

Queensland Shark Control Program Modernisation Proposal and Cost Estimate

October 2020



No Shark Cull



Executive Summary

This proposal has been written to demonstrate the cost efficiency of proven shark bite mitigation technologies, in the hopes that the Queensland Government will urgently modernize the current Queensland Shark Control Program. Throughout this proposal we will cover the key points outlined below.

The Need for Modernisation

The collaborators of this document urge the Queensland State Government to review the use of disproven lethal methods within the Queensland Shark Control Program. The failings of the current program have been highlighted, not only by the recent shark bite fatality (Greenmount Beach, 2020), but also the studies and court outcomes that show the current program is not successful in achieving its intended outcome.

Review of Alternative Approaches

The alternative methods explored in this document are taken from the *2019 Cardno Review of Alternative Approaches*. We congratulate the Government in taking this step to explore alternatives, and urge them to continue this process by urgently implementing the viable solutions presented in the report.

Queensland Economic Stimulus

If the Government chooses to move forward swiftly with this proposal, it will provide a fantastic opportunity to stimulate the Queensland economy at this much needed time. The implementation of these technologies will not only lead to job creation, but will also support the Australian businesses who are providers of the majority of these alternative methods. Utilising new technologies will also promote Queensland as a safe haven for wildlife such as whales, which will in turn support local ecotourism businesses.

Cost Summary

This proposal will outline our recommendation for which method is most suitable for all beaches in Queensland that currently have drumline or net deployment. These recommendations are based on the *Cardno* report. The proposal outlines the initial upfront infrastructure and asset costs (Capex) involved in the procurement and installation of these new methods, and also outlines the ongoing yearly cost (Opex), which is less than the current Shark Control Program.

Region	Upfront Cost (Capex)	Ongoing Cost (Opex p/y)
Cairns	\$3,225,000.00	\$35,000.00
Townsville & Magnetic Island	\$3,150,000.00	\$40,000.00
Mackay	\$2,700,000.00	\$30,000.00
Capricorn Coast North	\$4,125,000.00	\$45,000.00
Gladstone	\$450,000.00	\$5,000.00
Bundaberg	\$80,000.00	\$320,000.00
Rainbow Beach	\$20,000.00	\$80,000.00
Sunshine Coast	\$6,030,000.00	\$1,760,000.00
North Stradbroke Island	\$300,000.00	\$320,000.00
Gold Coast	\$13,340,000.00	\$1,520,000.00
TOTAL	\$33,420,000.00	\$4,155,000.00





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Introduction

Dear Minister Furner,

We write this open letter to ask that you, your party, and opposition parties adopt an election policy to immediately begin a timetabled transition to non-lethal shark control in Queensland. To help you consider our policy recommendation, we have prepared the attached proposal and costings to update the current Queensland Shark Control Program (*hereafter referred to as 'SCP'*).

We thank you for your consideration of the following information and encourage your Government to implement these non-lethal technologies in the immediate future. We hope to see progressive steps towards modernisation - using the following as laid out here in-principle with cost estimates, and ask that you, in the very near future, commit to transitioning to an updated, non-lethal SCP. The solutions presented in this report will produce a win for safety, tourism and marine conservation in this state. They are based on currently available technologies and scientific research.

It has been a matter of public record since the *Federal Senate Inquiry on Shark Mitigation and Deterrent Measures (2017)*, and the *HSI v GBRMPA and QDAF (2019)* case, that the current SCP provides no measurable benefit to human safety and that the scientific evidence is "overwhelming" in this regard. It has also been a matter of public record since the *2019 Cardno Review of Alternative Approaches (hereafter referred to as 'Cardno')* report that suitable alternatives to the current program do exist, for any given area, in many cases backed by peer reviewed science, and that they are commercially available.

We have provided estimated costings for drone surveillance and barriers because they are the preferred technologies due to their effectiveness for both public and wildlife safety. In the attached we have costed out an estimate on the much needed modernisation of the program, using the *Cardno* recommendations, along with pricing estimates available either publicly, or sourced through vendors recommended in *Cardno*.

Modernising the SCP is both necessary for public safety and affordable. It will help us 'Unite and Recover' a post-COVID Queensland, with both ongoing job creation, and initial infrastructure spending whilst moving us in a positive direction for beach safety.

As our borders begin to reopen, positioning Queensland as a true, global leader in beach safety will be a boon for the tourism industry. Utilising new technologies (in place of shark nets and drumlines) will promote Queensland as a safe haven for wildlife such as whales, which support local ecotourism businesses from the Gold Coast to Cairns, with the added benefit of reducing the risk of drownings at drawcard beaches like those at the Gold Coast.

It is unlikely Queenslanders, Australians or international visitors will continue to accept beach safety standards that are 60 years old. Tragically, we've seen nearly 30 shark bites (*Australian Shark Attack File*) at Queensland beaches with active drumlines or nets, including two fatalities; Stradbroke Island in 2006, and in September this year at Greenmount Beach. Queensland has the opportunity now to demonstrate leadership and improve the safety of its citizens and visitors.

We collectively wish to see Queensland beaches be as safe as possible, for people and wildlife. We applaud the Queensland Government’s recent announcement of the drone trial in South East Queensland, and hope that this report shows that a statewide rollout of alternatives identified in *Cardno* is both affordable and beneficial.

This proposal does not address the Administrative Appeal Tribunal’s legally mandated transition from traditional to SMART drumlines in the Great Barrier Reef Marine Park (finding #7 – Decision and Reason for Decision, *HSI v GBRMPA and QDAF*). Due to the fact that this transition was legally mandated, and we fully expect an investment and implementation of this transition, it was therefore unnecessary to include SMART drumlines in the following cost proposal. The Queensland LNP has already committed \$15m over 3 years toward the cost of SMART drumline implementation, and we expect Queensland ALP to follow suit.

The ongoing costs of the program after our proposed modernization suggests the SCP budget will reduce, after the initial upfront infrastructure/asset costs, whilst creating more jobs than the current SCP does. This proposal makes sense not only in terms of human life, but also economically.

We understand the necessity to begin the use of some of these technologies on a trial-basis. We would welcome trials as part of a timetabled commitment to transition away from current, lethal methods.

It is important to note that the costs included in this proposal are a first pass estimate only. There are likely other factors that will need consideration before a full budget can be designed, however we expect these to be minimal and would dissuade the Government from stalling progress on these grounds.

We thank you for your consideration of the following information and look forward to welcoming a policy announcement to modernise the SCP and move away from outdated and lethal current methods.



Dr Leonardo Guida
Australian Marine
Conservation Society



Lawrence Chlebeck
Humane Society
International



Jonathan Clark
Sea Shepherd



Andre Borell
Envoy: Shark Cull



Tim Silverwood
Ocean Impact Organisation



Nick Chiarelli
Ocean Impact Organisation



Natalie Banks
No Shark Cull QLD

Methodology

The methodology for this pricing estimate was to rely heavily on the data and findings in *Cardno* commissioned by Queensland Department of Agriculture and Fisheries. From basic beach features and wave energy of each location, to best suited alternatives identified for the various conditions seen along the Queensland Coast, we have followed this report closely. The only caveat to this is that we have corrected an error in the report which marked Shark Safe Barrier as a prototype, when it is in fact commercially available (and was at the time the report was published).

Using the information in *Cardno*, we selected from the most suitable alternatives for each region, and chose one (1), and in some cases two (2) alternatives for each beach that currently has SCP equipment located there.

For costings, we used pricing estimates either available publicly, or sourced through vendors recommended in *Cardno*, to assess the cost of the upfront installation or asset expenditure, as well as the ongoing operation of these alternatives.

Up-Front Infrastructure/Asset Pricing Methodology:

- Drones: we have used an estimate from the current trial of \$20,000 upfront cost for assets (drone, batteries, helipad, signs etc) and pilot training (flying, drone maintenance, shark identification, beach clearance SOPs etc). This is for a large drone that can also drop flotation devices to drowning victims. A smaller drone limited to shark spotting would be considerably cheaper, at ~\$5,000.
- Eco-Shark Barrier: we have calculated a per meter cost of \$1,280/m based on publicly available costing information on the recent 2019 Cottesloe Beach installation. We rounded this up to \$1,500/m to allow a pricing buffer for any circumstances that might increase the cost.
- Shark Safe Barrier: we have used an estimate from the vendor of \$10,000/m of installation.

Ongoing Costs Pricing Methodology:

- Drones: based on discussions with Hover UAV we have included \$2,500 drone maintenance/refurbishment/replacement costs, and a \$77,000 drone pilot salary (incl Super) per beach, and \$500 re-training cost each year to account for either professional development or staff turnover.

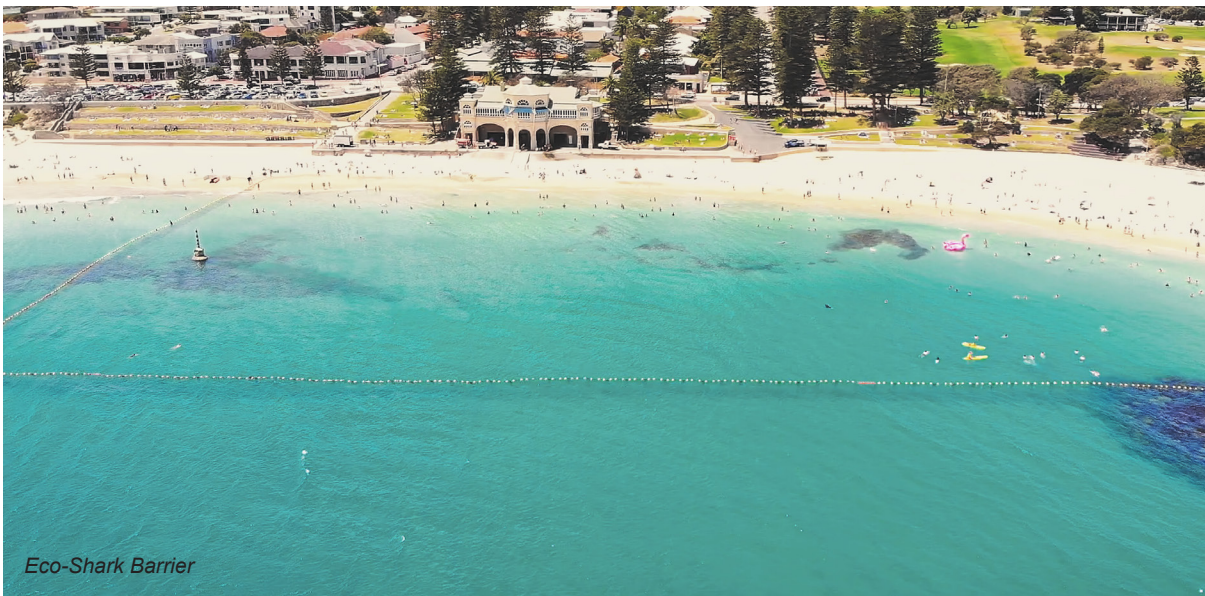
- Eco-Shark Barrier: we calculated an annual cleaning and maintenance cost of \$5,000 per barrier. We did not include the annual maintenance costs applying to the Cottesloe installation, as this involves a full deinstall and reinstall each year for surf season. As we have not recommended this solution at any surf breaks, this labour and cost intensive annual exercise would not be required. De-install and re-install may be required on an adhoc basis for impending cyclones
- Shark Safe Barrier: this solution can be monitored from the shore with binoculars, and the manufacturer advises that there is next to no maintenance required, so we have not included any ongoing maintenance cost on these barriers.

Other Notes:

- We suggest drones to be operated using trained full time on-staff pilots and using volunteers to supplement this only if and when required.
- We have overestimated the number of drones required in Southern Queensland. Some adjacent beaches will be able to be surveyed by a single drone and pilot if within Visual Line of Sight. We have excluded some beaches from having their own drone, where it is abundantly clear this will be possible from an adjacent beach however further streamlining may be possible.
- We have overestimated the number of barriers required in Central and North Queensland. We have put one at every beach with SCP equipment, however we believe this may be an over capitalisation. Swimming enclosures become destination beaches as demonstrated in WA, and it is unlikely that so many barriers, so close to each other in some regions, are required.
- The placing of barriers is based on *Cardno* recommendations, basic geological understanding of each beach using available maps, discussions with vendors, and shark scientist knowledge.
- We have not simply placed barriers where nets currently exist, as this would be a highly oversimplified methodology. We would like to make it abundantly clear that the current nets are not barriers in any way, shape or form, as per the DAF website: "The nets are intended to catch resident sharks and sharks that pass through the area while feeding on fish bait, but do not prevent them from entering any particular area."



Drones



Eco-Shark Barrier



Shark Safe Barrier



Efficacy

Efficacy was strongly considered in this proposal and only the highest rated alternatives presented in *Cardno* (Ranking of 1) have been proposed.

Ranking of alternatives in *Cardno* was conducted as follows "Alternative systems were evaluated for potential trial on the basis of: (a) whether they would be able to operate effectively in the prevailing conditions within a region; (b) were effective against the potentially dangerous bull, tiger or white sharks (as demonstrated through 'independent testing'); (c) were commercially ready; and (d) their comparative costs (where available). Importantly, community support was also considered to be a key factor that will need to be addressed in the final choice of alternative systems."

The *Cardo* review "found clear differences in the suitability of alternative systems among the SCP regions based on the differing environments between the north and the south. For example, even with the use of multi-spectral cameras used from aircraft, the prevailing poor water clarity in the north would limit detection of potentially dangerous sharks for a significant proportion of the year. Thus, visual observation systems are likely to be ineffective alternatives in the SCP regions of Cairns, Townsville, Mackay, Capricorn Coast and Tannum Sands."

Regarding detection systems, such as tagged sharks previously hooked on SMART drumlines, it found "although other commercially available shark detection systems (i.e. Cleverbuoy and detection of tagged animals) are not reliant on water clarity, these methods are among the least preferred ranked of the detection systems generally, meaning there are no ideal detection systems currently or potentially available for the north."

It went on to recommend the suitability of barrier systems in those northern regions, "The north regions are, however, suited to use the barrier

systems because of a general lack of ocean swell, although any barrier would need to be able to be dismantled prior to a cyclone to avoid it being seriously damaged by such extreme weather events. Such barriers offer no protection to water users outside of them."

In regards to drones, *Cardo* found "The prevailing good water clarity in southern Queensland lends itself to trialling of highly effective aerial detection systems in the SCP regions of Woongarra Coast, Rainbow Beach, Sunshine Coast, North Stradbroke and Gold Coast."

As these alternatives will ultimately be compared to the current SCP, we would like to make it clear that the efficacy of the current program is highly questionable. The Australian Shark Attack File shows ~30 shark interactions at beaches with either nets or drumlines in Queensland, including the tragic fatalities of Sarah Wiley and Nick Slater. There have also been 34 shark interactions at netted beaches in New South Wales, including one fatality, further demonstrating the lack of efficacy of shark nets.

The *HSI v GBRMP and QDAF* case was won by HSI partially on the basis that the SCP could not be proven to be effective in terms of human safety. DAF expert witness Professor Daryl McPhee (a member of the SCP's Scientific Working Group) stated under oath, that he would never advocate for a lethal program, and that there would likely be no increase in unprovoked shark interactions if it was ended (finding #50 and #94). It has also been accepted that the abundance of sharks does not correlate to risk of shark bite (finding #52). Given the entire premise of the current SCP is to reduce local numbers of sharks via lethal means, the efficacy of these lethal methods to reduce shark bites should be considered low at best.

Equipment Recommendations

Cairns										
Beach	Swell Energy	Unique Features	Current Methods	Suggested Method	Secondary Method	Barrier Length (m)	Cost Upfront	Cost Ongoing	Notes	
Buchan Point Beach	Low	Beach	Drumlines	Eco Shark Barrier	None	300	\$450,000.00	\$5,000.00		
Clifton Cairns Beach	Low	Beach	Drumlines	Eco Shark Barrier	None	300	\$450,000.00	\$5,000.00		
Ellis Beach	Low	Beach	Drumlines	Eco Shark Barrier	None	300	\$450,000.00	\$5,000.00		
Palm Cove Beach	Low	Beach	Drumlines	Eco Shark Barrier	None	400	\$600,000.00	\$5,000.00	Intentionally larger as destination beach	
Trinity Beach	Low	Headland	Drumlines	Eco Shark Barrier	None	250	\$375,000.00	\$5,000.00	Off headland	
Yorkey's Knob	Low	Beach	Drumlines	Eco Shark Barrier	None	300	\$450,000.00	\$5,000.00		
Holloways Beach	Low	Beach	Drumlines	Eco Shark Barrier	None	300	\$450,000.00	\$5,000.00		
							\$3,225,000.00	\$35,000.00		

We calculate a Capital Expenditure (hereafter referred to as Capex) of \$3.225m, and Operational Expenses (hereafter referred to as Opex) of \$35,000 for this regions' modernized program.

Townsville & Magnetic Island

Beach	Swell Energy	Unique Features	Current Methods	Suggested Method	Secondary Method	Barrier Length (m)	Cost Upfront	Cost Ongoing	Notes
Picnic Bay	Low	Bay	Drumlines	Eco Shark Barrier	None	200	\$300,000.00	\$5,000.00	Around Stinger Net
Alma Bay	Low	Bay	Drumlines	Eco Shark Barrier	None	150	\$225,000.00	\$5,000.00	Across Bay, 100m from Beach
Nelly Bay	Low	Beach	Drumlines	Eco Shark Barrier	None	250	\$375,000.00	\$5,000.00	Off Boatramp Rockwall
Florence Bay	Low	Bay	Drumlines	Eco Shark Barrier	None	300	\$450,000.00	\$5,000.00	Across Bay, 100m from Beach
Radical Bay	Low	Bay	Drumlines	Eco Shark Barrier	None	400	\$600,000.00	\$5,000.00	Across Bay, 100m from Beach
Pallarenda Beach	Low	Beach	Drumlines	Eco Shark Barrier	None	300	\$450,000.00	\$5,000.00	
The Strand (Kissing Point)	Low	Beach	Drumlines	Eco Shark Barrier	None	300	\$450,000.00	\$5,000.00	Between Rockwalls
Horseshoe Bay, Magnetic Island	Low	Bay	Drumlines	Eco Shark Barrier	None	200	\$300,000.00	\$5,000.00	Around Stinger Net
							\$3,150,000.00	\$40,000.00	

We calculate a Capex of \$3.15m, and Opex of \$40,000 for this regions' modernized program.

Equipment Recommendations Cont.

Mackay										
Beach	Swell Energy	Unique Features	Current Methods	Suggested Method	Secondary Method	Barrier Length (m)	Cost Upfront	Cost Ongoing	Notes	
Blacks Beach	Low	Beach	Drumlines	Eco Shark Barrier	None	300	\$450,000.00	\$5,000.00		
Eimeo Beach	Low	Beach	Drumlines	Eco Shark Barrier	None	300	\$450,000.00	\$5,000.00		
Bucasia Beach	Low	Beach	Drumlines	Eco Shark Barrier	None	300	\$450,000.00	\$5,000.00		
Harbour Beach	Low	Beach	Drumlines + Nets	Eco Shark Barrier	None	300	\$450,000.00	\$5,000.00		
Lamberts Beach	Low	Beach	Drumlines	Eco Shark Barrier	None	300	\$450,000.00	\$5,000.00		
South Lamberts Beach	Low	Beach	Drumlines	Eco Shark Barrier	None	300	\$450,000.00	\$5,000.00		
							\$2,700,000.00	\$30,000.00		

We calculate a Capex of \$2.7m, and Opex of \$30,000 for this regions' modernized program.

Capricorn Coast

Beach	Swell Energy	Unique Features	Current Methods	Suggested Method	Secondary Method	Barrier Length (m)	Cost Upfront	Cost Ongoing	Notes
Farnborough Beach	Low	Headland	Drumlins	Eco Shark Barrier	None	300	\$450,000.00	\$5,000.00	Off Headland
Yeppoon Beach	Low	Beach	Drumlins	Eco Shark Barrier	None	300	\$450,000.00	\$5,000.00	
Cootee Bay	Low	Headland	Drumlins	Eco Shark Barrier	None	400	\$600,000.00	\$5,000.00	Off Headland
Lammermoor Beach	Low	Beach	Drumlins	Eco Shark Barrier	None	300	\$450,000.00	\$5,000.00	
Emu Park	Low	Beach	Drumlins	Eco Shark Barrier	None	300	\$450,000.00	\$5,000.00	
Fishermans Beach	Low	Beach	Drumlins	Eco Shark Barrier	None	300	\$450,000.00	\$5,000.00	
Tanby Point	Low	Beach	Drumlins	Eco Shark Barrier	None	300	\$450,000.00	\$5,000.00	
Mullambin Beach	Low	Headland	Drumlins	Eco Shark Barrier	None	300	\$450,000.00	\$5,000.00	Off Headland
Kemp Beach	Low	Headland	Drumlins	Eco Shark Barrier	None	250	\$375,000.00	\$5,000.00	Off Headland
							\$4,125,000.00	\$45,000.00	

We calculate a Capex of \$4.125m, and Opex of \$45,000 for this regions' modernized program.

Equipment Recommendations Cont.

Gladstone

Beach	Swell Energy	Unique Features	Current Methods	Suggested Method	Secondary Method	Barrier Length (m)	Cost Upfront	Cost Ongoing	Notes
Tannum Sands	Low	Beach	Drumlines	Eco Shark Barrier	None	300	\$450,000.00	\$5,000.00	
							\$450,000.00	\$5,000.00	

We calculate a Capex of \$450,000, and Opex of \$5,000 for this regions' modernized program.

Bundaberg

Beach	Swell Energy	Unique Features	Current Methods	Suggested Method	Secondary Method	Barrier Length (m)	Cost Upfront	Cost Ongoing	Notes
Bargara	Medium	Beach	Drumlines	Drones	None		\$20,000.00	\$80,000.00	
Kelly's Beach	Medium	Beach	Drumlines	Drones	None		\$20,000.00	\$80,000.00	
Neilson Park	Medium	Beach	Drumlines	Drones	None		\$20,000.00	\$80,000.00	
Oaks Beach	Medium	Groyne	Drumlines	Drones	None		\$20,000.00	\$80,000.00	
							\$80,000.00	\$320,000.00	

We calculate a Capex of \$80,000, and Opex of \$320,000 for this regions' modernized program.

Rainbow Beach

Beach	Swell Energy	Unique Features	Current Methods	Suggested Method	Secondary Method	Barrier Length (m)	Cost Upfront	Cost Ongoing	Notes
Rainbow Beach	Medium	Beach	Drumlines + Nets	Drones	None		\$20,000.00	\$80,000.00	
							\$20,000.00	\$80,000.00	

We calculate a Capex of \$20,000 and Opex of \$80,000 for this regions' modernized program.

Sunshine Coast

Beach	Swell Energy	Unique Features	Current Methods	Suggested Method	Secondary Method	Barrier Length (m)	Cost Upfront	Cost Ongoing	Notes
Alexandra Headland	High	Headland	Drumlines + Nets	Drones	None		\$20,000.00	\$80,000.00	
Bribie Island	Medium	Beach	Drumlines	Eco Shark Barrier	Drones	350	\$525,000.00	\$80,000.00	
Buddina Beach	High	Beach	Drumlines	Drones	None		\$20,000.00	\$80,000.00	
Caloundra	High	Beach	Drumlines + Nets	Drones	None		\$20,000.00	\$80,000.00	
Castaways Beach	High	Beach	Drumlines	Drones	None		\$20,000.00	\$80,000.00	
Coolum Beach	High	Beach	Drumlines + Nets	Drones	None		\$20,000.00	\$80,000.00	
Currimundi	High	Beach	Drumlines	Drones	None		\$20,000.00	\$80,000.00	
Hyatt Regency Resort	High	Beach	Drumlines	Drones	None		\$20,000.00	\$80,000.00	
Marcus Beach	High	Beach	Drumlines	Drones	None		\$20,000.00	\$80,000.00	
Marcoola Beach	High	Beach	Drumlines + Nets	Drones	None		\$20,000.00	\$80,000.00	
Maroochydore Beach	High	Beach	Drumlines + Nets	Drones	None		\$20,000.00	\$80,000.00	
Moffat Beach	High	Beach	Drumlines	Drones	None		\$20,000.00	\$80,000.00	
Mooloolaba Beach	High	Bay	Drumlines + Nets	Shark Safe Barrier	Drones	400	\$4,000,000.00	\$80,000.00	In front of Loo with View coming off rocks
Mudjimba Beach	High	Beach	Drumlines				\$0.00	\$0.00	Covered by Surfair Drone
Noosa	Medium	Bay	Drumlines + Nets	Eco Shark Barrier	Drones	750	\$1,125,000.00	\$80,000.00	Between Groyne and Point
Peregian Beach	High	Beach	Drumlines	Drones	None		\$20,000.00	\$80,000.00	
Point Cartwright	High	Beach	Drumlines	Drones	None		\$20,000.00	\$80,000.00	
Sunrise Beach	High	Beach	Drumlines	Drones	None		\$20,000.00	\$80,000.00	
Sunshine Beach	High	Beach	Drumlines	Drones	None		\$20,000.00	\$80,000.00	
Surfair Resort	High	Beach	Drumlines	Drones	None		\$20,000.00	\$80,000.00	
Twin Waters Resort	High	Beach	Drumlines	Drones	None		\$20,000.00	\$80,000.00	
Wurtulla	High	Beach	Drumlines	Drones	None		\$20,000.00	\$80,000.00	
Yaroomba Beach	High	Beach	Drumlines	Drones	None		\$20,000.00	\$80,000.00	
							\$6,030,000.00	\$1,760,000.00	

We calculate a Capex of \$6.03m, and an Opex of \$1.76m for this regions' modernized program.

Equipment Recommendations Cont.

North Stradbroke Island										
Beach	Swell Energy	Unique Features	Current Methods	Suggested Method	Secondary Method	Barrier Length (m)	Cost Upfront	Cost Ongoing	Notes	
Amity Point	Low	Groyne x 2	Drumlines	Eco Shark Barrier	Drones	160	\$240,000.00	\$80,000.00	Between two Groynes	
Cylinder Beach	High	Beach	Drumlines	Drones	None		\$20,000.00	\$80,000.00		
Flinders Beach	High	Beach	Drumlines	Drones	None		\$20,000.00	\$80,000.00		
Ocean Beach	High	Beach	Drumlines	Drones	None		\$20,000.00	\$80,000.00		
							\$300,000.00	\$320,000.00		

We calculate a Capex of \$300,000, and an Opex of \$320,000 for this regions' modernized program.

Gold Coast

Beach	Swell Energy	Unique Features	Current Methods	Suggested Method	Secondary Method	Barrier Length (m)	Cost Upfront	Cost Ongoing	Notes
Broadbeach	High	Beach	Drumlines	Drones	None		\$20,000.00	\$80,000.00	
Burleigh Beach	High	Headland	Drumlines + Nets	Sark Safe Barrier	Drones	600	\$6,000,000.00	\$80,000.00	
Bilinga Beach	High	Beach	Drumlines + Nets	Drones	None		\$20,000.00	\$80,000.00	
Coolangatta Beach	High	Bay	Drumlines + Nets						Covered by Rainbow Bay Drone
Currambin Beach	High	Headland	Drumlines + Nets	Drones	None		\$20,000.00	\$80,000.00	
Elkhorn Avenue	High	Beach	Drumlines	Drones	None		\$20,000.00	\$80,000.00	
Greenmount Beach	High	Bay	Drumlines						Covered by Rainbow Bay SSB + Drone
Kirra Beach	High	Beach	Drumlines + Nets	Drones	None		\$20,000.00	\$80,000.00	
Kurrawa Beach	High	Beach	Drumlines + Nets	Drones	None		\$20,000.00	\$80,000.00	
Main Beach	High	Beach	Drumlines + Nets	Drones	None		\$20,000.00	\$80,000.00	
Mermaid Beach	High	Beach	Drumlines + Nets	Drones	None		\$20,000.00	\$80,000.00	
Sheraton Mirage Beach	High	Beach	Drumlines	Drones	None		\$20,000.00	\$80,000.00	
Miami Beach	High	Beach	Drumlines + Nets	Drones	None		\$20,000.00	\$80,000.00	
North Burleigh	High	Beach	Drumlines						Covered by Burleigh Drone
Northcliffe Beach	High	Beach	Drumlines	Drones	None		\$20,000.00	\$80,000.00	
North Kirra Beach	High	Beach	Drumlines						Covered by Kirra Drone
Narrow Neck	High	Beach	Drumlines	Drones	None		\$20,000.00	\$80,000.00	
Nobby Beach	High	Beach	Drumlines	Drones	None		\$20,000.00	\$80,000.00	
Palm Beach	High	Beach	Drumlines + Nets	Drones	None		\$20,000.00	\$80,000.00	
Rainbow Bay	High	Bay	Drumlines	Shark Safe Barrier	Drones	700	\$7,000,000.00	\$80,000.00	
Staghorn Avenue	High	Beach	Drumlines						Covered by Surfers Drone
Surfers Paradise Beach	High	Beach	Drumlines + Nets	Drones	None		\$20,000.00	\$80,000.00	
Tallebudgera Beach	High	Beach	Drumlines	Drones	None		\$20,000.00	\$80,000.00	
Tugun Beach	High	Beach	Drumlines	Drones	None		\$20,000.00	\$80,000.00	
							\$13,340,000.00	\$1,520,000.00	

We calculate a Capex of \$13.34m, and an Opex of \$1.52m for this regions' modernized program.

Other Recommendations

Drone Operators - Regional Managers

In consultation with Hover UAV, a drone solutions provider involved in NSW drone trials, we anticipate the need for two (2) regional managers to manage drone pilots. One (1) to manage Bundaberg, Rainbow Beach and Sunshine Coast Regions, and one (1) to manage North Stradbroke Island and Gold Coast Regions. Assuming a salary of \$100,000 including super for this role, we suggest a \$200,000 budget per annum.

Education

We recommend the Queensland Government conduct a thorough and meaningful education program to make the Queensland public, and visiting tourists, more aware of how to minimise the risk of shark interactions. It is encouraging to see the recent development in the SharkSmart communications/ awareness campaign. However, we stress that the Queensland Government build upon this with a thorough and meaningful education program. This would include, but is not limited to, continual updating of information (safety, scientific knowledge, public service announcements etc.), and wider distribution beyond the current website, pamphlets and TVC.

This program may include, but not be limited to - TV, radio, billboards, social media campaigns, beach signage etc. We suggest a \$2m budget over four (4) years for this program.

Personal Deterrent Rebate

We recommend the Queensland Government mirror the WA Government personal shark deterrent rebate scheme.

Quoting a November 2019 Press Release: "The McGowan Government's world-first personal shark deterrent subsidy scheme has reached a significant milestone, with more than 4,000 rebates claimed by Western Australian ocean users. The number of the scientifically proven devices purchased has grown in the past few months on the back of a successful digital marketing campaign raising interest in the devices, in particular to raise awareness among surfing communities. While divers still lead the take with 3,367 devices purchased, the number of surfers taking advantage of the rebate has grown to 633."

At 4,000 units and a \$200 rebate, we can put the cost of this program at \$800,000. Assuming a generous digital marketing spend of \$200,000, we suggest a \$1m budget over four (4) years for this program.

Electrical Barrier

We are extremely encouraged by the Ocean Guardian LR1000 electrical barrier. Indications are that costs will be very similar to the Eco-Shark Barrier and that this will be deployable in high energy swell conditions - making it a great option to add more barriers to the Sunshine Coast and Gold Coast regions in the future. As it is not commercially available yet, we have chosen not to incorporate it in this modernisation proposal, but do recommend a trial installation at the Governments discretion.

Summary

In summary, these recommendations show several benefits to the Queensland Government, Queensland residents, visiting tourists, and our surrounding environment including:

- Providing solutions that actually improve swimmer and surfer safety, as opposed to the current placebo program
- Offering a much needed boost to the Queensland Tourism economy by positioning ourselves as a world leader on shark bite mitigation
- Offering a much needed boost to the Queensland economy by building shark barrier infrastructure that will serve future generations, and create jobs
- Reducing the ongoing yearly cost of the program
- Providing Queensland with the opportunity to lead the world in utilizing eco-friendly technology to protect swimmers and surfers (whilst showcasing Australian engineered technologies)
- Offering a non-lethal program that will not harm marine life

We hope to see much needed modernisation in the near future and hope this can be done before the next shark bite or fatality at a beach currently 'protected' by shark nets or drumlines.

Dr Leonardo Guida
Senior Sharks Campaigner
Australian Marine Conservation Society
P: 07 3846 6777
E: amcs@amcs.org.au

Lawrence Chlebeck
Marine Biologist
Humane Society International
P: 02 9973 1728
E: admin@hsi.org.au

Jonathan Clark
Apex Harmony Campaign Coordinator
Sea Shepherd
P: 1300 623 267
E: qld_sharks@seashepherd.org.au

Andre Borell
Director
Envoy: Shark Cull
E: info@envoyfilm.com.au

Natalie Banks
Chair
No Shark Cull Inc
E: nonswsharkcull@gmail.com

Nick Chiarelli & Tim Silverwood
Co-Founders
Ocean Impact Organisation
E: info@ocean-impact.org



No Shark Cull

