- Can you briefly describe what role you have in the surfing industry and for how long?
- What direction do you see surfing and sustainability moving?
- Due to diminishing natural resources, in the near future do you think there will need to be any intervention to ensure tighter production guidelines around materials and manufacturing processes?
- Is there a future for mainstream surf products (boards and wetsuits) made of non-toxic materials that are 100% clean from processing of fossil fuels?
- Do you think surfers are reluctant to pay slightly more for a sustainable product (e.g. Patagonia wetsuit)?
- Do you think government incentives (financial or other) would encourage manufacturers of surfing equipment, such as yourself, to aim higher with eco-friendly products?
- What barriers do you think are preventing the main manufacturers of surfing equipment from going more eco-friendly?
- Do you think most surfers care enough about the natural environment to choose eco-friendly products?
- Do you have any personal views or experiences on the subject of environmental and sustainability challenges in the surfing industry?
- In your opinion, what is the biggest obstacle preventing further progress with environmental design and production of surfing equipment?

- Is it a challenge to keep up with environmental standards and remain competitive?
- Do you have any inspirational examples of developments in the surfing industry that bodes well for the future?
- Do you think there is a risk that the surfing industry could take an economical hit by adopting environmental initiatives, or is this a necessary step to move forward?