

2013/22: Should Australian states use nets, drum-lines and other shark culling measures?

What they said...

'We will always put the lives and safety of beachgoers ahead of the shark. This is, after all, a fish - let's keep it in perspective'

Western Australian premier, Colin Barnett

'An estimated 100 million sharks are killed every year around the world, a number that far exceeds what many populations need to recover'

Dan Stone, National Geographic, March 1, 2013

The issue at a glance

On December 27, 2013, Colin Barnett, the premier of Western Australia, announced a series of measures intended to reduce the likelihood of beachgoers in his state being attacked by sharks.

Included among these measures are the establishment of eight Marine Monitored Areas (MMAs) in eight popular Western Australian beach locations and the placing of baited drum-lines at each of these spots. The drum-lines will be cleared on a regular basis.

The MMAs will be patrolled by contracted commercial fishing vessels employed to kill any shark they detect larger than three metres. These fishing vessels will bolster the coverage already provided by Department of Fisheries and Western Australian Water Police vessels.

The measures have been introduced in response to an apparent increase in the number of fatal shark attacks in West Australian waters.

The Western Australian premier stated, in justification of the new measures, 'We have had 20 fatal shark attacks in WA in the past 100 years - seven of them in the past three years.'

However, the new Western Australian shark control procedures have caused concern among conservationists and others who have condemned them as unlikely to be effective in terms of protecting human life, while placing endangered species under increased pressure. The same claims have been made about the netting and drum-lining practices employed in New South Wales and Queensland. In October there was a call for the removal of nets from eastern beaches in response to the large numbers of whales being caught in the nets.

Background

[Most of the information contained in this background note has been drawn from the Wikipedia 'Shark net' entry (accessed at http://en.wikipedia.org/wiki/Shark_net and the 2006 Queensland Government Department of Primary Industries and Fisheries 'Report on the Queensland Shark Safety Program' (accessed at http://en.wikipedia.org/wiki/Shark_net)<http://www2.dpi.qld.gov.au/extra/pdf/fishweb/sharksafetyreport.pdf>)]

Shark control measures in Australia

There is a variety of shark control measures employed in different Australian states.

New South Wales

In New South Wales, 51 beaches are netted. The nets are maintained by the New South Wales Department of Primary Industries. The nets are generally 150 metres long, 6 m wide and 'bottom-set' on the seabed in depths of 10 metres. The nets can be 500 metres from the beach. The mesh is sized 50-60 centimetres. Nets are lifted every 24 to 48 hours for servicing so as to prevent rotting, to clean out debris and to remove dead sharks and other marine life. It is said that 35-50% of the sharks are entangled from the beach side. Acoustic 'pingers' have been fitted to the nets to warn off dolphins and whales and the nets are not in place in winter, the whale migration season.

The Department of Primary Industries states that the nets have 'never been regarded as a means of absolutely preventing any attacks', but help to deter sharks from establishing territories. The netting program began in 1937 and during the 70 year period during which the nets have been in operation, there has been only one fatal attack on a netted beach.

Queensland

In Queensland a 'Shark Safety Program' (SSP) has been in place on beaches since 1962. It relies on nets, drum lines or a combination of both to remove high risk sharks from a particular location.

In the 44 year history of the program, there has been one fatal attack on a beach with SSP measures in place. That occurred in January 2006.

The program was initially restricted to the Gold and Sunshine Coasts. Requests from local governments, however, led to inclusion in the program of other beaches throughout the state, and minor extensions to the program occurred up to 1996.

Beaches with shark control equipment installed tend to be close to high human population densities where the chance

of shark-human interaction is highest.

Nets are 186 metres in length. Each net is made up of 3 x 62 metre sections. The nets have a depth of 6 metres and a mesh size of 500 millimetres. They are marked with inflatable buoys and are anchored to the seabed using high-holding anchors.

The nets are set adjacent to and generally parallel to the shoreline according to the prevailing tides and currents. Their distance from shore is determined by topographical and sea conditions/feature of each area. Equipment is usually placed far enough offshore to preclude bather interaction.

For the drum line method, a 14/0 shark hook is suspended from an inflatable buoy using a 5 or 6 millimetre galvanised chain trace two metres long. The depth of the hook is adjusted to suit local conditions. The hook generally is baited every other day with fresh sea mullet, which is a naturally occurring food source for sharks. Each drum line is anchored to the seabed using varying lengths of 12 millimetre polypropylene rope and a high-holding anchor. The fresh bait attracts sharks and the float provides high impact resistance to set the hook if the bait is taken. Equipment is serviced by independent contractors who work under Queensland Boating and Fisheries Patrol (QBFP) supervision. The program operates at 10 Queensland centres and gear is present on 84 beaches.

In both New South Wales and Queensland there have been fatalities at non-protected beaches; however, there have been severe shark attacks on beaches that are protected by nets.

South Australia and Victoria

South Australia and Victoria have no direct and active anti-shark measures however South Australia conducts over-flights of beaches and maintains a data base of shark sightings.

Western Australia

Prior to the recent Barnett Government announcement, Western Australia had no specific shark catching equipment in place; however, there is a system of aerial surveillance at selected locations from October to February. This is used to alert authorities to the presence of dangerous sharks near beaches

Under the system about to be imposed, drumlines will be set up at eight populous beaches. The metropolitan Perth beaches where the devices will be set are: Ocean Reef/Mullaloo, Trigg/Scarborough, Floreat/City Beach, Cottesloe/North Cottesloe and Port Leighton. In the South West region, drum lines will be set at Old Dunsborough, Meelup/Castle Rock and Gracetown - where the most recent fatality occurred - up until the end of school holidays in February. Thereafter, surfing hotspots south of Cape Naturaliste will be the focus.

Any white shark, tiger shark or bull shark greater than 3m total length caught on the drum-lines will be 'humanely destroyed'. Current directions on the humane destruction of large sharks 'involve the use of a firearm'. Any sharks that are dead or destroyed will be tagged and taken offshore (distance to be confirmed) and discarded;

All other animals taken on the drum lines will be released alive 'where possible'. Any animals which are dead, or considered not in a condition to survive, are to be humanely destroyed, tagged and taken offshore for disposal.

The drum lines will be patrolled for 12 hours each day, between 6am and 6pm, seven days a week. Drum lines will be baited at both the commencement of, and prior to the end of, each patrol day, while all used baits will be disposed onshore. Exemptions from 'various state legislation' which prohibit the take, or attempted take, of protected shark species will be provided.

It is likely a 50m exclusion zone will be implemented around each drum line. Only vessels operated by the contractor employed to clear the drum-lines will be allowed within the exclusion zone. The successful firm will also respond to shark threats, including the deployment of additional drum lines within 30 minutes.

The Western Australian government has called for professional shark fishermen (apparently those who will also check the drum-lines) to apply to patrol the state's waters and kill any shark bigger than three metres spotted in the designated zones.

Kill rate

The ABC's Fact Check site has stated, 'Contrary to common misconception, nets and drum-lines are not meant to be protective barriers for swimmers. They are meant to kill dangerous sharks.'

However, efforts are made in both Queensland and New South Wales to release sharks if they do not pose a threat to people, although the reality is that most sharks that encounter the devices do not survive. In Queensland, if a captured shark is found alive when the nets and drum-lines are cleared, it will be euthanised if dangerous or released alive where possible, if not.

In the first 11 months of 2013, 633 sharks were captured as part of the Queensland program, of which 297 were considered dangerous. Of the sharks captured 481 sharks died in shark control equipment, 122 were humanely killed following capture as they were considered dangerous, and 30 were released alive as they were considered non-dangerous. Thus, of the 633 sharks caught in nets, less than 5 per cent survived and were released.

In New South Wales during the 2011-12 program, 158 sharks were found entangled in nets, 5 per cent of which (56 sharks) were found alive and then released.

In Queensland, it has been noted that Hammerhead sharks and rays were particularly vulnerable to net capture, whereas higher catch rates of tiger sharks were observed for drum-lines. Nets caught more marine mammals, whereas drum-lines exhibited higher catch rates of the threatened loggerhead turtle. Survival was lower in nets than drum-lines. By-catch species (turtles and marine mammals) were able to swim to the surface to breathe when they were hooked

on drum-lines, enhancing their survival potential.

Internet information

A note on shark attack statistics

Shark attack statistics need to be handled with care. Some sites list all possible attacks, including, for example, deaths which may have resulted from drowning and the corpse was subsequently mauled by a shark. Other sites include only what are referred to as 'unprovoked attacks'. On these sites, surfers and swimmers attacked by sharks are regarded as 'unprovoked attacks'; fishermen and deep sea-divers and others who have actively made contact with one or more sharks and are then attacked are sometimes regarded as being the victims of 'provoked' attacks. Some sites also exclude incidents where there have been no injuries sustained. Further, Queensland and New South Wales respective claims to only one shark-related fatality since the imposition of their shark protection measures refer only to those beaches where these measures are employed. They also do not tend to refer to the non-fatal attacks which have occurred on protected beaches.

The Shark Survivors Internet site maintains a comprehensive listing of shark attacks world-wide, including those of less severity. It includes deaths which are suspected to be shark-related and where possible includes both 'provoked' and 'unprovoked' attacks. The site's numbers are thus higher than those found on other sites. It also includes listings of historical attacks. At the time of publication of this issue outline the Shark Survivors Internet site was current to December 5, 2013.

The file can be accessed at <http://sharkattackfile.info/shark-attack-queries-general/complete-shark-attack-file.asp>

The Taronga Conservation Society Australia gives shark-attack statistics for Australia only. It tallies attacks and gives totals for fatalities, injuries and attacks that did not result in injury. This state-by-state detail is supplied only for 'unprovoked' attacks. It includes attacks back to 1791 and gives tallies by State sub-totals. It gives the year date and location of only the most recent fatality in each State. The site gives an Australia-wide total for 'provoked' attacks and again lists fatalities, injuries and attacks that did not result in injury.

This data can be accessed at <http://taronga.org.au/animals-conservation/conservation-science/australian-shark-attack-file/latest-figures>

The Taronga Conservation Society Australia also gives state-by-state data for just the preceding year (currently 2012).

This can be accessed at <http://taronga.org.au/animals-conservation/conservation-science/australian-shark-attack-file/annual-australian-shark-attack-report-summary-2012>

The Florida Museum of Natural History maintains an International Shark Attack File. The site includes an enormous amount of data. It gives data sub-divided according to the area of the world where the attack occurred. It looks in particular at White Shark attacks and gives data indicating time of day, age of victim, sex of victim and victim's race. Some of this data is presented in graphs. It should be noted that not all this data is fully contemporary. The most recent shark attack listed for Western Australia, for example, is said to have occurred in 2012. The total number of fatalities listed for that State is 14, compared to the 20 currently claimed over the last hundred years by the State's premier. Such discrepancies underline the different classification principles different groups apply when making their tallies.

The International Shark Attack File can be accessed at <http://www.flmnh.ufl.edu/fish/sharks/statistics/statistics.htm>

On December 27, 2013, the Western Australian premier, Colin Barnett, and the Fisheries Minister, Ken Baston, issued a joint press release titled 'Improving shark safety at popular WA beaches'. The media release details many of the provisions of the new shark management practices. The full release can be accessed at

<http://www.mediastatements.wa.gov.au/pages/StatementDetails.aspx?listName=StatementsBarnett&StatId=8039>

On December 27, 2013, WAtoday.com.au published a report titled, 'Premier Colin Barnett defends shark killing as WA bait line locations revealed'. The report includes numerous quotations from Premier Barnett, defending his government's new strategies.

The full text of the report can be found at <http://www.smh.com.au/wa-news/premier-colin-barnett-defends-shark-killing-as-wa-bait-line-locations-revealed-20131227-2zyvf.html>

On December 27, 2013, news.com.au published a report titled 'WA govt's shark kill plan proceeds' giving details of the areas to be protected under the State's new shark management scheme. The full text of this article can be found at

<http://www.news.com.au/national/breaking-news/wa-govts-shark-kill-plan-proceeds/story-e6frfku9-1226790667872>

On December 24, 2013, WAtoday.com published a report titled 'How WA's shark 'kill zones' will work'. The report gives details of how Western Australia's 'shark mitigation policy' is intended to work.

The full text can be accessed at <http://www.watoday.com.au/wa-news/how-was-shark-kill-zones-will-work-20131224-2zvmn.html>

On December 22, 2013, an ABC News Fact Check was published. The fact check examines the question 'Can governments protect people from killer sharks?' The piece is a very effective interrogation of a number of related

issues. It suggests both that culling processes can reduce human risk. However, it also indicates that there are likely to be significant environmental impacts.

The full text of this fact check can be accessed at <http://www.abc.net.au/news/2013-12-22/can-governments-protect-people-from-killer-sharks/5158880>

On December 16, 2013, ABC News published a report titled 'Experts criticise shark baiting saying it will increase risks for swimmers, surfers and divers'. The report collects the views of a number of marine experts that drum-lines may increase the risk of shark attack.

The full text of this report can be accessed at <http://www.abc.net.au/news/2013-12-11/baiting-for-sharks-will-lead-them-into-swimming-areas/5150582>

On December 12, 2013, The Conversation published a comment by Carl Meyer titled 'Western Australia's shark culls lack bite (and science)' Carl Meyer is an assistant researcher at the University of Hawaii. The full text of this article can be accessed at <https://theconversation.com/western-australias-shark-culls-lack-bite-and-science-21371>

On December 12, 2013, Perth Now published a report titled 'Baited drum lines to catch sharks 'create more dangerous situation' says PhD student'. The report considers the claims of one expert that baited drum-lines may attract sharks.

The full text of this report can be accessed at <http://www.perthnow.com.au/news/western-australia/baited-drum-lines-to-catch-sharks-create-more-dangerous-situation-says-phd-student/story-fnhocxo3-1226780883945>

On December 10, 2013, WAtoday.com.au published a report titled, 'WA government unveils shark "kill zones"'. In addition to giving early details of the new scheme is quotes a range of opinions from those supporting and opposing it.

The full text of this report can be found at <http://www.watoday.com.au/wa-news/wa-government-unveils-shark-kill-zones-20131210-2z3m0.html#ixzz2oMJOE4RU>

On December 10, 2013, WAtoday.com.au published a report titled, 'WA shark policy a 'cull by another name'. The report is largely a collection of expert opinion opposed to the new Western Australian shark management scheme.

The full text of the report can be found at <http://www.watoday.com.au/wa-news/wa-shark-policy-a-cull-by-another-name-20131210-2z48d.html>

On November 28, 2013, The Western Australian published a report titled 'Get sharks off protected list: Buswell'. The report details the demand from Western Australian Fisheries Minister Troy Buswell that sharks be removed from the Federal protected species list.

The full text of this report can be accessed at <http://au.news.yahoo.com/thewest/a/20048646/get-sharks-off-protected-list-buswell/>

On November 25, 2013, the ABC News ran a report titled, 'Shark cull debate reignited after fatal attack in WA'. The report details reactions to the recent death of a surfer taken by a shark in waters off Gracetown. It gives extensive comments from those proposing a shark cull and those opposed to such measures.

The full text of the report can be accessed at <http://www.abc.net.au/news/2013-11-25/shark-cull-debate-reignited-after-fatal-attack-in/5115208?section=wa>

In 2013 a Canadian study of the global exploitation of sharks (funded by grants from the [Canadian] National Science Foundation and the Natural Sciences and Engineering Research Council of Canada) provided detailed world-wide data on the number of sharks being fished annually. This provides a graphic factual context for claims that many shark species are facing extinction.

This is a detailed document; however it has an initial abstract which summarises many of its findings. The report can be accessed at http://wormlab.biology.dal.ca/pressmaterial/catches_exploitation/content/Worm_etal_EMBARGOED.pdf

Western Australians for Shark Conservation is a W.A, Perth based conservation group dedicated to the preservation of sharks in Western Australian waters. It is particularly opposed to the State's recently announced 'Shark Mitigation Policy'. The site includes comment from a range of experts and politicians supporting its position.

The site can be accessed at <http://www.wascgroup.com/>

Shark Angels is an international lobby group that uses education and advocacy programs to protect sharks, the ocean's apex species. They have an Australian chapter.

Their Internet site aggregates media treatments that support their point of view. It currently features an opinion piece arguing against the Western Australian cull. It can be accessed at <http://sharkangels.org/index.php/media/news/218-shark-cull-really>

The Western Australian Department of Fisheries has a public information site in shark safety. This site can be accessed at <http://www.fish.wa.gov.au/Education-and-Partnerships/Shark-Hazard/Shark%20safety/Pages/Shark-safety-FAQ.aspx/>

On October 28, 2013, the ABC's Environment site published a comment by Alexia Wellbelove. Wellbelove is a zoologist with the Humane Society International, a conservation and animal welfare organisation. The comment is titled 'We need to remove shark nets now' and refers to recent incidents of whales and other species being caught in shark nets. The full text of this article can be found at <http://www.abc.net.au/environment/articles/2013/10/29/3879318.htm>

On April 17, 2013, Australian Geographic published an analysis titled 'Fatal shore: Why so many shark attacks?' The article looks at the atypical number of shark attacks that have occurred in Western Australian waters and suggests a number of factors which may have influenced this. It calls for further research. The full text of this article can be accessed at <http://www.australiangeographic.com.au/topics/history-culture/2013/04/fatal-shore-why-so-many-shark-attacks-/>

On January 11, 2013, The Conversation published a comment by Christopher Neff, third-year doctoral candidate at the University of Sydney, School of Arts and Social Sciences and Department of Government and International Relations. His PhD research topic focuses on the 'politics of shark attacks.' The comment is titled 'Shark bite prevention should be led by evidence, not politics'. Christopher Neff argues that there are other more effective means of reducing the risk of shark attack than pre-emptive shark hunts. The full text of this comment can be accessed at <http://theconversation.com/shark-bite-prevention-should-be-led-by-evidence-not-politics-11542>

On October 22, 2012, The Conversation published a comment by Christopher Neff, third-year doctoral candidate at the University of Sydney, School of Arts and Social Sciences and Department of Government and International Relations. His PhD research topic focuses on the 'politics of shark attacks.' The comment is titled, 'The great shark debate: to cull or not to cull?' Neff argues that there are more effective and ecologically responsible means of responding to shark attacks than via culls. The full text of this comment can be found at <http://theconversation.com/the-great-shark-debate-to-cull-or-not-to-cull-9550>

On September 12, 2013, The Guardian published a report titled 'Plan to kill great white sharks that swim too close to Australian beaches'. The report gives background to the issue and highlights some of the earlier statements of premier Barnett that show a readiness to cull sharks. The full text of this report can be found at <http://www.theguardian.com/environment/2012/sep/28/great-white-sharks-killed-australia>

On July 16, 2012, The International Business Times published a report by Mark Johanson titled 'Shark Attacks In Western Australia Killing Tourism'. The report looks at the effect of a series of shark attacks and fatalities on Western Australian tourism. The full text of this report can be accessed at <http://www.ibtimes.com/shark-attacks-western-australia-killing-tourism-723573>

On July 15, 2012, The Conversation published a comment by Christopher Neff titled 'How government can help us avoid shark "attacks"' The comment focuses on the importance of a change in public attitudes and on better public education about shark safety. The full text of this article can be accessed at <http://theconversation.com/how-government-can-help-us-avoid-shark-attacks-8255>

On August 2, 2010, News Discovery carried a comment and analysis by Michael Reilly which suggests that popular reactions to shark attacks are extreme and that sharks represent less of a threat to human life than is often supposed. Reilly draws substantially on data taken from the University of Florida's International Shark Attack File. The piece is titled 'Shark Attacks: What Are the Odds?' and can be accessed at <http://news.discovery.com/animals/sharks/shark-attacks-what-are-the-odds-20100802.htm>

Arguments against Australian states using nets, drum-lines and other shark culling measures

1. Sharks do not pose a major threat to human beings

Opponents of stronger shark control measures claim such measures are an over-reaction as the threat sharks pose to human life is generally exaggerated.

On August 2, 2010, Michael Reilly posted a report on News Discovery which included some statistics on the extent of the relative risk represented by shark attacks in the United States and elsewhere. Reilly stated, 'On average, there are about 65 shark attacks worldwide each year; a handful are fatal. You are more likely to be killed by a dog, snake or in a car collision with a deer. You're also 30 times more likely to be killed by lightning and three times more likely to drown at the beach than die from a shark attack, according to ISAF (the University of Florida's International Shark Attack File).'

Reilly elaborated, 'The New England Journal of Medicine reported that from 1990 to 2006, 16 people died by digging until the sand collapsed and smothered them. ISAF counted a dozen U.S. shark deaths in the same period. Clearly, you'd be safer in the water, with the sharks.'

Similar claims have been made in relation to shark attacks in Australia. Based on figures found in the Taronga

Conservation Society Australian Shark Attack File, the Taronga Conservation Society Internet site states, 'Compared to fatalities from other forms of water related activity the number of fatal shark attacks in Australia is extremely low. In the last 50 years, there have been 50 recorded unprovoked fatalities due to shark attack, which averages one per year.' The Taronga Conservation Society site further claims, 'Based on the same calculations used by the International Shark Attack File for the "annual risk of death during one's lifetime" from various activities in America - Australians have a 1 in 3,362 chance of drowning at the beach and a 1 in 292,525 chance of being killed by a shark in one's entire lifetime.' In a further comparison, the Taronga Conservation Society site notes, 'There is an average of 121 deaths...from people drowning at Australian beaches, harbours and rivers each year (Royal Life Saving Society National Drowning Report 2011). During the period 1969-2000, in NSW alone, 218 rock fishermen were swept off the rocks and drowned. In that same period there were 40 shark encounters recorded in NSW with only two fatalities reported.'

2. Shark culls and other related measures threaten sharks and other marine species

Internationally, shark populations are in serious decline, mostly due to the impacts of fishing, particularly for shark fins which are mostly sold into Asian markets. Some estimates place the decline as as great as 90% of some species. The Australian Marine Conservation Society has noted that an estimated 100 million sharks are killed each year. This equates to 270,000 sharks fished each day. This rate of exploitation is pushing many species toward extinction. In Australia, although there is less data available, the data there is on shark populations suggests that they are in decline here also.

In Australia, most sharks can be legally caught by commercial and recreational fishers. However, due to declines in numbers, a handful of species are now listed as 'threatened' under the Environmental Protection and Biodiversity Conservation Act 1999. Listed as 'critically endangered' are the Grey Nurse Shark and the Spertooth Shark. Listed as 'endangered' is the Northern River Shark. Listed as 'vulnerable' are the Whale Shark, the [Great] White Shark, the Dwarf Sawfish or Queensland Sawfish, the Freshwater Sawfish and the Green Sawfish.

Under the Environment Protection and Biodiversity Conservation Act 1999, it is an offence to 'kill, injure, take, trade, keep, or move any member of a listed threatened species on Australian Government land or in Commonwealth waters without a permit'.

Despite this, Queensland, New South Wales, Hong Kong and South Africa are the only places in the world that use shark nets as a means of trying to protect beaches and reduce shark numbers. Shark nets have a serious impact on shark numbers. Since 2008, fisheries data shows that a total of 54 great white sharks have been culled by the netting or meshing programs in New South Wales and Queensland. The nets also inadvertently killed 13 endangered grey nurse sharks during this period.

Dr Carl Meyer of the Hawaii Institute of Marine Biology notes that large scale culling 'runs the risk of ecosystem-level cascade effects where a general lack of sharks results in boom or bust in populations of species further down the food chain'.

It is claimed that both shark nets and drum-lines also kill large numbers of species other than those for which they are set, usually referred to as by-catch. New South Wales and Queensland government reports show that the species of marine life caught and killed in the nets used by those states are overwhelmingly "non-target" species, which includes dolphins, turtles, whales and dugongs.

Less than 18 per cent of marine life caught on drum lines in South Africa in the 2011 to 2012 financial year have been great white or tiger sharks, according to statistics published by the KwaZulu-Natal Shark Board - the unit responsible for maintaining the lines in that province. According to the South African report, a humpback whale and an endangered leatherback turtle were among 97 animals caught by drum lines since their installation in February 2007. A Bond University study commissioned by the West Australian Government last year on the best shark hazard mitigation strategy for Western Australia, recommended against the use of drum lines. It was noted in the Bond study that the unintended catch of harmless marine species, including dolphins, would be especially high within the first years that drum lines were deployed, until the population loss lead to a decline in the numbers trapped.

3. Shark culls and other related measures do not guarantee beachgoers' safety

Opponents of many of the stronger measures used to block or kill sharks claim they are ineffective in guaranteeing beach-users' safety.

Shark nets, for example, do not stretch across the entire length of a beach and do not extend from the sea floor to the water's surface. Shark Defence Australia has claimed that 40% of sharks caught in shark nets in Queensland and New South Wales are caught on the beach side of the nets. It is claimed that this demonstrates the nets' ineffectiveness as they clearly allow significant numbers of sharks through to a point where there are human swimmers.

It has further been claimed that baited drum-lines can attract more sharks to an area and so may increase the level of risk faced by swimmers and surfers.

Christopher Neff, an American PhD student at the University of Sydney conducting the first doctoral thesis on the politics of shark attacks, has claimed that West Australian beachgoers would actually be more at risk of attack if the planned drum lines went ahead

Mr Neff has stated, 'I'm befuddled by the rationale of how baiting sharks towards the beaches is meant to reduce the risk of a shark attack.'

Animals Australia spokeswoman Lisa Chalk has similarly claimed that it was common sense that baiting sharks would only attract more, which would increase the likelihood of attacks.

It has also been noted that it seems contradictory for Western Australia to be in the process of banning shark cage

tourism because, the Western Australian Department of Fisheries has stated, 'there are concerns that sustained activities to attract sharks to feeding opportunities have the potential to change the behaviour patterns of those sharks' at the same time as the State is going to place drum-line baits for sharks.

Critics of nets and baited drum-lines also claim that their relative ineffectiveness makes them doubly dangerous as they lull swimmers into a false sense of security, leading them to the mistaken belief that they are in a protected area where they do not have to be alert for sharks.

Greens Senator, Rachel Siewert, has claimed in reference to the West Australian measures, 'I think they will give a false sense of security to those using the oceans [and] they won't actually address the issues.'

4. Beachgoers swim and surf at their own risk

Many of those opposed to stronger measures being employed to protect beachgoers from shark attacks argue that this call springs from a misperception about the nature of the marine environment.

There are those who claim that coastal waters are not essentially human recreation areas. Rather, it is claimed, they are marine habitats and are the natural territory of the various marine species that live within them, including sharks. It is further claimed that those who have a genuine respect for the marine environment recognise and accept that they are taking a certain risk every time that they enter the water.

Paul Sharp, an active recreational diver and shark expert, living in Western Australia, has stated, 'I think anybody who genuinely loves the ocean has a pretty realistic understanding of what the real risks are and they choose to take those risks.'

This risk is routinely recognised by those who organise ocean-based competitive swimming events. For example, each year Freshwater, one of Sydney's northern beaches, runs the Barney Mullins Swim Classic. In 2014, the event will be held on Sunday March 2. All competitors are formally advised: 'Ocean swims are demanding and potentially dangerous events. Risks include drowning, natural obstacles, man-made or -controlled obstacles, and marine attack. The Swim takes place in the open ocean. Swimmers enter at their own risk. You should have a medical check prior to entry, and prepare for the event by training. Water safety craft will patrol the course for the duration of The Swim. If a swimmer feels unable to proceed further in the swim, the attention of the water safety personnel should be sought.'

This standard warning is issued prior to all such events and is a clear indication that event organisers and those who take part acknowledge the hazardous nature of ocean-swimming and accept responsibility for their safety.

Western Australia's Department of Fisheries includes the following warning on its Internet site: 'Beaches are aquatic ecosystems. When you enter the ocean, you must remain vigilant of all risks associated with the aquatic environment, including the risk from sharks. While it is impossible to guarantee that you will not encounter a shark while swimming, the risk of shark attack is extremely low, despite the number of attacks in WA in recent years...If you are not happy to accept the risk, albeit low, do not enter the water.'

5. There are a variety of other means that can be used to protect humans against shark attack

Opponents of shark culling in all its forms argue there are other ways of protecting humans against shark attacks.

Firstly, it is claimed, there needs to be a general change in public perception of ocean environments so that all beach-users recognise the inherent risk of these locations. Christopher Neff, an American PhD student at the University of Sydney conducting the first doctoral thesis on the politics of shark attacks, has claimed, 'education means treating a trip to "the beach" like you would a trip to "the bush". This shift in thinking changes our expectations of safety and preparation. Looking at the ocean as the wild, (which it is) means making an informed choice about the risks we are taking based on our behaviour.'

Mr Neff has also suggested that some coastal waters may need to be designated unsafe for swimming or surfing because of shark risk, just as they are because of coastal topography and wave conditions. He has noted, 'In Recife, Brazil, they have made surfing illegal at certain beaches because of the number of shark attacks. Last week, [in the first week of July 2012], the city of Chatham in Cape Cod, banned swimming within 100 meters of seals.'

Mr Jeff has also suggested that beachgoers need to be comprehensively educated about behaviour that contributes to their safety. He claims that the information that needs to be made available is more complex than the warnings which are generally given and notes fifteen environmental/situational conditions which should be avoided if swimmers, surfers and other beach-users are to minimise their risk of shark-attack.

Other techniques that might be used included well-resourced shark-spotting programs. In Cape Town, the Shark Spotters program, introduced in 2004, works at eight beaches. It employs 30 people who spot and record white sharks in the inshore area, warning and evacuating water-users when white sharks are present. The organisation has recorded more than 1,500 shark sightings and the program has been successful at reducing risk.

Arguments in favour of Australian states using nets, drum-lines and other shark culling measures

1. Sharks represent a serious threat to Australian beachgoers

It has been claimed that average numbers of human lives lost due to shark attacks is a misleading way of viewing the danger that sharks can pose to beachgoers. According to this point of view there are some areas of the world where sharks represent a far more significant threat than they do in others.

Those calling for stronger measures against shark attacks note that to claim that as an average over the last fifty years one human life per year has been lost as a result of shark attacks in Australian waters is not an adequate response to the spate of deaths that has occurred in West Australian waters over the last few years.

Six people have been killed by suspected great white shark attack in West Australian waters since September 2011,

including three fatalities within less than two months. Since November 2000 there have been 25 shark attacks or shark-related fatalities reported in West Australian waters.

It has been noted that it is not only in West Australian waters that there have been significant clusters of shark attacks. Other clusters have been reported around the world, in the waters off Mexico, Hong Kong, New Zealand, Brazil and Iran. The reason for these clusters of attacks is not known.

It has also been claimed that there has been an increase Australia-wide in the number of attacks and deaths occurring as a result of sharks.

John West, the curator of the Australian Shark Attack File at Taronga Zoo, has noted that there have been 207 unprovoked shark attacks in Australia over the last 20 years, and that 124 of those have occurred in the last 10 years. Mr West has further noted that in West Australian waters, in the twelve months prior to April 2013, there was a total of eight recorded shark attacks, seven of them from great whites. This compares with an average for West Australia of 4.4 attacks each year over the past decade.

The need to protect human life is the principal reason given by the Western Australian premier, Colin Barnett, for the new strategies his government will be introducing.

Mr Barnett has stated, 'I realise that many people object to the catching of sharks; however, the government has taken this measure after long consideration. It wasn't a knee-jerk reaction. We've been looking at this for some time.' 'Our aim is to provide greater protection to beach goers.'

2. Stronger shark control measures succeed in reducing the loss of human life

Supporters of shark culls and other stronger measures to reduce shark numbers in popular fishing, swimming and boating areas claim that these measures are successful in reducing the loss of human life.

Critics of such measures usually state that shark-related fatalities continue to occur despite them. Supporters of such measures argue that though they may not succeed in totally eliminating the risk of attack and death, they do succeed in substantially reducing that risk. That is, they claim, in those areas where such measures are employed the number of lives lost or people injured due to shark attack is lower than it would otherwise have been.

In a Fact Check posted on the ABC's Internet site on December 22, 2013, it was stated, 'Historical shark attack figures suggest that the use of shark nets and drum-lines does markedly reduce the incidence of shark attack when implemented on a regular and consistent basis.'

The following figures are offered in support of the ABC Fact Check claim, 'In Queensland, there has been only one fatal attack on a controlled beach since 1962, compared to 27 fatal attacks between 1919 and 1961. Statistics from the NSW Department of Primary Industries indicate that before nets were introduced in NSW in 1936 there was an average of one fatal shark attack every year. There has been only one fatal attack on a protected beach since then and that was in 1951.'

There have been similar successes in South Africa where, in KwaZulu-Natal, a well-organised shark control program has reduced fatalities from shark attack at Durban beaches to zero. South Africa employs an extensive system of nets and drum-lines. At Durban, from 1943 until the installation of nets in 1952, there were seven fatal attacks, since then there have been none. Similarly, at KwaZulu-Natal's other protected beaches, from 1940 until most of those beaches were first netted in the 1960s, there were 16 fatal attacks and 11 resulting in serious injury. In the three decades since nets were installed there have been no fatal attacks at those beaches and only four resulting in serious injury.

Most of the shark nets deployed in South Africa are 214 metres long and 6 metres deep and are secured at each end by two 35 kg anchors; all have a stretched mesh of 51 cm. The nets are laid in two parallel rows approximately 400 metres offshore and in water depths of 10-14 metres. A drum-line consists of a large, anchored float (which was originally a drum) from which a single baited hook is suspended. Most beaches are protected either by two nets or by one net and four drum-lines, but the quantity of gear varies from beach to beach. Durban, the largest coastal city and holiday resort in South Africa, has 17 nets, each 305 metres in length, which cover all the popular swimming beaches between the mouth of the Umgeni River and the harbour entrance.

3. Shark attacks can damage the economies of coastal communities

It has been noted that shark attacks can have a dramatic effect on tourism in coastal communities and so seriously harm their economies.

On September 28, 2011, there was a shark attack at Fish Hoek Beach, near Cape Town, South Africa that resulted in a swimmer, Michael Cohen, losing portions of both of his legs.

The attack on Michael Cohen was filmed and drew more than a million Internet viewers. A survey of more than 400 people taken a month after the attack by the local surf lifesaving club and a community organization found that 17 percent of respondents had cancelled their planned vacation at Fish Hoek Beach following the attack.

On July 30, 2012, a great white shark attacked Christopher Myers at Ballston Beach in Truro, Cape Cod, in the northern United States. The attack had an immediate negative effect on the local economy.

Eric Gustafson, the owner of Fun Seekers, the oldest surf school on Cape Cod, has stated, 'The phones stopped ringing, like literally stopped for the first time ever.'

Wendy Northcross, the chief executive office of the Cape Cod Chamber of Commerce, has claimed, 'A series of shark attacks, even if they occurred on the Outer Cape, would affect tourism across the entire region.'

Ms Northcross has stated, 'After the attack on Mr Myers last summer, my office fielded scores of concerned calls.

Many tourists coming here for a summer vacation do not distinguish between the regions or towns. It's Cape Cod that gets the reputation...'

Similar concerns have been expressed in Australia. On July 16, 2012 (after the fifth fatal shark attack in West Australian waters in ten months) Western Australia's Fisheries Minister, Norman Moore, told the International Business Times that he was worried that the spate of attacks could seriously harm the state's lucrative tourism industry, which draws tens of thousands of tourists each year.

Mr Moore stated, 'Those people who want to come here to enjoy an ocean experience will be turned away because of this situation.'

Similar concerns have been expressed after the most recent shark-attack fatality in West Australian waters. West Australian MP, Troy Buswell, has demanded that great white sharks be removed from the Federal protected species list, warning that a series of attacks is threatening the South West's economy.

Surf stores and schools in West Australia claim they had sustained a drop in sales of surfboards, surfing lessons and water-based leisure equipment, with one Dunsborough store reporting 92012-13) its quietest year in two decades.

4. Shark culls and other measures are not intended to threaten the survival of sharks or other marine species

Supporters of shark culls, baited drum-lines and shark nets argue that they have no intention of hunting any marine species to extinction, they simply wish to protect human lives.

Keith Halnan, a surf instructor at Redgate Beach, Western Australia, has stated, 'We do need to cull. A lot of people think cull, cull, cull, is like kill, kill, kill, but we've got to do a biological control here. You know, we're not about to kill all the great whites but no one is putting a value on human life here.'

Mr Halnan, who was part of a delegation that has approached the Western Australian premier requesting a cull, has further stated, 'There should be a strategic reduction of great white shark numbers to bring the current situation back into balance. This would involve the use of strategically-set drum lines near shore.

We don't want to wipe out great white sharks but we do have to reduce their numbers in shore close to where people surf and swim to eliminate that threat to the public.

The litmus test to the government will be the drop in frequency of shark attacks to where the public feels safe entering the ocean.'

The Western Australian premier, Colin Barnett, has been reluctant to term the measures his government will employ a 'cull', stressing instead that the priority is protecting human life and thus on destroying sharks found in zones where they pose a threat to beach users.

Mr Barnett has stated, 'I don't know if it's a cull as such - and maybe that means different things to different people - but I certainly acknowledge that the public is demanding that sharks, where they stay around popular swimming or surfing areas, should be destroyed. I'm in that camp.'

Mr Barnett has explained his position further, "'I think we do need to be prepared to catch and, if necessary, destroy sharks that have either attacked or are a direct danger to people using our coastline. The great white is a protected species, so we have to recognise that.

But perhaps we need to look at a stronger, stricter stand when there is an imminent threat - and that is a large shark patrolling an area where people are located.

Safety of human life will be the first consideration.'

The Western Australian fisheries minister, Troy Buswell, has also denied that the new policy amounts to a cull. Mr Buswell has stated, 'It is not a widespread, fear-driven hunt for predators. It's a localised hazard-mitigation strategy.'

5. Stronger shark control measures have been employed or are being considered by other nations

Supporters of strong shark control measures claim that such measures are either being used or are being considered in other parts of the world.

South Africa has what may be the most extensive shark netting, drum-lining and general management program in the world.

Most of the shark nets deployed in South Africa are 214 metres long and 6 metres deep and are secured at each end by two 35 kg anchors; all have a stretched mesh of 51 cm. The nets are laid in two parallel rows approximately 400 metres offshore and in water depths of 10-14 metres. A drum-line consists of a large, anchored float (which was originally a drum) from which a single baited hook is suspended. Most beaches are protected either by two nets or by one net and four drum-lines, but the quantity of gear varies from beach to beach. Durban, the largest coastal city and holiday resort in South Africa, has 17 nets, each 305 metres in length, which cover all the popular swimming beaches between the mouth of the Umgeni River and the harbour entrance.

In Hong Kong, after the shark-attack death of three swimmers over 10 days in 1995, the government installed shark nets on all 32 gazetted beaches. Unlike the long-line and gill-net designs common in Australia and South Africa, these are permanent installations and are barrier nets. There have been zero fatalities since installation in 1995.

In July 2013, the French government on the Pacific island of Reunion announced a plan to kill 90 tiger and bull sharks along the coast (in addition to 24 already killed over the past year) in response to five human deaths from shark attacks reported since 2011. In the same period there has been a further seven non-fatal attacks. Although surfers have been the victims in the majority of the attacks, the two most recent shark attack victims were swimming in near-shore waters. The authorities have also announced a seasonal ban on surfing across much of the island.

Further implications

Shark attacks and how to respond to them are powerfully emotive issues.

Fear of sharks is deeply entrenched in our culture. Historically, the fear of sharks has been traced back as far as the

civilisations of Greece and Rome. More recently, sharks were believed to trail slave ships across the Atlantic and feast on human remains thrown overboard. Slave ship captains used fear of sharks to prevent slaves attempting to escape. The abolitionists then used the same fear, presenting the risk of shark attack as one of the horrors of the slave trade. Sharks served similar purposes in Australia where the danger of sharks was used to prevent convicts from attempting to escape.

Media, especially film, representations of sharks are generally fear-inducing. They are often presented as rapacious, indiscriminate killers, some with a penchant for human flesh. The first reference to a supposed rogue shark occurred at Port Said in 1899. It is now believed that the unprecedented prevalence of sharks in the area was due to construction waste from the Suez Canal. There was no contemporary proof that the three instances of shark bite were the result of one shark. To date there is no conclusive evidence that 'rogue sharks' exist. The Dutch Shark Society has stated, 'It is impossible to say that there are absolutely no rogue sharks - individual sharks may exhibit strange behaviours, possibly because they are sick or injured...'

However, there is no evidence to indicate that sharks ever "develop a taste for human flesh." Even if there is a series of attacks in one area, sharks tend to travel great distances in one day. That means the shark that made the first attack is probably hundreds of miles away when the second attack occurs.'

Belief in rogue sharks, however, persists. The impact of the 1975 film 'Jaws', which promoted the idea of a 'rogue shark', has been significant. Adjusted for inflation, 'Jaws' is the ninth highest grossing film of all time.

Popular perceptions of sharks are severely distorted. There are over 480 species of shark, most of which eat small prey and represent no threat to human beings. Despite this, all sharks tend to induce fear and many sharks are misrepresented. Until the 1980s, for example, it was believed that Grey Nurse sharks were man-eaters and they were widely hunted. It is now known that they are several notches down the food chain, eating a wide range of small fish, squid and crustaceans.

When people think of sharks it appears to be the Great White, the Bull Shark and the Tiger Shark that they have in mind. (The Oceanic Whitetip, another shark known to eat human beings, is less commonly considered as it does not come near shore.) These sharks induce unease in the same way that wolves do. They are apex predators in their environments. As such, these sharks represent a physical threat and a psychological one.

Though statistics vary, the extent of the physical threat that sharks represent to human beings is relatively small. Even in Western Australia, where there has been an unprecedented number of fatal attacks, there have been only eight fatal shark attacks in Western Australian waters since August, 2010. This averages less than two deaths a year and compared to the risk represented by many other human activities would seem to be small.

Psychologically the impact that shark attacks have seems to be out of all proportion to the number of deaths they cause. Much of this would appear to derive from the entrenched fear with which sharks are viewed. They also represent a direct challenge to the anthropomorphic view of the natural world common in Australia and elsewhere. It appears that many Australians believe they should be able to enjoy the natural world when and as they wish and anything which presents a threat to this enjoyment should be removed. As human populations have increased and water recreations become more common in response to higher levels of disposal income, this anthropomorphic view seems to have similarly grown.

Western Australian surf instructor, Keith Halnan, has expressed this view clearly. 'We also inhabit the ocean and via swimming and things like that, enjoy our ocean environment. To stop that is absolutely ridiculous.' The same man has also stressed the damage to Western Australian tourism that has been caused by the recent attacks. From this human-centred perspective it is clear that the current level of shark attacks is unacceptable and demands government action. The alternate view is that human beings are intruders in the marine environment and need to adjust to sharing it with the apex predators which occur there, even if that means people may be able to enter the water less often and have to take a range of precautions when they do so. This alternate view also recognises that the risk of shark attack will remain, albeit small, despite whatever precautions are taken.

In Queensland, New South Wales and now Western Australia, it is the human-centred view that prevails, at least at the level of government policy. It is not yet clear what view is dominant among the West Australian population.

This question has become an issue in Western Australia because there has been a spate of shark fatalities on beaches, which, compared to those of Queensland and New South Wales, have been relatively unprotected. It is interesting to note that how to protect against shark deaths are not a significant issue in these eastern states where people currently seem to accept the need for netting and drum-lines.

Newspaper items used in the compilation of this issue outline

AUST, October 9, 2013, page 3, news item by Tom Adolph, 'Diver survives second shark attack'.

<http://www.theaustralian.com.au/news/nation/abalone-diver-mauled-by-white-pointer-suffered-bronze-whaler-attack-years-ago/story-e6frg6nf-1226735065155>

AUST, November 5, 2013, page 3, news item by Mitchell Nadin, 'Using killer whales to scare sharks "risky"'

http://www.theaustralian.com.au/news/health-science/screams-could-chase-away-other-marine-life/story-e6frg8y6-1226753085502?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed%3A+TheAustralianTheNationNews+%28The+Australian+|+The+Nation%29

AUST, December 9, 2013, page 3, news item by Nicholas Perpetch, 'Pressure on Barnett to order shark cull'.

<http://www.theaustralian.com.au/national-affairs/state-politics/pressure-on-barnett-to-order-shark-cull/story-e6frgczx->

[1226778264497](#)

AUST, December 3, 2013, page 7, news item by Anthony Klan, `Shark culling vexed issue: PM'.

<http://www.theaustralian.com.au/national-affairs/shark-culling-vexed-issue-says-tony-abbott/story-fn59niix-1226773759305>

AUST, November 26, 2013, page 5, news item by Paige Taylor, `Shark attack sparks cull talk'.

<http://www.theaustralian.com.au/national-affairs/commonwealth-controls-legislation-regarding-protection-of-great-white-sharks/story-fn59niix-1226768203800>

AUST, November 25, 2013, page 5, news item (photos, incl of WA victim, surfer Chris Boyd) by Paige Taylor, `Sirens toll for third shark death'.

<http://www.theaustralian.com.au/news/nation/sirens-toll-for-third-shark-death/story-e6frg6nf-1226767380125>