APPLIED RESEARCH PROGRAM (ARP)

Final Report

to comply with Financial Assistance Agreement (FAA) Clause 12.2 and Schedule Item 5

Title of ARP project:

Integrated surfboard electronic shark deterrent to protect surfers and swimmers

NB: When completing any of the sub-sections of this Final Report, please note that if any of the requested information has already been provided in a previous sub-section of the report, it does not need to be repeated in the sub-section being completed. However, please make reference to the relevant previous sub-section for this information.

SECTION A: HIGHLIGHTS

1 PROJECT HIGHLIGHTS

Please provide the highlights as bullet points of two to five sentences each, suitable for release into the public domain and written for a lay readership. Each must include the significance of the highlight, such as the potential/achieved benefits for WA, including benefits for industry and other end-users (quotes from end-users can be included).

At least three to five research-related highlights are required (include in these the significance and also an explanation of i) the relevant research advance/output and ii) the link between the advance/output and the implications). Other examples of highlights include financial, industry engagement or educational highlights.

Shark Shield has successfully completed the project to design a new electronic shark deterrent suitable for all modern surfboards. The company's product delivers an outstanding solution for protecting surfers in Western Australian and globally from shark attacks.

The completed product, as specified in the Applied Research Program (ARP), seamlessly incorporates a removable electronics module into a standard surfboard grip pad. The electronics module is located in the rear "kicker" area of the tail pad. The electrodes, which in the current SURF7 system trail behind the surfboard creating drag, are now located within a flat, sticker-thin decal adhesive antenna and connect to the tail pad via an adhesive flex cable.

Shark Shield's innovative adhesive decal electrode design is 100% user installable on any surfboard, new or old, providing a cost effective and immediate solution for protecting Western Australian surfers, often in remote locations, as well as surfers across the globe. Electrical field modelling research of the adhesive decal electrodes has demonstrated that an effective shark deterrent field is generated. There are significant advantages to the adhesive decal design as it enables the installation of an electronic shark deterrent on virtually any watercraft, for example paddleboards used by Surf Lifesaving Australia. It is a safety solution that will increase participation in a wide range of water sports.

When surfers purchase a new surfboard and select to install an Ocean & Earth (O&E) Shark Shield tail pad, they can install the electronics module at any time in the future, turning the board into a shark deterrent. The miniaturised electronic module is completely removable and thus transferable between surfboards. The new O&E Shark Shield grip pad is priced competitively at $99.00 and can be installed on new or old surfboards, and as mentioned, in the future any watercraft. Consumer and surf retail research has confirmed that this solution enables broad consumer technology adoption, which previous solutions have not achieved.

To highlight the success of the product development and the global opportunity, Shark Shield has entered into a global joint branding and distribution agreement with Ocean & Earth, one of the world’s largest surf hardware companies. O&E have been supplying surf hardware globally for over thirty years.

Research from the University of Western Australia Ocean Institute during the 2013/14 testing period on Shark Shield products has again supported previous independent research as to the effectiveness of the company’s electronic shark deterrent technology. Shark Shield will be working with UWA on an ongoing basis to continue to enhance the performance of its new product range, including field-testing of the new surfboard deterrents. This is intended to be an ongoing process.

The new product production process has commenced with first product appearing in retail outlets in June/July 2016. The new product can be pre-ordered now from the company’s website. The new Shark Shield FREEDOM+ Surf will retail for $599.00, which includes the tail pad adhesive decal antenna and electronics.

SECTION B: GENERAL

2 GENERAL DETAILS

2.1 Name of research project

Integrated surfboard electronic shark deterrent to protect surfers and swimmers

2.2 Lead institution

Shark Shield Pty Ltd

2.3 Official contact person

Title:	Mr	Name:	Lindsay Lyon		
Position:	Managing Director, Shark Shield Pty Ltd				
Address:	7, 1 Winton Road, JOONDALUP WA 6027				
Telephone:	9468 2082	Mobile:	0409 531 738	Fax:	9300 0900
Email:	lindsay.lyon@sharkshield.com				

2.4 FAA Execution Date

06/02/2014

2.5 Length of FAA (years)

2

2.6 Year of report (ie Year 1, Year 2, etc)

Final

2.7 Reporting period for this Final Report (dd/mm/yyyy)

Start date 06/02/2014 Finish date 05/02/2016

2.8 Legal due date for this Final Report (as per the FAA)

08/03/2016

2.9 Actual submission date for this Final Report (dd/mm/yyyy)

04/03/2016

Variance between dates? Yes ☐ No X

Detailed reason for variance

(Please enlarge box as required.)

Variance approved by the Department of the Premier & Cabinet (DPC)? Yes ☐ No ☐

SECTION C: ARP PROJECT PROGRESS

3 SHORT ARP PROJECT DESCRIPTION (as per the ARP Project Plan)

Shark Shield's new surfboard innovation enables all modern surfboards to be "electrical shark deterrent ready" for less than a $2.00 change to the existing removable fin plug systems or a decal adhesive antenna, with no change to current surfboard manufacturing and/or design processes, and most importantly no impact on surfboard performance.

An electrical shark deterrent is two separated electrodes with a patented waveform pulsating between them, with the salt water acting as a medium to connect these electrodes. Working with material scientists at CSIRO, the surfboard innovation turns existing surfboard fins (for example carbon fibre) into the electrodes.

The innovation is an industrial design modification to the current fin plugs systems found in all surfboards globally. The fin plugs become an electrical connector with the fins becoming the electrodes. This removes the existing trailing antenna so there is no impact on the surfboards performance.

A miniaturised and removable power generator is installed in the grip pad kick area leveraging the existing grip pad designs. The grip pad houses the light weight power generator and acts as a wiring harness connecting to the fin plug systems on the top side of the surfboard. The new product will be sold as an aftermarket solution for $399 - $599.

4 ARP PROGRAM OBJECTIVES (as per the ARP Applicant Information)

Progress against ARP objectives (during the Project)

1. **Mitigation of the risk of shark attacks.**
2. **Facilitate end-user driven applied research.**
3. **Develop interrelated science and technology nodes of expertise in Western Australia relative to the program aim.**
4. **Improve Western Australia's connections nationally and internationally in strategic innovation areas.**

Briefly summarise progress against each ARP objective.

1. Mitigation of the risk of shark attacks

Field testing by UWA during 2013/14 of the e-field of the existing Shark Shield electrode configuration and strength have confirmed the effectiveness of Shark Shield's technology.

Shark Shield is very confident that the modelling of the e-field being produced by the new adhesive decal atennna will provide a similar protective electrical field to that tested by the UWA. In water testing of the power output has also confirmed the power output is comparable to existing products.

2. Facilitate end-user driven applied research

The end-user driven research for Shark Shield on the performance of the surfboard when fitted with the electronic deterrent option was initially conducted by Tom Carroll, two times world surfing champion, with very positive feedback.

Working units have been installed on surfboards and tested for weight and any user interference, with the Ocean & Earth sponsorded riders being fitted out with additional units for endorsement in May 2016 before the formal product launch in June.

The products have already been shown and demonstrated to a number of surf retail outlets with exceptional feedback on the design. All modifications based on the end-user research have now been incorporated into the final production design.

3. Develop interrelated science and technology nodes of expertise in Western Australia relative to the program aim

Over the period, Shark Shield has met with UWA on a number of occasions to share our work on the new product and existing technology. Shark Shield has entered into a non-disclosure and confidentiality agreement with UWA to increase their participation.

The UWA has provided Shark Shield with a detailed proposal to test the new product and Shark Shield is actively seeking additional finanical assistance to fund this research, the costs of the proposal is approximately $380,000.

As a result of the existing UWA research, Shark Shield electronic shark deterrents have been proven effective at turning sharks away.

4. Improve Western Australia's connections nationally and internationally in strategic innovation areas

The project outcomes have without doubt delivered a world first to the surfing industry which can only be described as signficant. Specifically considering the worldwide notariety of the Mike Fanning shark encounter in South Africa in 2015, and the new data showing that in 2015, on a global basis, saw the highest number of shark attacks ever. As a result the publicitiy around the new innovation has been signficant with global coverage.

In the May/June time frame, Shark Shield and the new surfboard innvation is scheduled to be featured on a major global current affaris program, as a Western Australian driven innovation.

5 ARP PROJECT OBJECTIVES, PROJECT PERFORMANCE INDICATORS & MILESTONES

Summary list of ARP project objectives (as per the ARP Project Plan)

The objective of this applied research is to develop a solution for end-users that saves lives, with the specific achievement objectives centred on research to modify existing proven electronic shark deterrent technology;

1. **such that the surfboard fins can become the shark deterrent electrodes;**
2. **so that the fin solution is tested and proven as an effective shark deterrent;**
3. **be end-user installable on a surfboard;**
4. **not affect the performance of the surfboard;**
5. **be an effective beach barrier for other end-users such as swimmers; and**
6. **be shown that the solution has long-term behavioural shark impact in deterring them from an area.**

5.1 Progress against project objectives (during the Project)

Summarise the progress towards achieving each project objective.

Please also discuss any encountered difficulties/failures and improvements put or to be put in place.

1. **Surfboard fins become the shark deterrent electrodes**

Shark Shield's initial electrical field modelling coupled with the UWA research on electronic shark deterrents demonstrated that the fin electrodes will work as an effective shark deterrent.

However, as noted in the Prototype Report there were significant commercial issues relating to gaining broad adoption of the fin/plug solution. The marketing analysis has made it very clear that without the ability to either own, or partner with, one of the two global fin / plug manufacturers, that consumer adoption will be extremely low. In addition to the barriers to entry of the plugs, the same distribution challenge presents with the special conductively coated fins required as electrodes.

The product research and design phase has shown that it is not a technical challenge; it is a commercial distribution and adoption challenge.

As a direct result of the above and as reported previously, the focus for the electrode design has moved to incorporate a parallel solution that is end-user installable, and can be fitted to both new and old surfboards, thus removing the barriers to adoption.

The commercially available solution Shark Shield has developed is a sticker-thin, adhesive decal electrode to replace the need for special plugs and fins, which would not be user installable. The electrical field produced by this design is more effective than the fin solution, and is end user installable on both new and old surfboards.

2. **Fin solution is tested and proven as an effective shark deterrent**

The e-field modeling through software has shown the adehisve decal antenna does provide an effective shark deterrent, and research conducted by UWA on Shark Shield devices shows that a smaller field can be effective in deterring sharks.

The UWA has provided a proposal to conduct real word field testing with sharks on the new design, and Shark Shield will be conducting field testing in May off the Neptune Island, South Australia.

The signficant benefits of using a sticker thin adhesive decal antenna design is that there is, in general terms, no limits to the size and configuration of the electrodes. The larger the electrodes and consider spacing creates a larger more effective electrical field.

3. **Fin solution is end-user installable on a surfboard**

The adhesive decal antenna along with the removable electronics are 100% fully end user installable.

The installation of the adhesive decal is an extention to the installation of a standard tail pad. The company has already produced “How To” videos on its website which can be viewed now.

The removable electronics screws into the tail pad kicker area and has no impact on the surfers performance. The electronics can be easily moved between boards.

4. **Fin solution does not affect the performance of the surfboard**

There are two areas that effect surfing performance with the new design: drag and weight. The drag produced by the sticker thin adhesive decal antenna is minimal and would not be noticed by over 90% of surfers in the market. Considering that many surfers already have stickers on the underside of the surfboard, the company is not expecting this to be a barrier to adoption.

The removable electronics weights 200 grams and the same can be said for this additional weight, the majority of surfers would not notice this slight increase. In more powerful surf, such as South Coast of Western Australia, additional weight can actually have an advantage.

5. **Fin solution is an effective beach barrier for other end-users such as swimmers**

Modelling of the effectiveness of multiple e-fields at a surfbreak or along a stretch of beach will be completed after the product field testing and review of the existing and future UWA modeling, however as stated in the initial submissions, there is no doubt that a barrier effect will occur.

6. **Fin solution has long-term behavioural shark impact in deterring them from an area**

This is to be determined following the product launch. In addition to the visual sightings and or reduction of sightings over time once the new Shark Shield devices are put in place, it may be possible to note behavioural shark changes on the eastern sea board using sharks that have been tagged.

South Africa have commenced in November the first trials of an electric shark barrier with the aim of proving that shark migration behaviour will change due the electric fence, and Shark Shield will be seeking access to this research to support the achievement of this objective.

Variance in project objectives? Yes X No ☐

Detailed reason for variance

With research demonstrating significant commercial barriers to adoption, the focus moved from the completion of the fin/plug solution to launching an adhesive decal antenna solution. The adhesive decal antenna solution achieves and exceeds all the objectives stated above.

Variance approved by DPC? Yes ☐ No ☐

ARP project performance indicators (PPIs) & milestones

1. Design Development Phases 0 – 4 (20 – 24 weeks) (including electronics design)	**April 2014 – July 2014**
2. Prototype Units Phase 5 (3 weeks)	**July 2014 – August 2014**
3. Testing Phase 5 (10 – 12 weeks)	**August 2014 – November 2014**
4. Tooling Phase 5 - 6 (10 – 12 weeks)	**November 2014 – March 2015**
5. Certification Phase 6 (4 – 8 weeks)	**March 2015 – May 2015**
6. First Order Procurement Phase 6 (4 – 6 weeks)	**May 2015 - July 2015**
7. Long Term Impact (26 – 52 weeks)	**August 2014 – August 2015**

5.2 Progress against PPIs and milestones (during the Project)

Summarise the progress towards achieving the PPIs and milestones. For the milestones, please update milestone progress (e.g. with “Commenced”; “In progress”; “Delayed”; or “Completed”).

Please also discuss any encountered difficulties/failures and improvements put or to be put in place.

1. Design Development (Phases 0 – 4) - COMPLETED

The early stage end-user and commercial requirements research has presented the challenges already discussed with respect to the commercial aspects of the fin/plug solution. This has resulted in an increase in the scope of the Product Specifications to consider the alternatives that ensure compliance with the project objectives of protecting surfers by providing an effective shark deterrent.

The PPI's in phases 0 - 3 were achieved in an extended time frame due to the consideration of the additional design alternatives to the fin/plug system as previously described. The initial proposed time frame for phases 0 - 4 was 20 - 24 weeks ending in July 2014, these phases were completed in November 2014. The phases completed consist of:

Phase 0 - End-user Requirements and Product Specifications
• Finalise Project Plan (Gant Chart)
• Draft System Requirements and Specification – Mechanical & Design / Electronics & Software
• Feasibility study (cost of goods, materials, hardware selection)
• System Architecture – electronic and software
Phase 1 - Conceptual Development – Surfboard Integration Requirements
• Sketches and renderings of conceptual streams, function, fit, aesthetics.
• Preliminary assembly layouts integrating hardware ideas with ergonomics and functionality.
• Progress meetings and review of system requirements.
• Manufacturing analysis and technique short list.
• Formal Design Review
Phase 2 - ID and mechanical design team
• 3D Product CAD layout of preferred design
• 3D part data for prototype release.
• 2D check drawings for the product (Used for QA and QC inspections).
• Preliminary BOM complete.
• Estimated Cost of Goods (COGS)
Phase 3 - ID and mechanical design team (CI, PIs)
• Draft Manufacturing Data Pack (MDP) for production quotation and prototype quotation
Fabrication of pre-production prototype of each product; Min: 1 Master and Slave
• Verify prototype works as designed and report, first field testing
• Validate user acceptance and report, using surfing community

Phase 4 - Electronics team:
• Electrical circuit design
• Printed Circuit Board (PCB) Specification, CAD Layout

2. **Prototype Units (Phase 5) - COMPLETED**

Prototypes were successfully developed and modelled for the grip pad along with the electronic housing, plus the fin/plug solution and the adhesive decal solution. The grip pad was compared to and shared with a number of existing manufacturers of grip pads with very positive feedback, which resulted in a commercial relationship with Ocean & Earth. The commercial marketing objective is to ensure the grip pad is as close to a standard grip pad as possible, this will remove an objection to selecting a Shark Shield grip pad which will make the surfboard at the point of purchase "Shark Shield Ready". This means that the consumer can add the electronics after the purchase of the surfboard, end-user installable electronics and decal electrodes.

Early field testing of the fin electrode system and the adhesive tape electrodes solution has indicated there is no impact on the surfer, meaning the electrical pulse generated is not effecting the physicality of the surfer. The field modeling was fine tuned will be used to provide estimations of the effective e-field and thus the effective protective range of the device.

3. **Testing (Phase 5) - COMPLETED**

The electrodes have been modelled successfully against the base line of the existing proven electrode design and against previous models completed by the South African National Space Agency. This phase is now complete and design work completed on the adhesive decal flat electrodes.

4. **Tooling (Phase 5 – 6) - COMMENCED**

Tooling design and fabrication for all custom components has commenced. First product molding and part creation completed, with initial product assembly, testing and certification completed. Production part supply sourcing commenced. Test engineers, Production engineers, tooling management, T1 through to signed off parts commenced. T1 samples and unit build for certification commenced. Data pack transfer – final ongoing production data packs commenced.

5. **Certification (Phase 6) - COMPLETED**

Certification of the power supply is the main consideration, with this objective being managed by sourcing a standard power adaptor and charger already certified. The company has not identified any additional certifications required for the device.

6. **First Order Procurement (Phase 6) - COMMENCED**

First orders have been placed on the manufacturer with two quotations being provided. Final manufacturer will be selected at the time of lodgement of this report, with first product target ship date of June 2016. It is expected that product will be in retail stores for purchase by July 2016.

7. **Long Term Impact – IN PROGRESS**

Long term impacts expected as a measure in the reduction of shark attacks on surfers, and specifically an overall reduction in attacks at locations where the devices are worn.

Variance in PPIs and/or milestones? Yes X No ☐

Detailed reason for variance

Design phases 1-3 time frame were extended to enable a dual development path that provided two alternatives to the consumer, both a fin/plug and adhesive antenna solution, with the adhesive antenna the final go-to-market solution. The delay has delivered a significantly more versatile solution to the market which will deliver more broad adoption and thus save more lives.

Variance approved by DPC? Yes ☐ No ☐

6 RESEARCH PROGRESS (progress, difficulties, staff during the Project

6.1 Project progress:

Summarise the research project's progress. Please include:

(i) progress against the project strategy (stated in the ARP Project Plan);

(ii) how the research is meeting end-user needs; and

(iii) any encountered difficulties/failures and improvements put or to be put in place.

The project strategy as stated in the ARP Project Plan was to deliver an effective shark deterrent to protect Western Australian surfers in both local and remote locations, there is no deviation to the project strategy.

As noted previously, timeframes in the early research and design phases 1 - 3 of the project were extended as alternative solutions had to be considered based on market research and commercial realities apparent during these phases. Appropriate risk mitigation actions were taken to consider the alternatives to the risks identified, specifically that consumers would not be able to adopt broadly the initial proposed fin/plug solution. This difficulty has been overcome with the improvement in the antenna design by putting in place the adhesive decal antenna solution.

The company has successfully delivered the project outcomes as planned and outlined in the ARP Program.

Variance in project strategy? Yes ☐ No X

Detailed reason for variance

(Please enlarge box as required.)

Variance approved by DPC? Yes ☐ No ☐

6.2 ARP project research/technical staff

List all research and/or technical staff working on the ARP project (provide title, name and position). Use asterisks to identify new staff.

(Please enlarge box as required.)
Lindsay Lyon, Managing Director - Shark Shield
Amanda Wilson, General Manager USA / Product Marketing Manager - Shark Shield
Tim Venter, R&D Manager / Manufacturing Manager - Shark Shield
Robert Tiller, Managing Director - Tiller Design
Steven Hill, Chief Design Engineer - Tiller Design*
Sam Walker, Industrial Designer - Tiller Design*
Adam Hobbs, Industrial Designer – Tiller Design*
Gilbert Han, Electronics Engineer – GH Electronics*
Christin Lundgren - Electronic Engineer - Shark Shield*
Hugh Kelly – Managing Director – Asian Electronic Manufacturing Services*
Steve Tebbutt – Engineer – Asian Electronic Manufacturing Services*

7 COLLABORATION (during the Project)

Summarise collaborative linkages, including progress against the Collaboration Plan stated in the ARP Project Plan.

For example, provide details of collaborative linkages associated with the project with:

(i) local, national and international researchers (including formal agreements on research collaboration); and

(ii) industry, government departments and other end-users.

The following achievements were made in the ARP Collaboration Plan;

Dr Charlie Huveneers, of SARDI and Flinders University; field testing specifically on the new Shark Shield surfboard design has not commenced due to the delay in the design phase. Charlie has been involved with the UWA testing of the existing FREEDOM7 during the 2013/14 timeframe and will be involved in the future final product testing as previously proposed.

Winthrop Professor Shaun Collin, UWA Ocean Institute; The company has provided UWA with testing equipment, expertise and internal research documentation over the period of this project. Collaboration continues with the signing of confidentiality agreements providing core research reports from Shark Shield to enable UWA to better analyse the current product testing. This data has been used as a baseline for the new innovation, along with considerations of alternative signal types.

Surfing Western Australia & Surfing Australia; Continued ongoing discussions on prototype designs have continued. KPI's will be based on field testing performance, specifically that the device does not impact surfing performance and can be leveraged in the surf school to attract more entrants to the sport in Western Australia. Surfing Western Australia will be provided units for use in May 2016.

FCS (Fin Control Systems); The collaboration with FCS to-date is the primary reason for the company deciding to consider alternatives to the fin/plug solution. Over a number of discussions with this products owner, Surf Hardware Pty Ltd (who invented the worlds first fin plug system), it became very apparent that access to this market for Shark Shield was going to be difficult. Whilst Shark Shield has completed the KPI's 1-2 it is unlikely that a commercial agreement will be reached. Surf Hardware is experiencing financial difficulties which are keeping them focused on their core business, thus seeing the Shark Shield opportunity as a distraction. Shark Shield's intent is to complete a working and installed prototype of the fin/plug system to re-engage Surf Hardware in a commercial discussion.

Tiller Industrial Design; Extensive collaboration continues with Tiller Design as shown through the project plan and achievements to-date on the design outcomes. Tiller have been instrumental in the successful completed design.

UWA Oceans Institute Western Australia; The UWA has provided Shark Shield with a detailed proposal to test the new surf product in South Africa. The company is currently seeking additional funding to support this proposal which has a cost of $380K.

KwaZulu Natal Shark Board South Africa; No further involvement to-date, although the sharing of information on the electronic shark barrier is occuring and Shark Shield will be seeking feedback on the completed surfboard designs once completed.

Flinders University South Australia; As above with Charlie.

CSIRO (material science); Extensive conversations and investigations where done with CSIRO with the conclusion that the required experts in the specific conductive material of interest, Graphene, are located at the Woolongong University in NSW. The company is now entering into an global exclusvity agreement with a new materials company based in the USA to source conductive plastics.

8 COMMUNICATION (during the Project)

8.1 Progress against the Communications Plan

Summarise progress against the Communications Plan in the ARP Project Plan.

Shark Shield has exceeded expectations on Public Relations in both Australia and the USA in building the awareness of the brand and electronic shark deterrents, and more specfically the introduction of a new integrated surfboard product. The company has experienced considerable success in generating education and awareness of electronic shark deterrents.

There has been considerable press coverage of the new surf product to date which is being supported by continued discussion on the effectiveness of Shark Shield's technology. Most notable is the annucment by Choice Magazine, Australia's Leading Independent Consumer Advocacy Group, that Shark Shield was the only shark deterrent reviewed that was scientifically proven and independently tested.

The formal product launch plan leveraging the relationship with Tom Carroll and an international current affairs program is scheduled for mid June 2016.

Variance in Communications Plan? Yes ☐ No X

Detailed reason for variance

(Please enlarge box as required.)

Variance approved by DPC? Yes ☐ No ☐

8.2 Publications

List publications arising from the ARP project in the following categories. Please exclude 'in press', 'accepted', 'submitted' or 'in preparation' publications.

Peer-reviewed journal articles

- Provide details of authors, year of publication, article title, journal name, volume, issue and page numbers.
- Use asterisks to identify co-authors from outside Australia.

(Please enlarge box as required.)
NIL

Total 0

Full conference papers in peer-reviewed conference proceedings

Provide details of authors, year of publication, title of paper and conference name, location & date(s).

(Please enlarge box as required)
NIL

Total 0

Peer-reviewed book publications

Provide details of authors, year of publication, article/chapter title, book title, editors, publisher name & location and page numbers.

(Please enlarge box as required.)
NIL

Total 0

9 RISK MANAGEMENT (during the Project)

Summarise progress against the Risk Management Plan stated in the ARP Project Plan.

The risks identified during the project and detailed in previous reporting periods have been resolved during the project timeframe. As a summary the risks and resolutions are detailed below with relative updated comments;

- Fin material selection with required electrical properties (low/low). This remained low with two identified solutions to manage risk. A metallic insert and a coating were the two options. Final solution if implemented would depend on effectiveness, cost and manufacturability

- Fin material selection with properties that do not impact surfing performance (low/medium). No change with both solutions selected above not impacting surfing performance.

- Miniaturization of electronics, such that the weight and size does not impact performance (low/low). Minaturization was achieved during the project.

- Electrical device performance and electrodes adequately deter sharks (medium/medium). Output and performance measured as effective as existing proven products.

- Personal safety during field testing with sharks (low/negligible). No Change.

- Lack of uptake by the surfing community. Research of the completed pre-production products confirm little to no barriers to adoption of the solution, with similar feedback from retailers.

Variance in Risk Management Plan? Yes ☐ No X

Detailed reason for variance

(Please enlarge box as required.)

Variance approved by DPC? Yes ☐ No ☐

10 INTELLECTUAL PROPERTY (during the Project)

Summarise progress in intellectual property management and use/licensing/commercialisation, including progress against the Intellectual Property Plan in the ARP Project Plan.

Please include details of:

(i) all intellectual property (IP) created under the ARP Project;

(ii) all patents (including provisional patents) in Australia and in overseas countries, including new patents filed, pending patents and issued patents; and

(iii) any commercialisation opportunities that have arisen in relation to the ARP Project and how these opportunities are being pursued.

The company has filed patents to the Fin Electrode System and will be lodging design copyright on the grip pad design.

Variance in IP Plan? Yes ☐ No X

Detailed reason for variance

(Please enlarge box as required.)

11 FINANCIAL DETAILS (during the Project)

11.1 State Government ARP grant details (as per the ARP Project Plan)

	Year 1	Year 2		
Agreed expenditure of State Government ARP grant	**Actual costings ($)**	**Agreed costings ($)**	**Actual costings ($)**	**Variance ($)**
Employment:				
Salary for development of customer requirements & product specifications	30,000	0	0	0
Sub-total	**30,000**	**0**	0	0
Research and development costs:				
Conceptual development & detailed design	73,200	94,800	235,429	140,629
Design implementation and prototype testing	1,500	30,500	49,379	18,879
Sub-total	**74,700**	**125,300**	284,808	159,508
Product development:				
Prototype review and production release	0	35,000	47,441	12,441
Sub-total		**35,000**	**47,441**	**12,441**
Equipment costs:				
Data transition, tooling validation and first samples	**0**	**35,000**	**0**	**-35,000**
Sub-total	**0**	**35,000**	**0**	**-35,000**
TOTAL	**104,700**	**195,300[1]**	**332,249**	**136,949**

[1]Unspent Year 1 State Government funds ($160,300) rolled-over for expenditure in Year 2.

The total project expenses detailed above exceeded the ARP Grant funding by $136,949 which excludes extensive labour costs, and tooling / sample costs yet to be incurred. As further validation of the expenses incurred on this project, during the period of the project the company has filed R&D Tax Incentive Claims with the ATO totalling $278,985 and year to date in FY16 expended a further R&D Tax Incentive Claim on this project of $188,203. The surf board shark deterrent under this grant is the only R&D activity the company is engaged in.

Variance in costings? Yes **X** No ☐

Detailed reason for variance between costings

As noted in previous reports, the move from a fin/plug system to remove consumer adoption risks required additional market research and considerable further R&D investment. The resulting output is a product that will gain broad based consumer adoption as the installation barriers are removed.

Variance approved by DPC? Yes ☐ No ☐

11.2 New research/technical staff (during the Project)

New employees hired using funds other than State Government ARP grant

Number of new employees (>0.5 FTE each) hired using funds other than the ARP grant?	

Details of new employees (>0.5 FTE each)

Name	Position	%FTE on Project	Commencement date	Funded by

11.3 Equipment purchased with value exceeding $50,000 (during the Project)

Summarise the purpose and research benefit of each equipment item, and complete the table below.

(Please enlarge box as required.)

Equipment funded from sources other than State Government ARP grant

(Add additional rows as required.)

Item	Cost ($)	Funded by
Total ($)		

11.4 Additional funding received (during the Project)

Provide details of any additional funding (such as new research grants and contract research), including the source (name of funding agency & type of grant or organisation/company name), title of grant or contract project, duration (year or years, e.g. 2012-2014) and value.

Additional cash funding ($)

Source	Chief Investigator	Grant/project title	Duration	Value ($)
			Total ($)	

Additional in-kind funding ($)

Source	Type	Grant/project title	Duration	Value ($)
			Total ($)	

SECTION E: ATTACHMENTS & CERTIFICATION

12 ATTACHMENTS

Is additional material attached? Yes **X** No ☐
(e.g. examples of media releases/articles/interviews)

How many additional pages are attached? Surf Product Overview

13 CERTIFICATION

I certify that:

i) this is an accurate progress report for the ARP Project; and

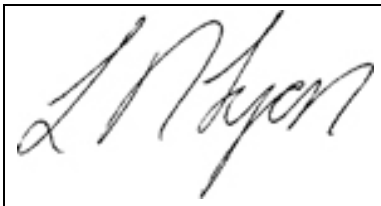
ii) all senior investigators agree that this report is an accurate representation of the progress of the ARP Project.

Title Mr

Name Lindsay

Position Managing Director

Signature



Date 03 March 2016

END OF FINAL REPORT