Darwin Initiative Main Project Annual Report

Important note: *To be completed with reference to the Reporting Guidance Notes for Project Leaders:*

it is expected that this report will be no more than 10 pages in length, excluding annexes

Submission Deadline: 30 April 2017

Darwin Project Information

Project Reference	EIDPO046
Project Title	Linking marine biodiversity conservation and fisher prosperity through marketplace innovation
Host Country/ies	Peru
Contract Holder Institution	University of Exeter
Partner institutions	ProDelphinus, Shellcatch, Pescadores Amigos de la Naturaleza, Ecopesca, Universidad Cientifica del Sur, San Jose municipality
Darwin Grant Value	£188,153
Funder (DFID/Defra)	Defra
Start/end dates of project	April 2015 / September 2017
Reporting period (e.g., Apr 2015 – Mar 2016) and number (e.g., Annual Report 1, 2, 3)	April 2016 to March 2017 Annual Report 2
Project Leader name	Prof. Brendan J. Godley
Project website/blog/Twitter	Website, Blog, Facebook, Twitter
Report author(s) and date	Joanna Alfaro-Shigueto, Jeffrey C. Mangel, Brendan J. Godley, 24 April 2017

1. Project Rationale

Peruvian small-scale fisheries (and globally) are massive in scale (10,000+ vessels, 40,000+ fishers), spread over vast areas, with over 100 landing sites, subject to little regulation, and communities are typically characterized by poverty and few employment alternatives. This means there is little motivation, pressure or financial resources for fishers to take the steps necessary to promote biodiversity conservation, even with identified solutions. Moreover, conservation initiatives typically encourage implementation of solutions (sometimes costly) but costs normally fall solely on fishers.

This was a challenge identified in our Main Round Project, as was the latent, unfulfilled interest on the part of consumers for sustainably fished products. Our objective is to spread the costs of conservation action – a societal benefit – across stakeholders and to reward fishers who proactively adopt solutions by providing

Figure 1. Peru (filled polygon) and the South American continent.

them differentiation in the marketplace and higher profits. Such a system has the potential to be self-sustaining, with conservation costs offset for participating fishers who earn more, leading to more fishers wanting to participate, further enhancing biodiversity conservation.

Similar initiatives have been developed with highly organized, industrial fisheries (e.g. Marine Stewardship Council). Our project innovates upon this model by designing a local, bottom-up system with small-scale fisheries.

This post-project builds upon this progress and lessons learned. It will provide fishers with the training, equipment, and expert oversight necessary to fish sustainably and will provide those fishers a clear path to a marketplace that acknowledges their efforts and that is willing to pay a premium for sustainably fished products - a premium that is returned directly to fishers to improve their livelihoods and support their continued efforts to fish responsibly.

The project is focused in Peru on the Pacific coast of South America. Project activities are focused on the small-scale fishing port of San Jose in northern Peru and potentially connecting to buyers or restaurants in the northern Peru city of Chiclayo, as well as in the capitol, Lima.

2. Project Partnerships

As planned, the lead in-country partner for this project is the marine research NGO **Pro Delphinus** (PD). PD facilitates contacts with government agencies and other partners and leads coordination and implementation of all project activities in Peru, including acquiring equipment, project logistics, research, training and outreach. Further partner organisations include: (1) **Pescadores Amigos de la Naturaleza** (PAN) which is the fisher cooperative in San Jose who form the core group implementing vessel monitoring and product tracking; (2) **EcoPesca** which has facilitated linkages with fish buyers throughout Year 1 & 2; and (3) **Shellcatch** whose camera technology form the backbone of the project's remote monitoring component and whose experience with product tracking and market development has been valuable in assessing project needs in San Jose. We also continue to liaise with **San Jose Municipality** to keep them apprised of the ongoing work and progress with the fishers in San Jose and with **Universidad Cientifica del Sur** (UCS) toward completion of the undergraduate thesis projects. These partnerships are documented in more detail in subsequent sections of this report.

Our relationship with project partners is maintained through periods of in-country field work and by an email circulation list, e-mails and telephone. Formal meetings with partners are held during periods of in-country fieldwork when project staff are present.

Additional Unforeseen Collaboration: In project Year 2 we have continued to collaborate with other institutions that have allowed us to expand upon project activities. These collaborations include: (1) **NOAA-Pacific Islands Fisheries Science Center** with whom we are working to further develop and test net illumination as a bycatch mitigation solution (2) **Flywire Cameras, Inc.** to test their portable HD video/GPS and net beacon technologies as potential fishery monitoring and bycatch mitigation solutions (3) **Ecuador Mundo Ecologico** who the project has been supporting in their test of net illumination in Ecuadoran net fisheries (4) the Peruvian industrial purse-seine company **TASA** with whom the project collaborates to train fishing crews in marine fauna bycatch conservation and handling; (5) **Stanford University** through the collaborative research of PhD candidate J. Mason; (6) **Oxford University** through the collaborative research of PhD candidate W. Arlidge, (7) the **HF radio base-station in San Jose** to assist in communicating with fishers and exchanging information about catch and bycatch, (8) with **Fishtek Marine** to develop low-cost, robust bycatch mitigation technologies suitable for small-scale fisheries, and (9) the **Embassy of the United States** to work with fishers and the San Jose community to monitor and reduce their waste production (e.g. plastics).

3. Project Progress

3.1 Progress in carrying out project activities

1.1 <u>Port assessment trips</u> (COMPLETED)

As scheduled, this was completed in Year 1 of the project.

1.2 Identify & train in-port personnel (COMPLETED)

As scheduled, 6 key in-port personnel were identified and their training was completed in Year 1. One additional person was trained in Year 2, K. Castillo. Training activities occurred during the port assessment trips but have continued in Year 2 through email and telephone.

1.3 Determine port & network system needs (COMPLETED)

Completed in Year 1. Continued in Year 2 with repeat, regular communications and port visits by PD staff with PAN fishers that allows for rigorous testing of system components and dialogue to improve its functioning (e.g. assess camera placement, image quality).

1.4 Acquire, install & test monitoring systems (COMPLETED)

Equipment was acquired, installed and tested in Year 1. Full camera system testing of 4 fishing vessels was completed in March 2016, a collaboration of PAN, PD and Shellcatch.

1.5 Test traceability monitoring (full system test) (COMPLETED)

Two full system tests were completed successfully, the first was on 18 Jun 2016 to two high-end restaurants in Lima: Maido and La Mar (Annex 7, Figures 1 to 4). The second test was completed on 26 Jan 2017 to a national supermarket, Tottus, to one of their stores in Chiclayo. (Annex 7, Figures 5 & 6)

1.6 Catch to market system operational (COMPLETED)

Full system tests proceeded as planned in Year 2 with three end-users and continues to be operational with Tottus supermarket, Chiclayo. Three deliveries were made to Tottus supermarket in March 2017, making a total of 6 successful deliveries.

1.7 Users trained in system operation (UNDERWAY)

Participating fishers and port personnel have been trained in camera system operation (e.g. camera use, charging, data download/upload). This included training for a major update in the data management software from project partner Shellcatch. Training in port-to-market monitoring was completed in June 2016. We've had 9 full system implementations, 6 of these have been successful. During these transactions, we have found and corrected mistakes and perfected shipping methods. This will continue during Q1 and Q2 in Year 3 to continue training with additional end-market partners.

1.8 Project reporting to partners, stakeholders, funders, government (UNDERWAY)

During Year 2, PD and partners had 14 meetings with Peru government offices in which project progress was discussed – this includes meetings with the Ministry of Environment (MINAM) and the Ministry of Production (PRODUCE, FONDEPES, SANIPES). We have also presented on project progress to fishers and local government officials during workshops and meetings in fishing ports (Annex 10). There are consistent weekly interactions between core project partners.

1.9 Student thesis projects assessing project impacts (COMPLETED)

As scheduled, two UCS undergraduate student were identified, A. Pasara completed and presented her undergraduate thesis project in Oct 2016. The second UCS student, E. Segura, is scheduled to complete his undergraduate thesis in Year 3. The University of Exeter MSc student was selected in Year 1. D. Bartholomew completed his degree and thesis in Aug 2016. The project was also able to extend support to two additional Exeter MSc students who are now conducting their research in Peru and will complete their degrees in Jul 2017.

Output 2: Fishers organized and participating in sustainable fishing

2.1 Engage fishers to participate (UNDERWAY)

As scheduled, PD has held 4 workshops in San Jose to promote project participation and another 6 workshops in 6 surrounding ports. Four vessels are actively participating in the project and another 4 vessels have noted their readiness to participate in the initial phase of the project (including being equipped with monitoring systems). (Annex 7, Figures 18 to 22, 26 & 27)

2.2 ProDelphinus and student staff identified and trained (COMPLETED)

Six PD staff have been trained in project goals and methods and are fully engaged in implementation of project activities. Trained PD staff are: N. Acuña, F. Cordova, C. Ortiz, E. Campbell, A. Gonzalez, A. del Solar. Trained UCS students are: A. Pasara and E. Segura.

2.3 Fisher self-reporting on catch and bycatch (UNDERWAY)

Seven gillnet vessels from San Jose are monitoring their fishing effort and/or bycatch with 96 trip reports provided in Year 2.

2.4 Acquire/fabricate mitigation & monitoring technologies (COMPLETED)

As scheduled, bycatch mitigation technologies (e.g. lights, pingers) were acquired and supplied to 12 small-scale gillnet fishing vessels during Year 1, including the 4 PAN vessels (16 fishers) that are participating in the project. We are also in active discussions with 2 companies (Flywire and Fishtek) to develop or modify fishery monitoring and bycatch mitigation technologies with direct project applicability (Annex 7, Figures 23 & 24).

2.5 Develop monitoring protocols and monitoring forms (UNDERWAY)

Self-reporting and onboard observer forms to monitor fishery catch and bycatch have been completed as scheduled. A Shellcatch camera system guidance document was also prepared. As fish purchases have begun, we identified the need for improved purchase tracking forms. These forms will be developed with input from end-user partners and will be initiated as orders become more frequent.

2.6 Onboard observer monitoring (UNDERWAY)

Onboard observer monitoring is underway as scheduled by PD trained biologists. Two fishing trips have been observed in Year 2. The strong collaboration between PD and fishers in San Jose has produced additional conservation research opportunities – specifically, satellite tracking of 5 critically endangered leatherback turtles captured by fishing vessels from San Jose in Year 2. (Annex 7, Figure 20; Annex 8; Annex 9)

2.7 Assessment & reporting on fisher participation, fishery impacts (UNDERWAY)

PD has undertaken preliminary assessments of catch and bycatch data to assess effectiveness of net illumination and acoustic alarms (Annex 9). A detailed assessment of net illumination is now also underway. Through reviews of observer effort and fisher self-reporting forms the project also tracks trends in catch and bycatch. We will continue to monitor fisheries in San Jose to include more data and make the assessments more robust. We also receive data from fishers that are not using mitigation techniques or cameras during their fishing trips. These data serve as baseline information, helping to assess project impact. PD staff are also working closely with Prof. Milner-Gulland of the University of Oxford and her PhD student W. Arlidge to develop detailed assessments of path and barriers to fishery sustainability, focused on incentivising bycatch mitigation (Annex 11). While this work will not be completed by project end, it will be important in promoting its long-term sustainability.

2.8 Liaise with local & regional government on project progress (COMPLETED)

A meeting at the San Jose Municipality was held in October 2016 and follow-up interactions have continued as scheduled. Project partners are in monthly communication with national government ministries. Fostering progress, project partner PD signed and MOU with the Ministry of Environment in June 2016.

Output 3: End-users engaged and participating through fish purchases

3.1 Project introduction workshops with owners, chefs, buyers (UNDERWAY)

Fourteen meetings (8 in Year 2) have been held with groups of restaurant owners, chefs and buyers since the start of the project and have demonstrated broad acceptance of the project concept. In addition to the 20+ restaurant owners from Year 1 with whom we have maintained contact, we have introduced the project to the following 11 restaurants: Capucchino, DeTomas, Los Cantarios, Isla del Encanto, El Chilcanito, El Molinero, Lobo de Mar, Isla del Encanto (2), Fiesta, La Picanteria, Mi causita and a second supermarket Makro (Annex 7, Figure 7).

At least 4 end-users have indicated willingness to participate in the project. These are Fiesta restaurant, DeTomas and Los Cantaritos and supermarket Makro. These three end-users add to our partners from Year 1, the national supermarket chain Tottus and the Gaston Acurio consortium of 9 restaurants. We continue additional discussions with these and other end-users to expand awareness of project and identify additional potential participants.

We are also part of a new government-led initiative called "A Comer Pescado" (Let's eat fish!) that promotes a national network to promote, sell and eat national seafood products. This initiative aims to promote local food products that are sustainable and nutritious. They are interested in working with the fishers that participate in this project and including them in this commercial network.

3.2 Chef-Fisher interchange workshops (COMPLETED)

Interchange events were organized in smaller groups than initially planned to have better focus and communication with participants. Three interchange events were held in Year 2. One interchange event was held in June 2016 in San Jose which brought a fish buyer to San Jose to meet PAN fishers (Annex 7, Figure 14). Two events were also held in Lima with representatives of 9 restaurants in attendance in which PAN fishers described their work and their roles in the project (Annex 7, Figures 16; Annex 10 meetings).

In addition to the projects activities, two fishers from San Jose participated in an artisanal fishers exchange program that brought them to a leatherback nesting beach in Mexico. They learned about and saw leatherback turtles nesting, traditional fishing methods of Mexico, and bycatch and conservation issues in Mexican fisheries.

3.3 Identify owners, chefs, market participants (UNDERWAY)

Because of the project introductions (Item 3.1), Tottus, Makro, Grupo Acurio, Maido, and Fiesta restaurants among others, have indicated they are prepared to receive products once the system is in place. First tests were with el Grupo Acuario (La Mar) and Maido. The second test was with Tottus supermarkets (Annex 7, Figures 1 to 3). We anticipated that additional product deliveries in the near term will be to Tottus supermarkets and Fiesta restaurants.

3.4 Development of awareness raising materials for end users (COMPLETED)

Project materials were designed and produced during Year 1, in addition to two videos. Three new materials were produced during the reporting period (2 stickers, 1 pin), bringing the project total to 9 products. Makro also produced a GIF advertisement that was promoted on their website and social network accounts.

3.5 Monthly orders placed by buyers (UNDERWAY)

We are in constant communication with M. Ferre, who oversees Tottus seafood products in the Chiclayo, Lambayeque store. When fishers are close to port, we communicate with them to know the seafood products they have. If they align with Tottus's seafood market needs, Ms. Ferre goes to San Jose to buy from fishers directly. This system has been in place since the successful test in January 2016 and has had three successful deliveries since, for a total of 4 Tottus deliveries.

3.6 Project video production (COMPLETED)

Two project videos were prepared, as scheduled, in Year 1.

3.7 Consumer smartphone application update (UNDERWAY)

New restaurant partners and Tottus supermarkets will be added to the BoVeda app and additional updates will be prepared as the full monitoring and purchase system is active and constant. The BoVeda app continues to be updated monthly with current closed seasons and as new fishery regulations are implemented.

3.2 Progress towards project outputs

In response to the recommendation of the Year 1 External Review and after discussion with the Darwin Initiative, we have revised this section to focus only on core Indicators and not Activities. A full, original version is supplied as Annex 12.

Output 1:	**Establishment of the first pilot ocean-to-market monitoring system in one small-scale fishing port in Peru allowing for monitoring of fisher compliance with sustainable fishing norms and for fish products to be differentiated and tracked to buyers.**			Comments (if necessary)
	Baseline	Change recorded by 2017	Source of evidence	
Indicator 1.4	By Q4 of Year 1 the system components (at-sea and in-port) are operating successfully and in tandem with two test deliveries to end-users completed.	Completed. System components operating successfully. 4 sample deliveries completed.	-Section 3.1, Item 1.4 -Annex 7, figures 1 – 7, 26, 27 -Annex 9	
Indicator 1.5	Beginning Q1 of Year 2 begin receiving at least one monthly standing order from end users for fulfilment by the network's fishers.	Underway. Network is set up and working, Frequency of orders depend on what fishers catch.	-Section 3.1, Items 1.5, 1.6 -Annex 7, figures 1 to 7	
Output 2:	**Fishers organized and participating in sustainable fishing. Fishers in the network will benefit from training and technology transfer to reduce their bycatch of threatened and endangered species and will benefit from access to the product tracking system and availability of buyers.**			Comments (if necessary)
Indicator 2.1	Through engagement and awareness raising activities, participation in the fisher network in the port of San Jose will be doubled to 10 vessels (~70 fishers, 10 vessel owners) by the end of Year 1 with these vessels employing the recommended sustainable fishing practices and equipping their vessels to participate in the vessel to market monitoring system.	Four vessels active as of Year 2, Q4. 12 fishing vessels in San Jose have been provided bycatch mitigation equipment which they continue to use.	-Sections 3.1, Item 2.1 -Annex 7, Figures 18 to 22, 26 & 27	
Indicator 2.2	2 students and 1 PD project coordinator identified and trained in project goals, methods and protocols.	1 PD coordinator identified, 2 of 2 students identified.	-Section 3.1, Items 1.2, 1.9 -Annex 6 -Annex 7, figures 11 to 13	E. Alfaro, coordinator. A. Pasara, and E. Segura (students).
Indicator 2.4	Self-reporting and independent onboard observer monitoring will be initiated with participating fishing vessels beginning in Year 1 and continuing	96 trip reports in Year 2. 7 total vessels self-reporting catch and bycatch from San	-Section 3.1, Item 2.3 -Annex 7, figures 18 to 22, 26, 27 -Annex 8 & 9	

	throughout the project to allow for monitoring and quantification of fishing effort and bycatch rates. (approx. 48 self-reported trips over 2 years, per vessel; approx. 480 total reports). At least 75% participating fishers submitting self-report forms per month regarding their catch and bycatch.	Jose. 100% of the participating vessels are submitting monthly reporting forms.		
Output 3:	**End-users engaged and participating through fish purchases. End users (restaurants, distributors, markets) will have more direct communication and access to fishers allowing for a predictable supply of sustainably caught products and allowing for differentiation of their product or service in the marketplace.**			Comments (if necessary)
Indicator 3.1	Through engagement and awareness raising activities throughout Year 1, 5 restaurants, 1 supermarket chain, and 1 distributor will begin buying products from the fisher network by the beginning of Year 2.	Underway. By end of Year 2, 3 end-users have participated in test orders, and 1 national supermarket has established a procedure for continued orders.	-Section 3.1, Items 3.1, 3.3 -Annex 7, figures 1-7, 16	
Indicator 3.2	16 workshops held over 2 years to promote growing participation in the project by end-users (e.g. markets, distributors, restaurants).	8 meetings held in Year 2. A total of 14 meetings over 2 years.	-Section 3.1, Item 3.1 -Annex 10	This activity will be completed in Q1 and Q2 of Year 3.
Indicator 3.6	In project Year 2 the monitoring system shifts to full implementation with regular, reliable monthly deliveries (one delivery per month for first quarter, and 2 per month minimum for remainder of year).	Underway. The system is in place with 1 end-user, Tottus supermarket, making regular orders.	Section 3.1, Item 3.5 Annex 7, figures 1 to 7	Order dynamic is different than originally envisioned: orders are dependent on what species are caught, not on time.

3.3 Progress towards the project Outcome

Outcome:	An integrated model system promoting marine biodiversity conservation, small-scale fishery sustainability and a traceable marketplace for sustainably fished products that distributes conservation costs and promotes fisher empowerment and poverty alleviation.			Comments (if necessary)
	Baseline	Change by 2017	Source of evidence	
Indicator 1	No baseline	This project	-Section 3.1, Items	Using

Measurable declines in bycatch and/or mortality rates of protected marine fauna resulting from the implementation of mitigation measures by participating fishers. We estimate a decline in small cetacean catch rates of approximately 40% and decreased sea turtle mortality of 30%.	was indicated but pre-project fishery are data are available for analysis to establish baseline catch and bycatch rates.	component and assessments are underway.	1.8, 2.3, 2.4, 2.6, 2.8. -Annex 7, figures 18 to 22, 26, 27 -Annex 8 & 9	observer and camera system data PD and thesis students are assessing catch and bycatch rates (e.g. Annex 8, 9). Pre-project data are also available that can be used to assess baseline catch and bycatch.
Indicator 2 A functioning pilot marketplace tracking system in one fishing port allowing for differentiation and reliable, regular deliveries of sustainably fished products to Lima markets.	No system available. 0 deliveries	System installation was successful. Four successful deliveries, to three end-users accomplished in Year 2.	Section 3.1, Items 1.3 to 1.7, 3.1, 3.5	
Indicator 3 A doubling to ten fishing vessels (70 fishers, 10 owners) participating in the fisher network – using sustainable fishing methods and providing their fish for sale through the tracking system.	5 vessels originally agreeing to participate in the network.	4 vessels currently using camera systems. 12 total vessels equipped with bycatch mitigation tech provided by the project. 7 total vessels self-reporting on catch and/or bycatch.	Section 3.1, Items 2.1, 2.3, 2.4.	
Indicator 4 Increased profitability for participating fishers by 25% in this poor fishing community through participation in the product tracking system (registered buyers, product traceability, predictable order quantities).	Current pre-system values as recorded by participating fishers. But the project did not indicate a baseline. Current intermediary markup is *ca*. £1 per kilo	This project component has yet to be implemented. Sale prices will be monitored and compared to San Jose market pre-system prices.	-Section 3.1, Item 3.5 -See also, Sections 6, 9, 10	Increased profitability will follow post-project as current fish sale dynamics impede fisher ability to profit (see Sections 6, 9, 10). Establishing a stable fisher-market

				network and capacity building will facilitate continued post-project interactions and increased profit.

3.4 Monitoring of assumptions

Our outcome and output level assumptions listed below have remained true, with no significant changes experienced during project Year 2. There has, however been a major, temporary natural and economic disruption in the first quarter of 2017 (Assumption 3 below). Coastal ocean warming and massive coastal rains and flooding have severely impacted the northern Peru coastline and economy and disrupted project activities. These disruptions have included reduced and altered fish catches and challenges landing or selling fish or reaching markets. This situation led us to request a six-month project extension, time that should be sufficient for climatic and economic conditions to normalize. In spite of these conditions, we have been able to continue with fishery monitoring and fish sales, but progress has been impeded.

Project outcome & output assumptions

1. Project partners and stakeholders, especially fishers, retain commitment to sustainable fishing practices and the use, management and maintenance of the tracking system and willingness to purchase through the network.
2. Retention of key staff and/or ability to appoint replacements.
3. There are no major economic disruptions (anthropogenic or natural) affecting the fisheries and stakeholder capacity to prioritise need for resource management.
4. Techniques and/or technologies can be identified and implemented to reduce negative interactions of the fishery with protected marine fauna.

3.5 Impact: achievement of positive impact on biodiversity and poverty alleviation

As detailed in the previous report, the anticipated impact of this project will be that the marine biodiversity of Peru is preserved through a system that more equitably distributes conservation costs, alleviates poverty in coastal communities and promotes fishery and species sustainability. During Year 2, we have continued to positively impact Peru's biodiversity through the collaborations with fishers in San Jose and their use of bycatch mitigation strategies and technologies (Indicators 2.1, 2.3 to 2.10). These practices have reduced bycatch (and capture severity) of threatened and endangered species, thus promoting fishery sustainability and biodiversity conservation (Annex 8). See Section 6.0 for comments on poverty alleviation.

4. Contribution to the Global Goals for Sustainable Development (SDGs)

Project activities contribute toward 3 of the Millennium Development Goals in Peru:

1. Environmental sustainability (Vessel-to-market monitoring will ensure sustainable fishing with positive biodiversity implications).
2. Poverty alleviation (income to poor households, reduced marginalization).
3. Partnership for development (through innovative cross-sectoral learning and collaboration).

5. Project support to the Conventions, Treaties or Agreements

- PD staff have led or participated in preparation of 3 documents submitted to the ACAP-Seabird Bycatch Working Group (SBWG) Meeting, La Serena, Chile, May 2016, and PD staff J. Mangel and J. Alfaro are members of the SBWG.
- PD provides project information to Peru government treaty focal points toward fulfilling national reporting responsibilities under ACAP (seabirds) and IAC (sea turtles).
- PD president Joanna Alfaro is a member of the Ministry of Environment (MINAM) inter-ministry roundtable on emblematic marine species conservation and attended its 4 meetings in 2016-2017.
- PD president Joanna Alfaro participated in the annual national CITES meeting in Cuzco, Peru in November 9-11, 2016.
- PD supported a large whale disentanglement training workshop, September 8-9, 2016, led by D. Matilla from the International Whaling Commission and attended by fisher participants in this project (Annex 7, Figure 17).

6. Project support to poverty alleviation

As stated in previous reports, the project is designed to establish a stable system that promotes fishery sustainability and satisfies a growing market for sustainably fished products. The indirect outcome of this system – but one essential to its stability – is increased profitably and recognition for fishers who can then voluntarily maintain higher standards of sustainability for their fishery. The primary expected beneficiaries of this work will be the participating fishers in San Jose, their families and the participating vessel owners.

In Year 2 we succeeded in completing fish sales from participating fishers. We expect this system will become increasingly stable and consistent during Year 3. These sales did not achieve increased profits but have helped establish the vessel-to-market system. Long-term implementation of the vessel-to-market system should also allow participating fishers to increase profits by more directly connecting them to end-users, but hurdles remain before this can be fully achieved (See also section 9). The current intermediary markup is ca. £1 per kilo of fish. This provides a target value that can be passed along to participating fishers. At least one fish buyer has indicated their preference to purchase fish directly from PAN at this same markup.

Participating fishers have also received national and international acknowledgement and training opportunities that can help reduce their social and economic marginalization (e.g. Annex 7, Figures 14 to 17).

7. Project support to gender equity issues

This project has been more directly focused on biodiversity and poverty alleviation aspects rather than gender equity issues. In year 2 there has been an emergent opportunity to include women in this project. We started a small project related to the correct management of solid waste in San Jose. One of the activities in this project is to create a group of women from San Jose, where they pick and discuss a marine conservation issue important to them and their community. With help from PD staff, these women will then implement solutions in San Jose to mitigate the issue. An additional opportunity we are also exploring (see also Section 9) is for women in these fisher families to be employed to transport fish directly to buyers. This would overcome one of the main hurdles fishers currently face selling directly to buyers instead of intermediaries. Gender equity has also been promoted through project partner staffing and student training. The majority of PD's core staff are female and women are in the majority of the project's advisory and leadership roles. Women lead on most reports and manuscripts that are outputs of the project, two women will attain post-graduate degrees, two have received undergraduate training, four have received post-graduate level training, and an additional five have received more than 1 year of training during the project.

8. Monitoring and evaluation

As articulated in this report and in the main bid, the progress of the project against key milestones and indicators is appraised by a Steering Group made up of partner organisations that meets approximately bi-annually. There is also regular communication among project partners, facilitated by the field presence of the key Darwin Staff. The key indicators show the progress of the project as catalysed by the launch of several ongoing initiatives. These include port assessments, equipment purchase, fabrication and installation, development of education and training materials, holding of meetings, talks and training workshops, at-sea monitoring of the San Jose fishery and working with end-users for participating in the project. The majority of these are clearly articulated and time stamped and have moved beyond the planning stages to varying levels of implementation.

Through our regular monitoring and evaluation, it became clear that the weather disruptions in northern Peru in the first quarter of 2017 could impact the project timeline and outputs. Localized ocean warming impacted fishing activity (catch rates, catch species, fishing areas) and massive coastal flooding impacted nearly all aspects of life in affected communities. Specific to the project, this impacted participating fishers fishing effort and catch, and the ability to get fish projects to the market as originally planned. For this reason, we requested and had approved a 6-month project extension – time that should be sufficient to normalize fishing activity and restore local infrastructure.

9. Lessons learnt

Year 2 activities have centred on implementing end-to-end product tracking and fish sales. Through these activities, challenges have emerged to which the project continues to adapt. First, neither PAN nor its participant fishers are legally able to receive payments from buyers, therefore an intermediary is still necessary. Second, PAN and participating fishers lack a consistent means to transport fish products directly to buyers. Both of these issues will need to be resolved for increased profitability to be achievable. Second, while we have found buyers of fish products, we have noted that they do not take full advantage of what we see as the marketing opportunities surrounding the initiative (e.g. further highlight sustainable products to consumers). Third, the camera technologies and software the project is using continue to be changed and upgraded. That has resulted in the need for unanticipated equipment updates and additional training. Similar projects should anticipate the need for ongoing training and equipment/software upgrades. Fourth, the collaboration with the University of Oxford has informed the project about more robust means quantify and monitor project activities and outcomes and behavioural change (e.g. Annex 11). Projects that build these monitoring methods into their activities from the beginning will be better able to track and quantify outcomes and behavioural change resulting from the project.

10. Actions taken in response to previous reviews (if applicable)

External reviewers of our Year 1 report had four main comments:

1. Include baseline data from San Jose fisheries, that do not use bycatch mitigation materials, nor vessel monitoring systems.

   Response: The project also receives baseline information from San Jose fishers that do not use mitigation techniques or have vessel monitoring systems. Moreover, we have onboard observer data collected prior to the project that also provides baseline, pre-treatment information. We have conducted regular assessments of bycatch rates (e.g. Annex 9) and a detailed analysis of net illumination is currently underway. Additional pre-/post- analyses and assessments will continue beyond the project end date.

2. The project should establish 2-3 indicators per output that measure progress towards output completion rather than completion of activities, and could drop the others.

   Response: This recommendation was adopted after discussion with Darwin.

3. The project proposes that the buyers have an appetite for paying more for sustainably fished products. The reviewer is surprised that the project did not submit a detailed analysis of the commercial exchanges of fish in the port of San Jose and nearby towns. The project could better select, engage, and pitch to buyers if it knew on average how much of the fish production each buyer buys, how often, and for what price/profit. Also, the project could better track future sustainable fishing if it knew the percentage of sustainable fish production that buyers are willing to buy. If this percentage stays small, it would be hard to be confident that the scheme can be scaled up.

Response: We based our initial estimates of potential increased profits on the experience of project partner Shellcatch in establishing similar programs elsewhere. During Year 1 we also conducted some of the more detailed assessments the reviewer requested, but we acknowledge that these only partially addressed this issue. The informal and private nature of many of these transactions also made it challenging to develop detailed estimates. In Year 2, as we have commenced with transactions, we have begun filling in some of these details and have also reached out to additional potential buyers (See section 3, Point 3.1), alternative networks (e.g. A Comer Pescado) and sought additional training (e.g. Fish 2.0) toward better understanding fish marketplace dynamics, and increasing potential for additional sales and increased profits. In Year 2 there was actually more demand for fish products than we were logistically able to fulfil.

4. The project does not appear to take any steps to involve women. The photos show that all or almost all project participants are men. The project did not research whether and how women fish, and did not collect data disaggregated by gender – or if this has been done, it has not been reported. Finally, the project utilises the word “fishermen” to refer to fishers in general. This is gender-biased.

Response: We thank the reviewer for raising this, it made us more aware of the need to consider gender equality issues more directly. The project does involve women, as evidenced by the in-port staff, PD staff, as well as the students that participate in the project. Social norms exclude women from fishing in San Jose (and the Peru coast). Unfortunately, J. Mason, while still involved with the project could not continue developing the gender roles component of her work. We have, however, another initiative in the same port focusing on women and the roles they can play in marine conservation (e.g. see Section 7) and we will continue to look for additional opportunities going forward. The term “fishermen” has been changed to “fishers” throughout the document.

11. Other comments on progress not covered elsewhere

There have been no major enhancements or refinements to the project, nor any significant difficulties encountered. We do not foresee any major additional risks.

12. Sustainability and legacy

As detailed above, the project has made considerable inroads to creating a profile in-country. There is strong buy-in from partners for the project, demonstrated by the number of project activities we have completed and carried forward. Efforts to promote the project in-country have come in the form of the numerous meetings, talks and workshops held with fishers at multiple fishing ports and with local and national level government officials and end-users (e.g. restaurants, fish markets, chefs). There continues to be strong interest expressed by the Peru government in the potential of camera systems and their applications in small-scale fisheries like that in San Jose. Government interest is also evident from their “A Comer Pescado” initiative. Project related activities have also been covered through local and national print and radio coverage. There is certainly evident interest in end-users for the sustainable fisheries model the project is establishing.

Our planned exit strategy remains unchanged although it has been delayed due to the weather disruptions. The goal of the project is to establish the structure of the vessel-to-market system and establish initial linkages to buyers. Following project completion, in-country partners will continue to work with the PAN network and advise on fishery bycatch monitoring. PD will also

be in a position to further promote the project beyond those sustained linkages established in Year 2. This includes the public-private partnership A Comer Pescado which could provide alternative or additional market linkages. PD staff A. Pasara also attended the Fish 2.0 event in Santiago, Chile in March 2017 (Annex 7, Figure 25). Training at this event has helped the project to better understand the needs of fish product businesses and how to more effectively pitch the initiative to investors, buyers and end-users.

There will also be considerable legacy aspects to this project including greatly enhanced levels of training of local staff and project participants, and training and educational materials.

13. Darwin Identity

In addition to those stated in Year 1 report, a BoVeda pin was produced with a link to the Darwin project. The support of the Darwin Initiative has also been recognized in 3 publications, 1 press release, 3 radio interviews and at 2 conferences presented in Year 2. The Darwin Initiative is acknowledged as the core, primary funder of this project at meetings with stakeholders.

The project had an active web presence, with over 10,000 followers receiving weekly postings on the Pro Delphinus Facebook page, a BoVeda Facebook community page with more than 500 followers as well as a PD Twitter page with more than 500 followers. All of these outreach resources have served as opportunities to raise awareness of the Darwin Initiative, which has growing recognition, particularly among government offices and NGOs

14. Project Expenditure

Table 1: Project expenditure during the reporting period (1 April 2016 – 31 March 2017)

Project spend (indicative) since last annual report	2016/17 Grant (£)	2016/17 Total Darwin Costs (£)	Variance %	Comments (please explain significant variances)
Staff costs (see below)			0	
Consultancy costs	0	0	0	
Overhead Costs			0	
Travel and subsistence			0	
Operating Costs			0	
Capital items (see below)	0	0	0	
Others (see below)			0	
TOTAL				

Annex 1: Report of progress and achievements against Logical Framework for Financial Year 2016-2017

Project summary	Measurable Indicators	Progress and Achievements April 2016 - March 2017	Actions required/planned for next period
Impact The marine biodiversity of Peru is preserved through a system that more equitably distributes conservation costs, alleviates poverty in coastal communities and promotes fishery and species sustainability.		Steps have been taken to achieve a more sustainable use of marine resources in Peru. Fishers in different ports in Peru are using the bycatch mitigation tools provided, vessels are participating in the Vessel-to-Market monitoring project, end-users are participating in monthly seafood orders.	
Outcome An integrated model system promoting marine biodiversity conservation, small-scale fishery sustainability and a traceable marketplace for sustainably fished products that distributes conservation costs and promotes fisher empowerment and poverty alleviation.	Mitigation resulting in declines of marine fauna bycatch/mortality, reliable delivery of sustainably fished products to Lima markets, increase in fisher participation in project and profitability.	• Mitigation tools to reduce bycatch have been given to fishers. • Vessel monitoring system has been implemented • Successful testing and implementation of vessel-to-market delivery.	• Increase in vessel participation in self-reporting & VMS • Continued reduction of bycatch incidence & severity • Recurring orders from end-users
Output 1. Establishment of the first pilot ocean-to-market monitoring system in one small-scale fishing port in Peru allowing for monitoring of fisher compliance with sustainable fishing norms and for fish products to be differentiated and tracked to buyers.	Staff, students, and stakeholders identified, training sessions, equipment purchased and installed, and operating successfully.	PD staff, students, and fishers have been identified and trained. Equipment and software has been purchased and is being used on 5 vessels.	
Activity 1.1 Project personnel to conduct a site visit to begin coordination with project participants and assess vessel and port infrastructure toward designing the tracking system.		Completed	
Activity 1.2, Identify personnel that will operate tracking system locally, and liaise with project partners (fishers, PD, end-users).		Completed	
Activity 1.3 Prepare a detailed assessment of port & tracking network system needs that will be addressed in establishing the system.		Completed	
Activity 1.4 Necessary equipment and technologies will be acquired, installed and tested.		Completed	
Activity 1.5 Upon completion of installation and testing of individual project components, a full system test will be conducting to ensure the traceability monitoring		Completed	

is operating as a coordinated system.		
Activity 1.6 System setup is scheduled for Year 1. Upon completion of system setup, the tracking system will become operational in Year 2 with fishers participating, transport of fish to market and linkages to buyers.		Completed
Activity 1.7 Upon completion of system setup, users (fishers, transporters, buyers) will be trained in system and component operation. This training will occur repeatedly throughout the project to allow for training of new entrants.		Underway, training workshops will continue for new entrants.
Activity 1.8 Regular, scheduled reporting of project activities and progress will be provided to partners, stakeholders, funders and local and national government agencies.		Underway, will continue during the 6-month extension.
Activity 1.9 One UoE based Masters student and two UCS based undergraduates will conduct research projects to assess the project and its impacts on the fishery and bycatch.		Completed. Three UoE MSc students have been identified. One completed thesis in July 2016. An additional two will complete their degrees in July 2017. Two UCS undergraduate students were identified. One completed degree in October 2016. One will complete by end of Year 3.
Output 2. Fishers organized and participating in sustainable fishing. Fishers in the network will benefit from training and technology transfer to reduce their bycatch of threatened and endangered species and will benefit from access to the product tracking system and availability of buyers.	An increase in vessels, project coordinator and student trained, mitigation techniques are being used, workshops and meetings are held.	Students and project coordinators have been identified and trained, as well as the 20 fishers that already participate in the project. Workshops have been held in San Jose port, and 6 other Peruvian ports.
Activity 2.1. Through repeated workshops fishers in San Jose and other ports along the coast will be informed about the project and bycatch mitigation and be encouraged to participate in the project.		Underway A total of 10 workshops have been held along the Peruvian coast, in 7 ports ports (San Jose, Salaverry, Tambo de Mora, Mancora, Callo, Ilo). 04 of these workshops were held in San Jose port.
Activity 2.2. Field coordinators from ProDelphinus and Universidad Cientifica staff will be identified and trained in project goals, methods and protocols.		Completed 6 in-port and 6 PD staff identified and trained. Two UCS student trained.
Activity 2.3 Fishers who agree to participate in the project will be required to self-report on their catch and bycatch. This will allow the project to monitor the effectiveness of the sustainable fishery practices and technologies employed.		Underway 16 fishers from 4 vessels have participated in vessel monitored trips. 96 fishing trips monitored and reported in Year 2. 7 vessels from San Jose also use mitigation tools and self-report their fishing-trips.
Activity 2.4 Necessary bycatch mitigation equipment &technology is obtained, imported into Peru or fabricated domestically.		Completed LED lights, pingers and line cutters have been purchased and delivered to ports of Peru, including San Jose. Research and collaborations into new or improved

		technologies in progress and as possible.
Activity 2.5 Development of fishery monitoring protocols and forms for use by fishers and observers.		Underway Protocols and data sheets have been designed and given to fishers. Trained observers and fishers have returned datasheets that are entered and managed by PD in a fishery monitoring database. Purchase tracking forms and protocols are in development.
Activity 2.6 A subset of fishing trips by project participant vessels will be monitored by trained onboard observers at intervals throughout the project to provide detailed assessments of catch and bycatch and to complement and compare with information collected by participating fishers through self-reporting.		Underway 2 trips have been observed by PD staff.
Activity 2.7 Annual summary reports will be prepared and provided to project participants, stakeholders, funders and government offices assessing fisher participation, fishery impacts (i.e. catch and bycatch).		Underway
Activity 2.8 Regular meetings will be held with local and regional government officials to detail the goals and objectives of the project, to report on project progress and to highlight the potential for the initiative to be implemented more broadly.		Underway 14 meetings were held with local and regional governmental organizations, including the Ministry of Environment (MINAM) and, the Ministry of Production (PRODUCE, FONDEPES, SANIPES).
Output 3. End-users engaged and participating through fish purchases. End users (restaurants, distributors, markets) will have more direct communication and access to fishers allowing for a predictable supply of sustainably caught products and allowing for differentiation of their product or service in the marketplace.	Restaurants and supermarkets contacted, workshops are held.	Underway Meetings have been held with end-users to present project: Tottus and Makro supermarkets, Gaston Acurio Restaurants group, Inkaterra hotels and restaurants, etc.
Activity 3.1 Workshops will be held at regular intervals through the duration of the project with restaurant owners, chefs and fish buyers and distributors in Lima, Peru to raise awareness of the project and promote buy-in and participation.		Underway 8 workshops have been held with possible end-user markets. We have contacted Tottus and Makro, two nation-wide supermarkets, Gaston-Acurio Restaurants, as well as individual restaurant owners.
Activity 3.2 Multiple interchange events will be scheduled to bring restaurant owners, chefs and fish buyers to ports to introduce them to fishers involved in the project, raise awareness of the challenges and pressures fishers face and to encourage the development of new, deeper partnerships and relationships between project participants.		Completed 1 buyer interchange workshop held in San Jose and two workshops that brought fishers to Lima to meet restaurant owners, managers, staff. 2 fishers participated in an interchange program with artisanal fishers from Mexico.

Activity 3.3 Workshops and interchange events (Activities 3.1 & 3.2) will provide the opportunities to identify those interested in participating in the project and subsequently provided more detailed information on the project and its components.	Underway
Activity 3.4 Multiple awareness materials in various formats (print, t-shirts, web, press release, etc.) will be designed and produced for use in workshops and interchange events and also to raise awareness among consumers at participating restaurants of the project and its participants.	Completed In addition to materials prepared in Year 1, a pin with the BoVeda logo was prepared.
Activity 3.5 With the initiation of the operational tracking system in Q1 of Year 2, monthly orders will begin to be placed by buyers for fulfilment by the fisher network.	Underway 6 successful deliveries completed. Tottus supermarkets has now received 4 successful deliveries. Orders will continue during Year 3.
Activity 3.6 A video will be produced promoting the project concept and highlighting the participants (fishers, restaurants, etc.) for use at meetings and workshops and in other media content (internet, smartphone apps).	Completed
Activity 3.7 The ProDelphinus smartphone application 'BoVeda' will be updated to include information about the project for consumers and end-users.	Underway, the app updated monthly.

Annex 2 Project's full current logframe as presented in the application form (unless changes have been agreed)

Project summary	Measurable Indicators	Means of verification	Important Assumptions
Impact: The marine biodiversity of Peru is preserved through a system that more equitably distributes conservation costs, alleviates poverty in coastal communities and promotes fishery and species sustainability.			
Outcome: An integrated model system promoting marine biodiversity conservation, small-scale fishery sustainability and a traceable marketplace for sustainably fished products that distributes conservation costs and promotes fisher empowerment and poverty alleviation.	• Measurable declines in bycatch and/or mortality rates of protected marine fauna resulting from the implementation of mitigation measures by participating fishers. • A functioning pilot marketplace tracking system in one fishing port allowing for sustainably fished products to Lima markets. • A doubling to ten fishing vessels (70 fishers, 10 owners) participating in the fisher network • Increased profitability for participating fishers by 25% in this poor fishing community through participation in the product tracking system	• Data collection by fishers and trained observers on fishery catch and bycatch (catch quantities, bycatch rates, mortality rates) allowing for analysis and reporting on effectiveness of sustainability practices. • Organizational documents and reporting forms allowing for assessment of participation in fisher network and use of sustainable fishery technologies. • Data collecting and analysis of tracking system components allowing for assessment of its functionality. • Data collection on fish product tracking and sales record to assess effectiveness of the system	• A1 Project partners and stakeholders, especially fishers, retain commitment to sustainable fishing practices and the use of the tracking system. • A2 Retention of key staff and/or ability to appoint replacements. • A3 There are no major economic disruptions affecting the fisheries and stakeholder capacity to prioritise need for resource management. • A4 Techniques and/or technologies can be identified and implemented to reduce negative interactions of the fishery with protected marine fauna.
Outputs: **1**. Establishment of the first pilot ocean-to-market monitoring system in one small-scale fishing port in Peru allowing for monitoring of fisher compliance with sustainable fishing norms and for fish products to be differentiated and tracked to buyers.	1a. In-port staff identified. 1b. Key stakeholder groups participate in a scoping trip. 1c. 100% of necessary equipment and technologies will be acquired, installed and tested. 1d. System components (at-sea and in port) are operating successfully and in tandem with two test deliveries to end-users completed. 1e. Beginning Q1 of Year 2 begin receiving at least one monthly standing	1a Press releases 1b Workshop reports, interim field reports, Darwin project website and blog. 1c Annual report by end of years 1 and 2. 1d Project resources 1e Promotion materials developed by buyers highlighting their participation in the project. 1f National or International conference and meeting presentations on the project.	A1 Project partners and stakeholders, especially fishers, retain commitment to sustainable fishing practices and the use, management and maintenance of the tracking system and willingness to purchase through the network. A2 Retention of key staff and/or ability to appoint replacements. A3 There are no major economic disruptions (anthropogenic or natural) affecting the fisheries and stakeholder capacity to prioritise need for resource management.

	order from end users. 1f. Training sessions held with system users. 1g. Two annual reports prepared and provided to stakeholders. 1h. One Master's Thesis (UoE) and two undergraduate theses (UCS) completed.		
2. Fishers organized and participating in sustainable fishing. Fishers in the network will benefit from training and technology transfer to reduce their bycatch of threatened and endangered species and will benefit from access to the product tracking system and availability of buyers.	2a Through engagement and awareness raising activities, participation in the fisher network in the port of San Jose will be doubled to 10 vessels (~70 fishers, 10 vessel owners) by the end of Year 1 with these vessels employing the recommended sustainable fishing practices and equipping their vessels to participate in the vessel to market monitoring system. 2b 2 students and 1 ProDelphinus project coordinator identified and trained in project goals, methods and protocols. 2c Mitigation technologies and strategies will be identified and implemented consistently by fishers in the network to reduce the bycatch of marine mammals and sea turtles. Existing technologies can be We estimate a decline in small cetacean catch rates of approximately 40% and decreased sea turtle mortality of 30%. 2d Self-reporting and independent onboard observer monitoring will be initiated with participating fishing vessels beginning in Year 1 and continuing throughout the project to allow for monitoring and quantification of fishing effort and bycatch rates. (approx. 48 self-reported trips over 2	2a Press releases 2b Workshop reports, interim field reports, Darwin project website and blog. 2c Annual report by end of years 1 and 2. 2d Project resources 2e Promotion materials developed by buyers highlighting their participation in the project. 2f National or International conference and meeting presentations on the project.	A1 Project partners and stakeholders, especially fishers, retain commitment to sustainable fishing practices and the use, management and maintenance of the tracking system and willingness to purchase through the network. A2 Retention of key staff and/or ability to appoint replacements. A3 There are no major economic disruptions (anthropogenic or natural) affecting the fisheries and stakeholder capacity to prioritise need for resource management.

	years, per vessel; approx. 480 total reports). At least 75% participating fishers submitting self-report forms per month regarding their catch and bycatch. 2e 24 workshops held with fishers over 2 years to promote participation in the project. 2f 100% of necessary equipment is obtained, imported into Peru or fabricated domestically. 2g A minimum of three reporting forms with guidance documents prepared covering fisher self-reporting, product tracking and product commerce. 2h 12 onboard observer trips completed as an independent assessment of fishery catch and bycatch and to augment fisher self-reporting forms. 2i 2 annual reports prepared summarizing fisher participation in the project and fishery impacts (catch and bycatch levels and characteristics). 2j 6 meetings with local and regional government officials to promote the project.		
3. End-users engaged and participating through fish purchases. End users (restaurants, distributors, markets) will have more direct communication and access to fishers allowing for a predictable supply of sustainably caught products and allowing for differentiation of their product or service in the marketplace.	3a Through engagement and awareness raising activities throughout Year 1, 5 restaurants, 1 supermarket chain, and 1 distributor will begin buying products from the fisher network by the beginning of Year 2. 3b 16 workshops held over 2 years to promote growing participation in the project by end-users (e.g. markets, distributors, restaurants). 3c 3 interchange events held with at least 15 participants to promote raised	3a Press releases 3b Workshop reports, interim field reports, Darwin project website and blog. 3c Annual report by end of years 1 and 2. 3d Project resources 3e Promotion materials developed by buyers highlighting their participation in the project. 3f National or International conference and meeting presentations on the project.	A1 Project partners and stakeholders, especially fishers, retain commitment to sustainable fishing practices and the use, management and maintenance of the tracking system and willingness to purchase through the network. A2 Retention of key staff and/or ability to appoint replacements. A3 There are no major economic disruptions (anthropogenic or natural) affecting the fisheries and stakeholder capacity to prioritise need for resource

	awareness among stakeholders of the tasks and challenges faced by each, and to promote opportunities for additional, unforeseen collaborations. 3d A minimum of 30 end-users identified who are interested in receiving more information on the project and for possible participation in the product tracking system 3e 8 education materials designed in a variety of formats and 2 press releases prepared. 3f In project Year 2 the monitoring system shifts to full implementation with regular, reliable monthly deliveries 3g 1 video produced about the project and the BoVeda smartphone application update.		management.

Activities

1.1 Project personnel to conduct a site visit to begin coordination with project participants.
1.2 Identify personnel that will operate tracking system locally, and liaise with project partners (fishers, PD, end-users).
1.3 Prepare a detailed assessment of port & tracking network system to address in establishing the system.
1.4 Necessary equipment and technologies will be acquired, installed and tested.
1.5 A full system test will be conducted to ensure the traceability monitoring is operating as a coordinated system.
1.6 Tracking system will become operational in Year 2 with fishers participating, transport of fish to market and linkages to buyers.
1.7 Users (fishers, transporters, buyers) will be trained in system and component operation.
1.8 Regular, scheduled reporting of project activities and progress will be provided to partners, stakeholders, etc.
1.9 One UoE based Masters student and two UCS based undergraduates will conduct research projects on project.

2.1 Through repeated workshops fishers in San Jose and other ports along the coast will be informed about the project and bycatch mitigation.
2.2 Field coordinators from PD and UCS staff will be identified and trained in project goals, methods and protocols.
2.3 Fishers who agree to participate in the project will be required to self-report on their catch and bycatch.
2.4 Necessary bycatch mitigation equipment &technology is obtained, imported into Peru or fabricated domestically.
2.5 Development of fishery monitoring protocols and forms for use by fishers and observers.
2.6 A subset of fishing trips by project participant vessels will be monitored by trained onboard observers at intervals throughout the project.
2.7 Annual summary reports will be prepared and provided to project participants, stakeholders, etc.
2.8 Regular meetings will be held with local and regional government officials to detail goals, project progress and highlight the potential for the initiative to be implemented more broadly.

3.1 Workshops will be held at regular intervals through the duration of the project with end-users (restaurant owners, chefs).
3.2 Multiple interchange events will be scheduled to bring restaurant owners, chefs and fish buyers to ports to introduce them to fishers involved in the project and to encourage the development of new, deeper partnerships and relationships between project participants.
3.3 Workshops and interchange events will provide the opportunities to identify those interested in participating in the project and subsequently provided more detailed information on the project and its components.
3.4 Multiple awareness materials in various formats will be designed and produced for use in workshops and interchange events.
3.5 Monthly orders will begin to be placed by buyers for fulfilment by the fisher network.
3.6 A video will be produced promoting the project concept and highlighting the participants (fishers, restaurants, etc.) for use at meetings and workshops.
3.7 The ProDelphinus smartphone application 'BoVeda' will be updated to include information about the project for consumers and end-users.

Annex 3 Standard Measures

Please note, standard measures were not included as part of the project application form and, as a result, target values were not established. We have included measures of all activities that apply and included target values for those items for which we established a target value elsewhere in our proposal. For all other items for which a target value was not established we have entered 'na'.

Table 1 Project Standard Output Measures

Code No.	Description	Gender of people (if relevant)	Nationality of people (if relevant)	Year 2 Total	Total planned during the project
2	Number of people to attain Masters qualification (MSc, MPhil etc)	1M, 2F	UK	3	1
3	Number of people to attain other qualifications (ie. Not outputs 1 or 2 above)	1M, 1F	Peru	2	2
4A	Number of undergraduate students to receive training	4M, 2F	Peru	6	2
4B	Number of training weeks to be provided			216	Na
4C	Number of postgraduate students to receive training	3M, 4F	4 UK-based, 2 Peru, 1 USA	7	2
4D	Number of training weeks to be provided			148	Na
5	Number of people to receive at least one year of training (which does not fall into categories 1-4 above)	1M, 5F	Peru	6	Na
6A	Number of people to receive other forms of education/training (which does not fall into categories 1-5 above)		Peru	255	Na
6B	Number of training weeks to be provided			17	Na
7	Number of (ie different types - not volume - of material produced) training materials to be produced for use by host country			8	Na
8	Number of weeks to be spent by UK project staff on project work in the host country			24	Na
11A	Number of papers to be published in peer reviewed journals			3	Na
12B	Number of computer based databases to be **enhanced** and handed over to host country			2	Na

14A	Number of conferences/seminars/ workshops to be **organised** to present/disseminate findings			0	Na
14B	Number of conferences/seminars/ workshops **attended** at which findings from Darwin project work will be presented/ disseminated.			2	Na
15A	Number of national press releases in host country(ies)			0	Na
15C	Number of national press releases in UK			1	Na
15D	Number of local press releases in UK			0	Na
17A	Number of dissemination networks to be **established**			0	Na
19A	Number of national radio interviews/features in host county(ies)			2	Na
19C	Number of local radio interviews/features in host country(ies)			1	Na
20	Estimated value (£'s) of physical assets to be handed over to host country(ies)			£1,000	
23	Value of resources raised from other sources (ie in addition to Darwin funding) for project work			£115,645	

Table 2: Publications

Title	**Type** (e.g. journals, manual, CDs)	**Detail** (authors, year)	**Gender of Lead Author**	**Nationality of Lead Author**	**Publishers** (name, city)	**Available from** (e.g.weblink or publisher if not available online)
Captures of manta and devil rays by small-scale gillnet fisheries in northern Peru.	Journal	Alfaro-Cordova, E. A. del Solar, J. Alfaro-Shigueto, J.C. Mangel, D. Montes, O. Carrillo, B. Diaz. 2017	Female	Peru	Fisheries Research	In press
Trophic ecology and distribution of the smooth hammerhead shark (Sphyrna zygaena) in northern Peru.	Journal	Gonzalez-Pestana, A., Acuña, N., Alfaro-Shigueto, J., Mangel, J.C., and Espinoza, P. 2017	Female	Peru	Fishery Bulletin	In press
Are we working towards global research priorities	Journal	A. F. Rees, J. Alfaro-Shigueto, P. C. R. Bar	Male	UK	Endangered Species	Link

for management and conservation of sea turtles?		ata, K. A. Bjorndal, A. B. Bolten, J. Bourjea, A. C. Broderick, L. M. Campbell, L. Cardona, C. Carreras, P. Casale, S. A. Ceriani, P. H. Dutton, T. Eguchi, A. Formia, M. M. P. B. Fuentes, W. J. Fuller, M. Girondot, M. H. Godfrey, M. Hamann, K. M. Hart, G. C. Hays, S. Hochscheid, Y. Kaska, M. P. Jensen, J. C. Mangel, J. A. Mortimer, E. Naro-Maciel, C. K. Y. Ng, W. J. Nichols, A. D. Phillott, R. D. Reina, O. Revuelta, G. Schofield, J. A. Seminoff, K. Shanker, J. Tomás, J. P. van de Merwe, K. S. Van Houtan, H. B. Vander Zanden, B. P. Wallace, K. R. Wedemeyer-Strombel, T. M. Work, B. J. Godley. 2017			Research	
Living on the Edge: Hawksbill Turtle Nesting and Conservation Along the Eastern Pacific Rim	Journal	Alexander R. Gaos, Michael J. Liles, Velkiss Gadea, Alejandro Peña de Niz, Felipe Vallejo, Cristina Miranda, Jodie Jessica Darquea, Ana Henriquez, Eduardo Altamirano, Alejandra Rivera, Sofía Chavarría, David Melero, José Urteaga, Carlos Mario Pacheco, Didiher Chácon, Carolina LeMarie, Joanna Alfaro-Shigueto, Jeffrey C. Mangel, Ingrid L. Yañez & Jeffrey A. Seminoff. 2017	Male	USA	Latin American Journal of Aquatic Research	In press

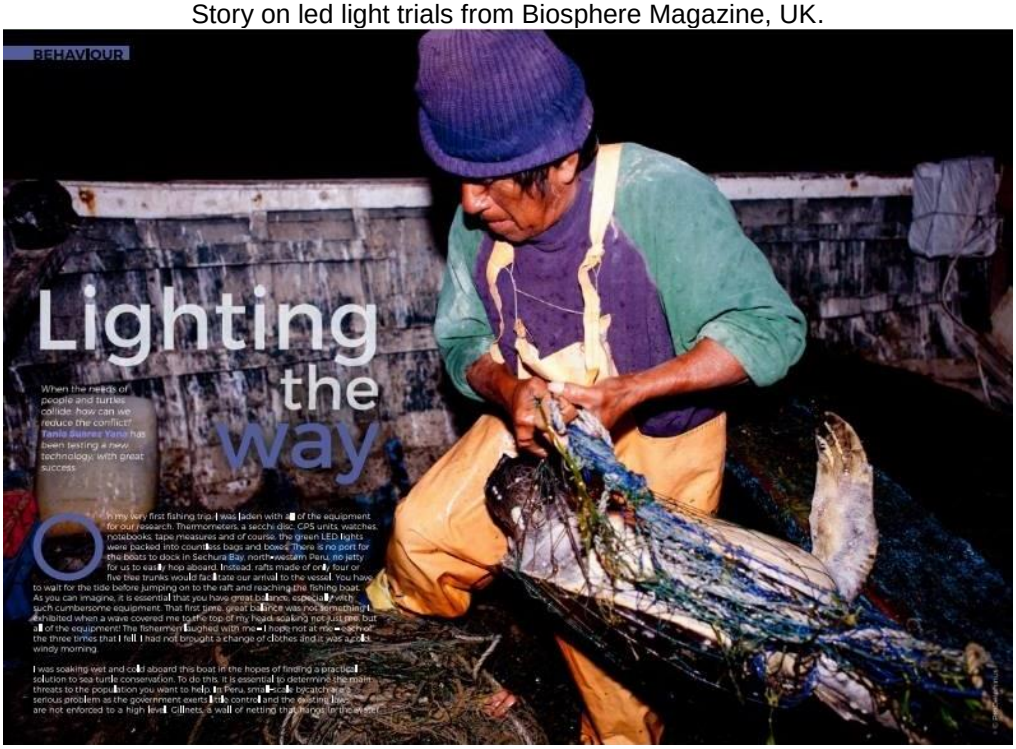
Annex 4 – supplementary material

Button pin “If fish you want to eat, responsibly you should choose” that was given out to restaurant and end-user partners with Boveda logo.

Annex 5: Darwin Project Press Coverage

Ad produced and promoted by Makro super markets about BoVeda.

Story on led light trials from Biosphere Magazine, UK.



RSPB bycatch booklet highlighting net illumination potential to reduce sea turtle bycatch.

Target species:

Bycaught species:

Fleet:

Oceans:

SHINING LIGHTS TO SAVE SEA TURTLES

Overview

Suspended in the water column by a floatline, gillnets act as a wall to larger marine organisms, creating a risk of entanglement for non-target species such as seabirds, turtles, sharks and marine mammals. Monofilament is the primary material used in gillnets now. This is far less visible to non-target species compared with traditionally-used materials (e.g. cotton, hemp), resulting in higher target catch, but unfortunately, higher bycatch as well.

The scale of gillnet fishing goes largely unreported in the Eastern Pacific due to the extensive involvement of small artisanal vessels, but bycatch is potentially significant in the highly productive waters of the region. The very large Peruvian gillnet fleet, for example, is thought to catch more than 10,000 birds per year, including species such as the vulnerable Humboldt penguin (*Spheniscus humboldti*), white-chinned petrel (*Procellaria aequinoctialis*), and even low numbers of Critically Endangered waved albatross (*Phoebastria irrorata*). Peruvian gillnets also have high interaction rates with sea turtles, including in bottom set gillnets used in the Constante small-scale fishery where it's estimated that over 300 green turtles are caught annually.

"Gillnet fisheries are massive in scale in Peru but also worldwide, and unfortunately very few solutions to bycatch have been identified for these fisheries. Our research has been directed at trying to find effective, low cost solutions to gillnet bycatch – solutions that can allow for fisheries that are sustainable for marine life and for fishers." said Dr Jeffrey Mangel of University of Exeter and Peruvian NGO ProDelphinus, which has been working on bycatch reduction in the Constante fishery, north west Peru, for over a decade.

Solutions

Gillnets become hard to see at low light levels beneath the waves, so proposed solutions to gillnet bycatch are centred on increasing net visibility to non-target species, including the use of high-contrast net panels and net lighting. To investigate the effectiveness of net lighting in the Constante small-scale fishery, ProDelphinus researchers used 114 pairs of nets on 11 vessels undertaking typical fishing activity targeting demersal species such as guitarfish. In each pair, one net was illuminated with green light-emitting diodes (LEDs) placed every ten metres along the gillnet floatline. The other net in the pair was the control and not illuminated. The control nets caught 125 green turtles while illuminated nets caught 62, a statistically significant reduction in bycatch, but with no reduction in the intended catch of fish.

"This was the first time that lighting technology has been trialled in a working fishery, and net illumination reduced green turtle deaths by 64 per cent. The results are exciting because it is an example of a relatively cost effective measure that can work in a small-scale fishery, which, for a number of reasons, are fisheries that can be very difficult to find practical, real-world solutions." said Dr Mangel.

Future

Finding practical techniques for tackling bycatch across species groups can be a real challenge, but net illumination provides hope for saving turtles, and possibly other marine life, including seabirds. ***"Based on the impressive results with sea turtles, further tests are now ongoing to see if net illumination is also effective at reducing bycatch of seabirds and marine mammals"***, said Dr Mangel, with initial results appearing positive. ***"Given that Peru's gillnet fleet comprises the largest component of the nation's small-scale fleet and is conservatively estimated to set 100,000 km of net per year, we now need to work beyond the Constante fleet with larger fisheries to see if the results can be repeated with other threatened and endangered species."***

Alfaro-Shigueto *et al.*, 2011; Mangel *et al.*, 2011; Ortiz *et al.*, 2016; Žydelis *et al.*, 2013

Annex 6: Darwin Project Conference Presentations and Thesis Work

Student thesis:

David Bartholomew, MSc University of Exeter dissertation

Man versus Machine: Electronic Monitoring versus On-Board Observers in Small-Scale Fisheries in Peru

Small-scale fisheries impact greatly on the populations of threatened marine fauna. Peru's small-scale elasmobranch gillnet fishery captures thousands of sharks and rays each year, as well as high rates of incidental capture of sea turtles, small cetaceans and pinnipeds. We assessed the ability of cameras to identify and quantify catch in this fishery by comparing its performance to fishermen's reports. Cameras were installed across five boats with a total of 139 fishing sets during our study. The cameras were shown to be an effective tool to identify catch, with > 90% detection rates for 9 of 11 species of elasmobranch caught. Detection rates of incidental catch were much lower (sea turtle = 63%; cetacean = 67%). The camera's ability to quantify target catch was shown to be dependent on catch quantity and catch size. Cameras were more effective at quantifying ray capture than sharks in our study. We showed cameras could provide a more time- and cost-effective method for monitoring catch in small-scale fisheries and can be used to overcome deficiencies in fishermen's reports. However, cameras remain insufficient to monitor bycatch. We expect camera performance to improve over time for all catch species with modifications to the camera specifications.

Andrea Pasara, Universidad Cientifica del Sur dissertation

Descripción de la captura incidental y comercio de Hippocampus ingens Girard, 1858 "caballito de mar" de las redes de cortina de fondo de embarcaciones artesanales en la Bahía de Sechura, Piura

Seahorses are part of fisheries bycatch and are also affected by their international trade, which is used mainly for Traditional Chinese Medicine (TCM). Studies evaluating the bycatch and trade of *Hippocampus ingens* are still limited. However, information suggests that Peru is one of the leading exporters of seahorses in South America. This study analyzes bycatch and trade of *H. ingens* in bottom gillnets from small-scale vessels in Sechura Bay during 2011. For this, data on the catch per unit effort (CPUE), position of the sets and size of each individual caught in the nets was taken. Additionally, a survey was conducted to fishermen in order to collect trade information. This data showed that the average CPUE was 0.16 seahorses/km2h and that probably the annual bottom gillnets vessels incidentally caught 5489 seahorses during the year. The highest percentage of individuals were in adulthood between sizes 13 and 14 cm and were located mainly in the fishing areas near Constante and Bayóvar ports. Furthermore, the information collected by surveys revealed that trade is still present in the bay despite its prohibition, it exists between one to three buyers in the ports and that the cost of seahorses is around 100 soles per kilogram. Most of the seahorses come from bycatch and are exported to the international market. Also, fishermen have little knowledge about this specie and its legal protection. This thesis provides the first estimate of seahorse bycatch (*H. ingens*) on bottom gillnets in Peru, showing the impact from fishing and trade on seahorse populations, highlighting the need to consider conservation plans for this specie and the ecosystem based management of local fisheries.

Titles of presentations at conferences (5th Congress of Marine Sciences of Peru, November and 5th Colombian Meeting on Condrichthyes, October 2016)

Title: Development of the National Amazon River Dolphins and Manatee Conservation Plan (Poster)
Authors: E. Campbell, J. Alfaro-Shigueto, H.Y.J. Luis Mena

Title: Whale entanglements: frequency and economic cost (Poster)
Authors: E. Campbell, J. Alfaro-Shigueto, J.C. Mangel

Title: What you see is not what it looks like: Identification of mobulids in Peru using genetic barcodes (Poster)
Authors: E. Alfaro Córdova, X. Velez-Zuazo, J. Alfaro-Shigueto, O. Carrillo Zavala, D. Sarmiento Barturen

Title: Capture of mantas and mobulas (Mobulidae) by the artisanal gillnet fishery of Northern Peru (Oral)
Authors: E. Alfaro Córdova, A. Del Solar Escardó, J. Alfaro-Shigueto, J.C. Mangel, O. Carrillo Zavala, D. Sarmiento Barturen, B. Díaz Solano

Title: Evaluation techniques of marine otters (*Lontra felina*) along the Peruvian coast. (Poster)
Authors: C. Ortiz Álvarez, J. Alfaro-Shigueto, J.C. Mangel

Title: Trophic Ecology and Areas of Rearing Hammerhead Shark (*Sphyrna zygaena*) in North of Peru. (Oral)
Authors: A. González-Pestana, N. Acuña Perales, J. Alfaro-Shigueto, J.C. Mangel, P.A. Espinoza Silvera

Title: Preliminary Results of the Elasmobranch Diet in Northern Peru (Poster)
Authors: A. González-Pestana, E. Alfaro Córdova, N. Acuña Perales, J. Coasaca Céspedes, F. Córdova Zavaleta, E. Segura Cobeña, D. Benites, M. Espinoza, A. Jimenez Heredia, S. Pingo Paiva, J. Alfaro-Shgueto, J.C. Mangel, A. Indacochea Mejia, V. Moscoso, J.C. Xavier, S. Kohstsu Asato, A. Sánchez Rea, A. Arévalo del Águila, A. Pásara Polack, E. Campbell, P. Antonio Espinoza Silvera

Title: Preliminary Results of Reproductive Biology of the Tollo (*Mustelus Whitneyi*) (Poster)
Author: A. Gonzalez-Pestana

Title: Situation of Batoids in Peru: Diversity, Conservation, Fisheries, Ecology and Missing Information (Oral)
Authors: A. González-Pestana, X. Velez-Zuazo, C. E. Kouri, G. Mucientes, J.C. Mangel

Title: Bycatch assessment of *Hippocampus ingens* of the deep gillnet fishery of Sechura Bay, Piura (Poster)
Authors: A. Pásara Polack, J. Alfaro-Shuez, E. Alfaro Córdova; J.C. Mangel, M. Quiñe

Title: Evidence of marine litter in stomachs of *Mobula japanica* in northern Peru (Oral)
Authors: J. Coasaca Céspedes, S. Valle Rubio

Title: Analysis of stomach contents found in *Mobula japonica* (Myliobatidae: Mobulinae) (Oral)
Authors: Javier Coasaca Céspedes, Francisco Córdova Zavaleta, Nicolás Acuña Perales, Sonia Valle Rubio

Peer-reviewed research:

*1. Trophic ecology and distribution of the smooth hammerhead shark (*Sphyrna zygaena*) in northern Peru*

The smooth hammerhead shark (*Sphyrna zygaena*) is the third most captured shark species in Peru, a nation with one of the largest shark fisheries in the Pacific. As a top predator, hammerheads have an important role in the marine ecosystem; nevertheless, fisheries that captured *S. zygaena* often have limited management and enforcement, and species ecology is poorly understood. Our study sought to better understand the trophic ecology and distribution of *S. zygaena* in northern Peru by using three complementary analyses: stomach contents, stable isotopes, and mercury levels. From 2013 to 2015, we collected 485 samples from seven ports of sharks measuring between 53 to 294 cm TL. Our results show that *S. zygaena* is a specialized top predator. The most important prey species were the Humboldt squid (*Dosidicus gigas*) and the Patagonian squid (*Doryteuthis gahi*). Hammerheads displayed different diets depending upon body size, but not by gender, location, season, year or environmental conditions. Because of the prey species in each class size, we suggest that hammerheads change their distribution and habitat according to their ontogeny. Given the importance of *D. gigas* in the diet, and it's know distribution in Peru, we conclude that northern Peru is an important eastern Pacific feeding ground for *S. zygaena*. δ13C, δ15N and mercury values indicate that the mother distributes further north and more offshore in comparison with juvenile sharks. Given that this species and its principal preys are commercially important, these findings could contribute to the design and implementation of conservation plans for hammerhead shark fisheries.

2. Are we working towards global research priorities for management and conservation of sea turtles?

In 2010, an international group of 35 sea turtle researchers refined an initial list of more than 200 research questions into 20 meta-questions that were considered key for management and conservation of sea turtles. These were classified under 5 categories: reproductive biology, biogeography, population ecology, threats and conservation strategies. To obtain a picture of how research is being focused towards these key questions, we undertook a systematic review of the peer-reviewed literature (2014 and 2015) attributing papers to the original 20 questions. In total, we reviewed 605 articles in full and from these 355 (59%) were judged to substantively address the 20 key questions, with others focusing on basic science and monitoring. Progress to answering the 20 questions was not uniform, and there were biases regarding focal turtle species, geographic scope and publication outlet. Whilst it offers some meaningful indications as to effort, quantifying peer-reviewed literature output is obviously not the only, and possibly not the best, metric for understanding progress towards informing key conservation and management goals. Along with the literature review, an international group based on the original project consortium was assigned to critically summarise recent progress towards answering each of the 20 questions. We found that significant research is being expended towards global priorities for management and conservation of sea turtles. Although highly variable, there has been significant progress in all the key questions identified in 2010. Undertaking this critical review has highlighted that it may be timely to undertake one or more new prioritizing exercises. For this to have maximal benefit we make a range of recommendations for its execution. These include a far greater engagement with social sciences, widening the pool of contributors and focussing the questions, perhaps disaggregating ecology and conservation.

3. Living on the Edge: Hawksbill Turtle Nesting Along the Eastern Pacific Rim

Prior to 2007, efforts to monitor and conserve hawksbill turtles (*Eretmochelys imbricata*) in the eastern Pacific Ocean were opportunistic and records were virtually non-existent. The first abundance estimates were published in 2010, but contained limited data on the species. Ongoing research since that time has led to the identification of several rookeries, including sites containing large proportions of the overall hawksbill nesting currently known to occur in the region. Monitoring projects were established at several sites and have since provided substantial nesting data on the species. Here we summarize data collected between 1983 and March 2016 from all sites (n=9) confirmed to host >10 nests in any given season to provide an update on hawksbill nesting in the eastern Pacific. We documented a total of 3,508 hawksbill nests, 262,486 hatchlings and 528 individual nesting females in the region; the vast majority of these

records were generated subsequent to 2007. We found that most nesting (80.6%) occurs in three mangrove estuaries located in Central America (El Salvador and Nicaragua), highlighting the importance of these rookeries/habitats for hawksbills in the region. Considering the extremely imperilled state of hawksbills in the eastern Pacific, our increased records should not be misinterpreted as signs of recovery, but rather as optimism that there is still an opportunity to restore the species in the region. By integrating data collected on nesting hawksbills with local conservation realities, we provide a more holistic view of the conservation status and management needs of hawksbills in the eastern Pacific Ocean region.

Annex 7: Project Photos

Figure 1. PD port staff packing fish to send to Lima for test delivery.

Figure 2. Maido Restaurant receiving fish from San Jose vessels with Shellcatch cameras.

Figure 3. Ceviches and restaurant plates created by LaMar Restaurant with *tollo*, fished in vessels equipped with Shellcatch cameras.

Figure 4**.** Procedures for test shipment of fish products from San Jose to Maido and La Mar restaurants, Lima, June 2016.

Figure 5. Carlos, a San Jose fisher, completing the delivery to Tottus supermarket in March 2017.

Figure 6. Products bought from participating fishers on sale in Tottus, in Chiclayo, Lambayeque.

Figure 7. PD staff introducing BoVeda, the vessel monitoring system project and how they could participate to Mi Causita Restaurant (Left) and Manolo Restaurant (Right).

Figure 8. J. Alfaro-Shigueto presenting correct sea turtle, marine mammal and seabird techniques to industrial fishers from Tasa.

Figure 9. E. Cordova, PD staff, with fishers from Mancora talking about marine conservation and sea turtles in Peru.

Figure 10. A. Gonzalez, PD staff, with San Jose fishers and the San Jose municipality after talking about sea turtle conservation.

Figure 11. PD staff pose with one of their posters at the 5th Meeting of Chondrichthyes in Bogota, Colombia.

Figure 12. PD staff presenting at the 5th Congress on Marine Sciences Lambayeque, Peru.

Figure 13. Project biologist A. Pasara discussing her thesis research at Universidad Cientifica del Sur, Oct 2016.

Figure 14. Chef-Fisher Interchange workshop, San Jose, June 2016.

Figure 15. PAN fishers Pedro and Papelillo in Mexico during the fishers interchange event.

Figure 16. PAN fishers Julio and Rusber presenting their involvement in the Darwin project in a A Comer Pescado meeting in Lima.

Figure 17. IWC whale disentanglement workshop, Los Organos, Peru. A summary video of the workshop produced by IMARPE (Peru marine research institute) is available here (link). Bottom photo: PAN fishers Ronald and Don Julio practicing whale disentanglement procedures on day 2 of the workshop.

Figure 18. Burmeister´s porpoise (*Phocoena spinipinnis*) bycaught in a vessel from San Jose.

Figure 19. An olive ridley (*Lepidochelys olivacea.)* bycaught in a vessel from San Jose.

Figure 20. Leatherback turtle entangled in gillnets, reported by fishermen from Salaverry port.

Figure 21. A green sea turtle (*Chelonia mydas.)* bycaught in a vessel from San Jose and ready for release.

Figure 22. LED lights installed on gillnets, ready to be submerged.

Figure 23. An experimental net beacon to alert for bycatch events, under development by PD and Flywire Cameras, Inc.

Figure 24. Low-cost, low profile LED lights and acoustic alarms (pingers) developed by Fishtek Marine.

Figure 25. Andrea Pasara at the Fish 2.0 meeting in Santiago, Chile.

FISH2.0 Where Seafood Businesses and Investors Connect

Business Participants

	NAME	BUSINESS NAME	COUNTRY	EMAIL
1.	Andrea Pásara Polack	Pro Delphinus	Peru	andrea@prodelphinus.org
2.	Cristián Emhart	F4F: Food for the future	Chile	cristian@f4f.cl
3.	Cristian Vasquez	TRADING FAIR TRADE BOLSADEPESCALOSLAGOS.CL	Chile	cvasquez@fundacionchinquihue.cl
4.	Daniel Alejandro González Aguirre	Lobster Marketer in Chile (National)	Chile	danielgonzalezaguirre@gmail.com
5.	David Hockley	Patagonia Biotecnología S.A.	Chile	dhockley@fertum.cl
6.	David Salazar	Consorcio Pesquero Atico	Peru	dsalazarp@hotmail.com
7.	Fernando Fernandini	Agromar del Pacifico S.A.	Peru	ffernandiniv@gmail.com
8.	George Ito	Pacific Food	Peru	agerencia@pacificholding.com.pe
9.	Griselda Paula Ilabel Pérez	Fundación CocinaMar	Chile	griselda@cocinamar.cl
10.	Jeanette Urrutia Rivera	Quality Metrics SpA	Chile	j.alejandraurrutia@gmail.com
11.	Jose Boluarte	Congeladora Oceanica SAC	Peru	boluarte.jose@gmail.com
12.	Juan Andres Oliva	Faro Chilote	Chile	ju.oliva@icloud.com
13.	Juan García Saldivia	Sindicato de pescadores artesanales caleta Anahuac	Chile	sticaletapescadores@gmail.com
14.	Leonel Lucero Gonza	Ahumados Lucero Mora	Chile	ahumadosluceromora@gmail.com
15.	Meyling Tang	Fundacion Cocinamar	Chile	meylingtang@yahoo.es
16.	Noemi Andrea Solar Bacho	We Lafken	Chile	noemi.solar@gmail.com
17.	Oscar Rojas	PESCART CHIMBOTE	Peru	orojasr90@gmail.com
18.	Priscilla Verástegui Sierra	Sustainable Fishery Trade	Peru	priscilla.verastegui@sftperu.com
19.	Rebeca Gálvez	Patagonia Biotecnologia S.A.	Chile	rgalvez@fertum.cl
20.	Simone Pisu	Sustainable Fishery Trade (SFT)	Peru	simone.pisu@sftperu.com
21.	Valentina Mendez	Cooperativa de Pescadores Artesanales de Puerto Montt	Chile	copermonttchile@gmail.com
22.	Waldo Chamorro	Pez volador	Chile	pmanriquezangulo@gmail.com

FISH20 www.fish20.org @fish20org facebook.com/fish20org

Figure 26**.** The target species of the San José and Bayóvar fishery includes several shark and ray species: **(a)** thresher sharks (*Alopias* spp.), **(b)** bronze whalers (*Carcharhinus brachyurus*), **(c)** school

sharks (*Galeorhinus galeus*), **(d)** broadnose sevengill sharks (*Notorhynchus cepidianus*), **(e)** Pacific angel sharks (*Squatina californica*), **(f)** hammerhead sharks (*Sphyrna* spp.), **(g)** smoothhound sharks (*Mustelus* spp.), **(h)** spotted houndsharks (*Triakis maculata*), **(i)** eagle rays (*Myliobatis* spp.), **(j)** pelagic stingrays (*Pteroplatytrygon violacea*) and **(k)** spinetail devil rays (*Mobula japanica*). Images captured using cameras developed by Shellcatch Inc. installed on the fishing vessels involved in our study.

Figure 27. Several species are also caught incidentally in the fishery: **(a)** dolphinfish (*Corriphaenus hippurus*) and common dolphins (*Delphinus* spp.), **(b)** dusky dolphin (*Lagenorhynchus obscurus*), **(c)** olive ridley turtle (*Lepidochelys olivacea*), **(d)** leatherback turtle (*Dermochelys coriacea*), **(e)** South American fur seal (*Arctocephalus australis*) and **(f)** Humboldt penguin (*Spheniscus humboldti*). Images captured using cameras developed by Shellcatch Inc. installed on the fishing vessels involved in our study.

Annex 8: Sample Data Forms

1. FORMATO PARA OBSERVADORES A BORDO DE REDES ANIMALERAS

FICHA POR VIAJE

CÓDIGO DE VIAJE: TC-1639

Nombre de la Embarcación	N° de Matrícula	Código del Observador	Número de Tripulantes	Sistema
Jesus En Ti Confio	PL-3848 5-BM	J. Robert Fiestas G	4	-Manual | Mecánico
Puerto de Zarpe	**Fecha de Zarpe**	**Hora de Zarpe**	**Especies Objetivo**	
Bayovar	02/03/17	05:00 am	CRUZ	
Puerto de Llegada	**Fecha de Llegada**	**Hora de Llegada**		
San Jose	06/03/17	11:00 am	**Tamaño de Paños (L x A)**	**Tipo y Tamaño de Malla**
Tipo de Camada	**Camada**	**Número de Paños**	Largo = 30 Brz Alto = 5 y 7 Brz	7", 9", 11"
—	Fresca | Salada | Congelada	28		

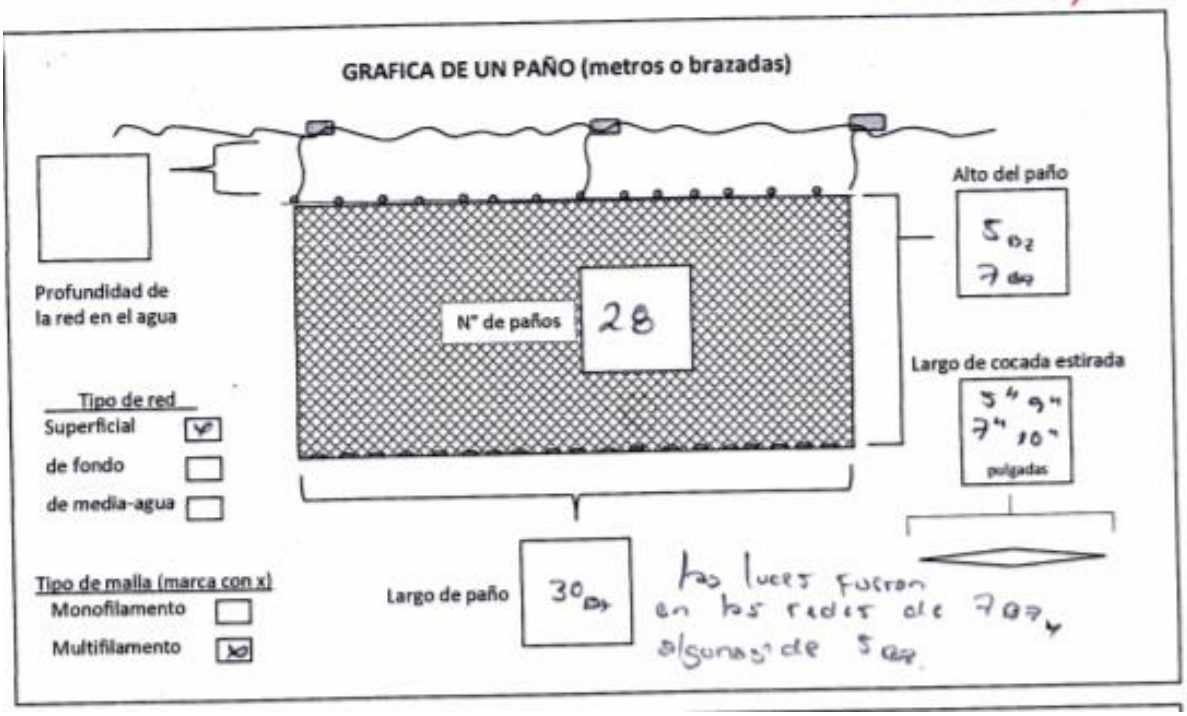
Especies Capturadas (cantidad o kg. de cada una)	Profundidad de las redes en el agua (brazadas o metros) superficie, de fondo o combinado
CRUZ → 450 Kg BATEA → 100 kg Bonito → 30 Kg	-
	Costo total del viaje (S/.) (Víveres, combustible, agua, etc.)
	S/. 7.00
	Ganancia total de la embarcación. (S/.)
	S/. 3.430.5

*** Por favor, no te olvides de dibujar las características de tu aparejo de pesca en la parte de atrás de esta ficha ***

Comentarios: Pescamos Cerco de la Isla "labor de tierra" a trabajar a Superficie porque a fondo aun estaba el Suelo Sucio o Con "barbasco", las aguas a Superficies Tambien estaban un poco Sucio, pero Se Veian andar Cruzetas a flote. las Corrientes estuvieron fuerte para el Sur, Nos llevaba hasta mas de 10 millas

TC-1639

GRAFICA DE UN PAÑO (metros o brazadas)



2. FICHA PARA LANCES

Código de Viaje: TC-1639

N° Lance	Tendida		Recogida		# de Aves Avistadas	
1	Hora Inicio: 13:39	Hora Final: 15:58	Hora Inicio: 05:52	Hora Final: 09:00am	Final Tendida: Pajarote Galápagos: —	Final Recojo: Pajarote Galápagos: —
Temp °C	LAT: 00.23.241	LAT: 00.21.830	LAT: 00.17.241	LAT: 00.20.006		
27.8°C	LON: 80.41.009	LON: 80.41.592	LON: 80.46.098	LON: 80.46.384	P. Rosada: —	P. Rosada: —
Beaufort	Fecha: 01/03/17	Fecha: 01/03/17	Fecha: 02/03/17	Fecha: 02/03/17		
—	Profundidad del fondo (m. o bz.)	Superficial 10	¿Usó Pingers? (Cuantos)	# paños con luces	# luces usadas	Otras aves: 7 fragatas	Otras aves: 25 pelicanos
Visibilidad (m)	8 oz	Fondo	no	—	—		
1.50 m		Media agua					
Nubes (%)	¿Uso winche? (si / no)	Comentarios:					
40%	No						

N° Lance	Tendida		Recogida		# de Aves Avistadas	
2	Hora Inicio: 17:53	Hora Final: 19:38	Hora Inicio: 01:20	Hora Final: 03:40am	Final Tendida: Pajarote Galápagos: —	Final Recojo: Pajarote Galápagos: —
Temp °C	LAT: 00.21.793	LAT: 00.21.341	LAT: 00.22.096	LAT: 00.21.142		
27.7°C	LON: 80.41.289	LON: 80.41.348	LON: 80.41.110	LON: 80.41.003	P. Rosada: —	P. Rosada: —
Beaufort	Fecha: 02/03/17	Fecha: 02/03/17	Fecha: 03/03/17	Fecha: 03/03/17		
—	Profundidad del fondo (m. o bz.)	Superficial X	¿Usó Pingers? (Cuantos)	# paños con luces	# luces usadas	Otras aves: Petrel.	Otras aves: —
Visibilidad (m)	6 oz	Fondo	-	—	—		
1.10 m		Media agua					
Nubes (%)	¿Uso winche? (si / no)	Comentarios: la corriente estaba fuerte para arriba la red salio solo enredada					
10%	No						

3. FICHA PARA TORTUGAS

Código de Viaje: TC-1639

OBSERVADOR:	J. Hubert Freites Galan						CODIGO DEL ANIMAL:		AyS 162
FECHA	HORA	LANCE	ESPECIE	LMC[1] (cm)	LCC[2] (cm)	ACC[3] (cm)	COLA(cm) a | b	LUCES C | m | S	COLOR DEL FLOTADOR
03/03/17	8:22	01	T. olivacea	30	67	70.6	15 | 5	5	—
POSICION:	LATITUD	00.19.956	LONGITUD	80.46.216					
ESTADO*(01)	ENREDO*(01)	ENGANCHE*(—)	DESTINO*(01)	OBSERVACIONES					
			MUESTRA: (05)						
			NUMERO DE FOTOS: 04						

ESQUEMA CON RELACION AL ARTE

¿Dónde en la red cayó la tortuga (si fue cerca de corcho, el plomo, etc.)?

FLOTE

*LCC: Largo mínimo hasta la escotadura
*LMC: Largo máximo del caparazón
*ACC: Ancho curvo del caparazón
*Listado de códigos

ESQUEMA DE TORTUGA ENREDADA

Marcar en donde se enredó la tortuga.

Marca Antigua 1: —

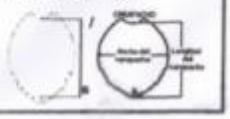
Marca Antigua 2: —

Marca Nueva 1: # 213

Marca Nueva 2: # 214

Medición de la cola (cm)

Medidas del caparazón



FICHA PARA TIBURONES

Código de viaje: TC-1639
Lance #: 01

Resumen de capturas	Número de animales	
Nombre de especie	Con luces	Sin luces
1: Cornuda		1.70 pzs
2:		
3:		
4:		
5:		
6:		
7:		

Comentarios

Especie
1. Azul
2. Diamante
3. Martillo
4. Zorro coetún
5. Zorro pelágico
6. Manita
7. Mantequero
8. Gatita
9. Vidrio
10. Otro (especificar)

Condición
1. Vivo
2. Muerto

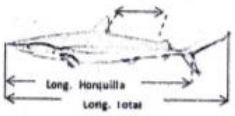
Sexo
1. Macho
2. Hembra

Dureza (clasper)
1. Flácido
2. Semiduro
3. Duro

Luces (C | m | S)
C = Paño con luces
m = Intermedio sin luces
S = Paño sin luces

Luces C|m|S	Código de muestra	Especie	Condición	Long. Total (cm)	Long. Horquilla (cm)	Long. Interdorsal (cm)	Sexo	MACHOS		HEMBRAS			Muestra	N° de Fotos
								Long. Clasper (cm)	Dureza	Cicatriz de cópula	Abertura Cloaca (cm)	# Crías		
S	-	03	02	82	67	21.3	02	-	-	-	-	-	-	-
S	-	03	02	89.7	71	20	02	-	-	-	-	-	-	-
S	-	03	01	85	66	22	01	-	-	-	-	-	-	-
S	-	03	01	85	65	24	02	-	-	-	-	-	-	-
S	-	03	01	87	67	23	02	-	-	-	-	-	-	-
S	-	02	02	88	70	20.5	01	2	3	-	-	-	-	-
S	-	03	02	84.7	68	22.5	01	3	3	-	-	-	-	-
S	-	03	01	81	61.5	21.7	02	-	-					
S	-	02	02	64	57	19	01	2	3					

Long. Interdorsal



Ficha para Rayas y afines

Código de viaje: TC-1639
Lance #: 01

Resumen de capturas	Número de animales	
Nombre de especie	Con luces	Sin luces
1: batea		6 pzs
2:		
3:		
4:		0
5:		
6:		

Comentarios

Especie
1. Manta
2. Guitarra
3. Angelote
4. Raya Águila
5. Mobula japanica
6. Mobula munitana
7. Otro (especificar)

Condición
1. Vivo
2. Muerto

Sexo
1. Macho
2. Hembra

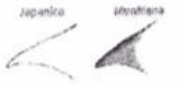
Dureza (Clasper)
1. Flácido
2. Semiduro
3. Duro

Luces (C | m | S)
C = Paño con luces
m = Intermedio sin luces
S = Paño sin luces

Muestra
1 piel 2 Músculo 3 Estómago 4 Estómago y músculo

Semen: SI/NO **Cicatriz de cópula:** SI/NO

Luces C|m|S	Código de muestra	Especie	Condición	Long. Total (cm)	Ancho Disco (cm)	Sexo	MACHOS		HEMBRAS			Muestra	N° de Fotos
							Long. Clasper (cm)	Dureza	Cicatriz de cópula	Abertura Cloaca (cm)	# Crías		
S	-	batea	01	1.25	86	01	19	01	-	-	-	-	-
S	-	batea	01	39.5	29	02	-	-	-	-	-	-	-
S	-	batea	01	1.29.5	70	01	16	01	-	-	-	-	-
									0				



FICHA PARA INTERACCIÓN CON LOBOS MARINOS

Código de viaje: TC-1639

Especie consumida por el lobo	Precio venta (kg)	# individuos
MARTILLOS	S/10	3
BONITOS	S/4P	

Comentarios:
- LO CONSUMIDO EN ESTE CASO ES TOTAL EN LOS BONITOS EN LOS TOLLOS ES SOLAMENTE LOS ESTOMAGOS
- EN LA LONGITUD ESPECIFICA DE LOS TOLLOS LOS BONITOS ES ENTRE 20 y 30 centimetros
- EN EL % DE LO BONITOS ES TOTAL SU CONSUMO

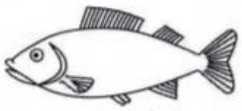
Parte consumida:
1. cabeza
2. media
3. cola

Destino:
1. consumo a bordo
2. consumo en casa
3. descarte
4. Otro (especificar)

Luces	Lance	INTERACCIÓN						AVISTAMIENTO						
								tendida		descanso		recojo		
C | m | S		Especie consumida por el lobo	parte consumida	% consumido	Longitud estimada	Destino	% paño dañado	lobo chusco	lobo fino	lobo chusco	lobo fino	lobo chusco	Lobo fino	FOTOS
	01							2		1		1		
	02							1		1		1		
C	03	TOLLOS y BONITOS	(2) y TODO	5%	7 DAÑO	1 y 3	Simple	1		1		2		1
	04	TOLLOS y BONITOS	(1) y TODO	5%		1 y 3	Simple	3		1		3		1

Lobo fino

Lobo chusco



Marcar la parte consumida por el lobo

Annex 9: Catch & Bycatch Mitigation Monitoring And Testing

Mitigation testing: From July to December 2016 we completed 52 set pairs testing net illumination (Tables 1 & 2, Map 1). Bycatch consisted of 23 sea turtles and one marine mammal. Data are still preliminary and there was no observed statistically significant difference in catch or bycatch rates between control and treatment nets (Table 2).

Table 1. Total target catch and by-catch from the lights experiment, Jul to Dec 2016.

Treatment	Sets	Mean Effort	Target catch	Turtle	Bird	Mammal
Control	52	0.83	924	16	0	1
Illuminated	52	0.33	463	7	0	0

Table 2. Average CPUE (N/km x d) in the lights experiment, Jul to Dec 2016.

Treatment	Target catch	Turtle	Bird	Mammal
Control	28.3 ± 70.3	0.35 ± 0.87	0	0.03 ± 0.20
Illuminated	35.2 ± 117.6	0.56 ± 2.02	0	0
% change	+25%	+60%	0	-100%

Leatherback bycatch monitoring: Apart from the bycatch mitigation experiment, we continue to monitor fishing effort in San Jose and to tabulate reports of leatherback turtle interactions from other Peru ports. For this reporting period, there were no leatherbacks captured on sets monitored by our onboard observers from San Jose. Seventeen non-experimental fishing trips (124 sets) were monitored with from July to December 2016 (Map 1).
For net vessels from San Jose that collaborate with PD there were another 8 incidents of leatherback bycatch (Table 3). Another 2 leatherback interactions were reported from ports other than San Jose during this reporting period (Table 4, Map 2).

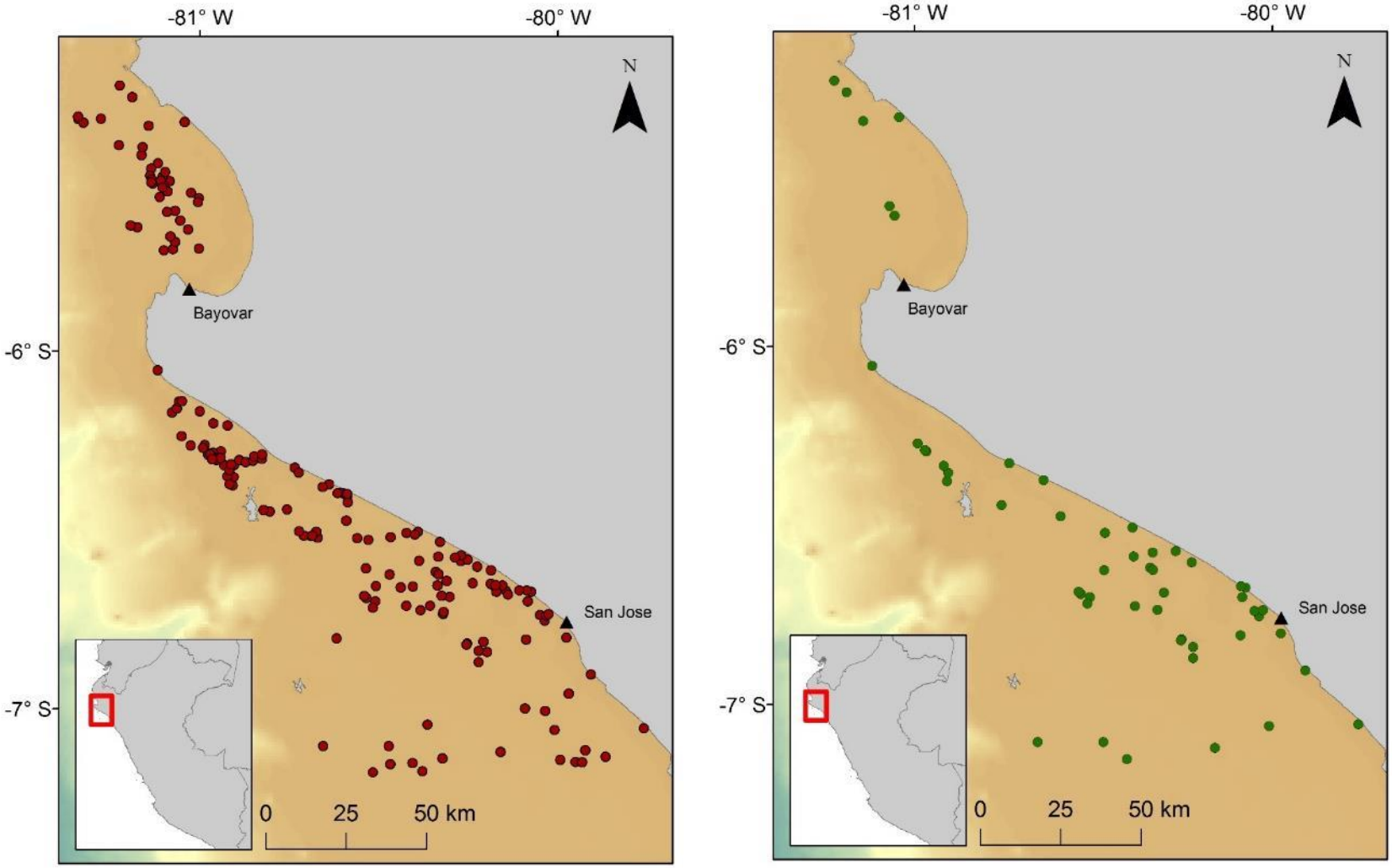
Table 3. Leatherback bycatch in net vessels operating from San Jose as reported by participating fishermen, July to December 2016. The turtle marked in bold was released with satellite transmitters.

Date	Fishery	CCL	Fate
04 Aug	Net		Released
19 Sept	Net	115	Released
04 Oct	Net		Released
10 Oct	Net	150	Released
11 Oct	Net		Released
13 Oct	Net		Released
14 Oct	**Net**	**122**	**Released**
22 Oct	Net		Released

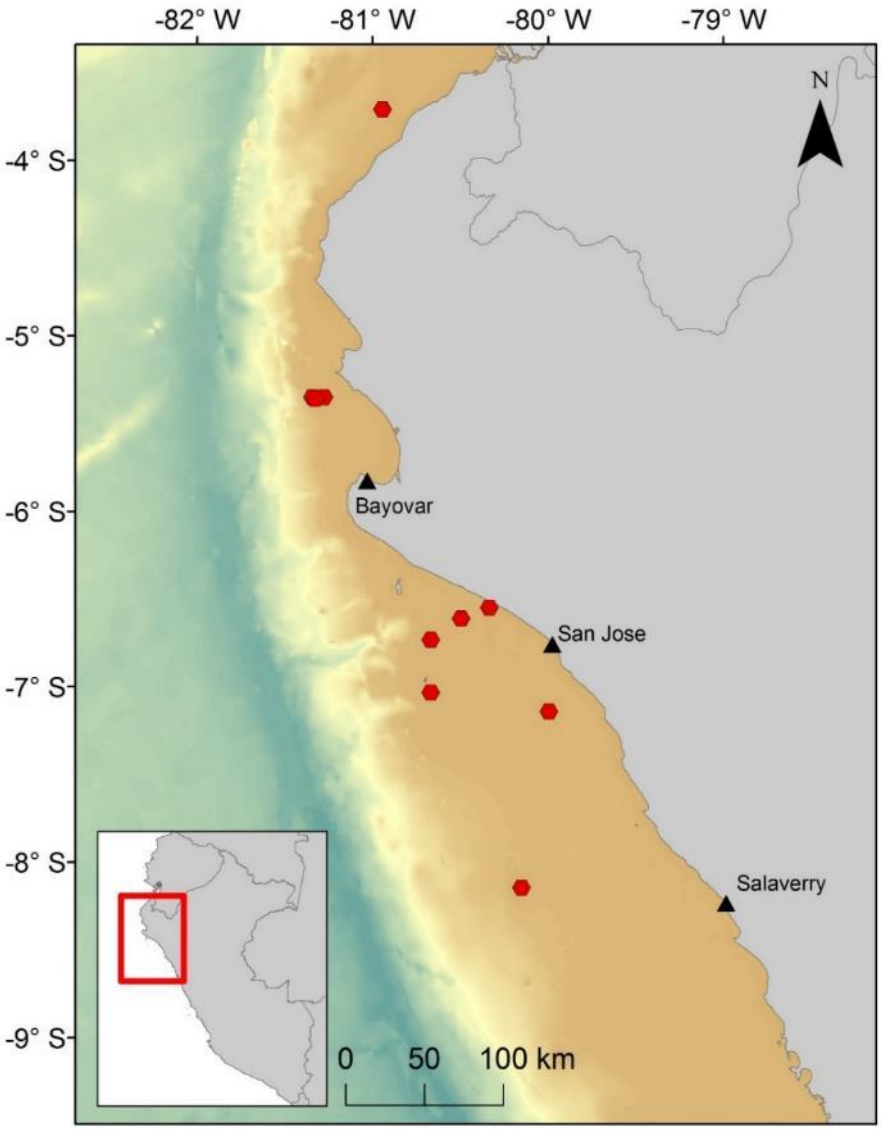
Table 4. Leatherback bycatch as reported by participating fishermen and observers from 2 ports, July to December 2016.

Date	Port	Fishery	CCL	Fate
Aug	Zorritos	Net	72	Unknown
Nov	Salaverry	Net		Released

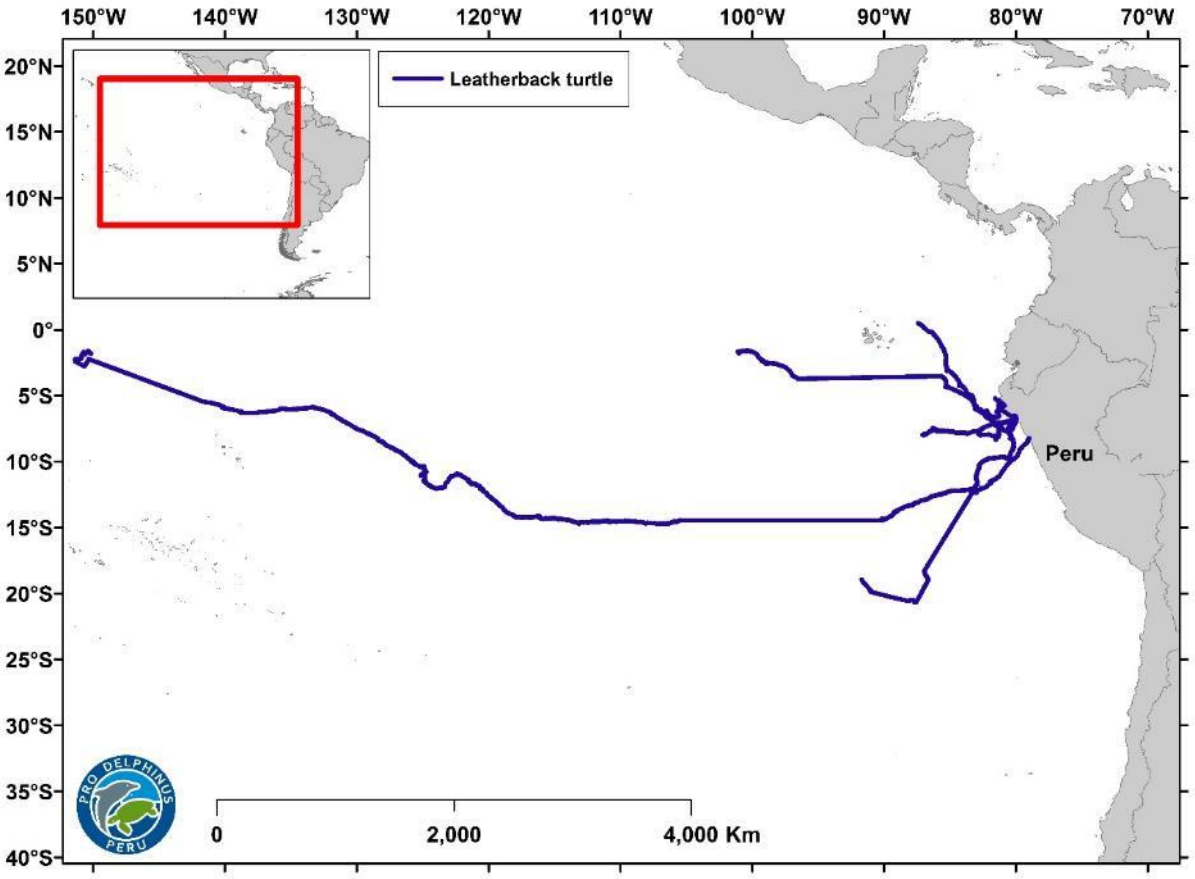
Map 1. Locations of all fishing sets monitored by onboard observers from July to December 2016 (left). Locations of treatment pairs testing net illumination (right).



Map 2. Locations of leatherback interactions from July 2016 to December 2016.



Summary map of leatherback turtle tracking, including those made possible by this project.



Annex 10: Summary of meetings and workshops attended by PD staff during Y2.

Location	Dates	Public	Objective
San Jose	Jun 2016 Jun 2016 Nov 2016 Dec 2016	Fishers	Workshops with fishers to discuss marine conservation, solutions to bycatch and how they can be involved.
Salaverry	Dec 2016		
Tambo de Mora	Apr 2016		
Mancora	Sep 2016		
Callao	Apr 2016		
	Jan 2017		
Ilo	Sep 2017		
Lima	Apr 2016	Government	Ministry of Environment- To discuss new CITES regulations regarding Elasmobranchs
	May 2016		Ministry of Production- Economic diversification with important gastronomic figures
	May 2016		Ministry of Environment- COMUMA meeting
	May 2016		Ministry of Environment- COMUMA meeting
	May 2016		FIUPAP- VIII National congress of unification and integration of artisanal fishers
	May 2016		Ministry of Environment-Workshop on projects focussing on CITES species
	Jul 2016		Ministry of Environment-Strategy meeting on climate change and fisheries
	Aug 2016		Ministry of Environment- COMUMA meeting
	Aug 2016		Ministry of Environment- COMUMA meeting
	Sep 2016		Ministry of Environment- COMUMA meeting
	Oct 2016		Ministry of Production- A Comer Pescado meeting
	Oct 2016		Ministry of Production- A Comer Pescado meeting. PAN fisher Pedro participated.
	Dec 2016		Ministry of Production- A Comer Pescado meeting. PAN fishers Rusber and Julio participated.
	Jan 2017		Ministry of Production- A Comer Pescado meeting
Lima	Apr 2016	End-Users	Restaurants "Brisas Marinas" and "Manolo"
	Apr 2016		Restaurants "Los Cantaritos", "Chilcanito", "El Molinero", "Lobo de Mar", "La Isla del Encanto", "La Isla del Encanto 2", "De Tomas"
	May 2016		Restaurant "Fiesta"
	May 2016		Restaurant "La Picanteria"
	Jun 2016		Restaurant "Maido"
	Jul 2016		Restaurant "Mi Causita"

Annex 11: Draft survey forms

DRAFT SURVEY ON TRACKING RAISED AWARENESS/BEHAVIORAL CHANGE

Monitoreo de Impacto de Programas de Conservación: Medida de Conocimiento, Comportamiento

Fishermen background questions

1. A que edad empezó a pescar? ___

2. Sobre su trabajo en la embarcación, Usted es:
   Capitán/Patrón Tripulante Cocinero Duenyo

3. Con que aparejo de pesca trabajó principalmente en el 2016?

   Cortina Espinel Buzo Cerco Otras___ Cuales:

Exposure to education campaign questions

1. Have you ever participated in a talk, festival, or activity about marine conservation? **Y/N**
   - Possible follow-up: what was the event(s) about? ___
2. Have you ever heard of (but not attended) any talks, festivals, or activities about marine conservation? **Y/N**
   For 1 and 2, what is more important – whether they attended an event, or had interactions with an ngo or government about these topics?
3. Have you ever shared information with the government / any other group (ngo, etc.) about your interactions with sea turtles? **Y/N**
4. Have you ever attended a talk or other event by ProDelphinus? **Y/N**

Turtle knowledge questions

1. What is the species of sea turtle that is caught most frequently? ___
2. What are the names of the sea turtle species found in Peru? ___
   - Green, hawksbill, loggerhead, olive ridley, leatherback
3. How many sea turtle species are found in Peru? ___ (correct answer: 5)
4. Are the turtles you encounter when fishing born in Peru? **Y/N**
   - If not, where do they come from? ___
5. The loggerhead turtles found in Peru are born in Australia. **True/False**
6. Where are the loggerhead turtles found in Peru born?
   - Mexico / Australia / Costa Rica / Indonesia
7. Female sea turtles lay eggs on the beach to reproduce. **True/False**
8. The leatherback turtle's main food is jellyfish. **True/False**
9. The leatherback turtle's main food is crabs/sea grass**. True/False**
10. The green turtle's main food is seagrass. **True/False**
11. How many years is it before a sea turtle is able to reproduce?
    - 1 / 5 / 10 / 20 / 30
12. Which of these species is the more endangered? Green turtle / Leatherback turtle

Behavior questions

1. When is the last time you ____?
   a. Ate sea turtle meat (on boat or in general?)?
   b. Bought sea turtle meat?
   c. Sold sea turtle meat?
   d. Killed a sea turtle? Too confrontational?
   e. Caught a sea turtle and used it for food at sea? (implies killing it?)
   f. Caught a sea turtle and used it for food at home?
   g. Caught a sea turtle and sold the meat?
   h. Released a sea turtle alive?
2. Response categories:

a. Last week / last month / last 6 months / last year / > 1 year / >3 years

3. If you catch a live sea turtle when fishing, what do you usually do with it? ___
4. What do you do / would you do **currently** if you catch a sea turtle?
   Eat / sell / use as bait / discard dead / release alive / other

Potenciales motivaciones para los conflictos de los pescadores con los lobos marinos

Abajo se describe una lista de motivaciones potenciales detrás de los conflictos con lobos marinos y pescadores.

	Categoría I	Categoría II	Descripción	Expresión	Motivación
1	Ecológica		Pasivo		Los lobos marinos son una plaga, hay muchos de ellos
2	Económica		Incrementa costos	Costo- dinero	Lobos marinos dañan mis aparejos
3	Económica		Incrementa costos	Costo- dinero	Tengo que gastar más dinero en combustible tratando de evitar los lobos marinos
4	Económica	Bienestar psicológico	Incrementa costos	Costo- tiempo	Tengo que pasar más tiempo para llegar a zonas donde no hay lobos marinos
6	Económica		Reduce ganancias	Costo- tiempo Costo- dinero	Tengo que pescar en áreas menos óptimas para evitar los lobos marinos
7	Económica	Social	Reduce ganancias	Costo- tiempo	Los lobos marinos me hacen trabajar más tiempo porque tengo que pasar más tiempo pescando o reparando mi equipo
8	Económica	Ecológica	Reduce ganancias	Reducción de captura	Los lobos marinos comen y ahuyentan a los peces, reduciendo la cantidad que puedo pescar
9	Económica		Reduce ganancias	Reducción de captura	No puedo vender el pescado que muerden/comen los lobos marinos
10	Económica		Reduce ganancias	Reducción-calidad	Los lobos marinos se comen los mejores pescados
11	Económica		Reduce ganancias	Reducción-calidad	Los lobos marinos reducen el precio de los pescados (mordidos, deteriorados por lobos)
12	Salud y seguridad		Pasivo		Los lobos marinos se acercan demasiado a los barcos y temo por mí seguridad
13	Personal	Bienestar psicológico	Carga cognitiva		Tengo que encontrar nuevos sitios de pesca para evitar los lobos marinos
14	Personal		Pasivo		Los lobos marinos huelen mal y afectan mi disfrute de la pesca
15	Personal	Bienestar psicológico	Pasivo		Le tengo miedo a los lobos marinos
16	Bienestar psicológico		Activo		Nadie más está haciendo algo sobre los lobos marinos, tengo que hacer algo
17	Bienestar psicológico	Cultural	Pasivo		Me preocupa que tenga que dejar de pescar y encontrar otra forma de vida
18	Social		Pasivo		Estoy preocupado de que otros pescadores vienen a mis zonas de pesca para evitar lobos marinos y el problema podría aumentarse

Soluciones posibles para los pescadores en conflicto con los lobos marinos

A continuación, se presenta una lista de posibles soluciones para los conflictos de los pescadores con los lobos marinos.

Categoría	Solución
Control letal (manejo de especies)	Saca de población de lobos marinos anualmente O establecer una cuota de saca de lobos marinos.
Control letal (manejo de especies)	Permítame matar / envenenar / espantar a los animales que están comiendo mi pesca
Investigación (llegando a manejo de especies)	Programa de marcado para determinar si se trata de una población residente o transitoria de lobos marinos que están robando peces
Separación (Conservación, designación y planificación)	Lugares específicos son designados como protección del lobo marino o áreas de pesca, las redes se utilizan para mantener a los lobos marinos fuera de las zonas de pesca
Económicos (medios de vida, incentivos económicos y morales)	Se me ofrece una compensación por las pérdidas económicas que sufro debido a los lobos marinos
Económicos (medios de vida, incentivos económicos y morales)	Me proporcionan un ingreso económico para compensar mis perdidas / tiempo / daño a mi aparejo de pesca
Económico	Se crea un mercado alternativo basado en los lobos marinos (e.g, turismo ecológico a través de las rutas de observación de lobos marinos)
Educación (Educación y formación)	El material educativo se pone a disposición de los pescadores para informarles de la importancia de los lobos marinos / métodos existentes para manejar las interacciones con ellos / contribución de los actores para desarrollar un plan de manejo de lobos marinos / pescadores

Tecnología (Gestión de especies, investigación y seguimiento)	Se desarrollan artes de pesca alternativos que previenen la depredación y el daño del león marino, Ej. Redes más fuertes
Tecnología/Comportamiento	Elementos de disuasión Ej. Dispositivos acústicos de acoso o siluetas en forma de tiburón colocados en la red
Comportamiento	Ajustar el comportamiento del pescador para armonizar con la conducta de forrajeo del lobo marino (e.g,pescar en horas del día en que los lobos marinos no se alimentan tan activamente / reducir el tiempo de redes en agua / colocar redes más alejadas de las colonias conocidas de lobos marinos, sitios de reproducción y crianza
Desarrollo institucional	No estoy seguro de cuál es la mejor opción, pero debemos ponernos de acuerdo para acordar/identificar soluciones
Subsistencia, incentivos económicos y morales	El gobierno debe ayudarnos a la transición hacia otros medios de vida alternativos (otros trabajos)
Regulador	La regulación hace ilegal dañar/agredir a los lobos marinos

Annex 12: Original, full list of Project Outputs (section 3.2, page 5).

	Establishment of the first pilot ocean-to-market monitoring system in one small-scale fishing port in Peru allowing for monitoring of fisher compliance with sustainable fishing norms and for fish products to be differentiated and tracked to buyers.			Comments (if necessary)
	Baseline	Change recorded by 2017	Source of evidence	
Indicator 1.1	Two in-port staff identified by Q2 of Year 1 and fully trained in system procedures operating independently by Q4 of Year 1.	Completed in Year 1.	Section 3.1, item 1.2	
Indicator 1.2	At least 4 of key stakeholder groups (fishers, SJ representatives, system developers, conservation researchers) participate in a scoping trip where monitoring and tracking system needs are identified.	Completed in Year 1.	Section 3.1, Item 1.1	
Indicator 1.3	100% of necessary equipment and technologies (hardware and software components) will be acquired, installed and tested by Q4 of Year 1.	Completed in Year 1.	Section 3.1, Item 1.4	
Indicator 1.4	By Q4 of Year 1 the system components (at-sea and in port) are operating successfully and in tandem with two test deliveries to end-users completed.	Completed. System components operating successfully. 4 sample deliveries completed.	-Section 3.1, Item 1.4 -Annex 7, figures 1 – 7, 26, 27 -Annex 9	
Indicator 1.5	Beginning Q1 of Year 2 begin receiving at least one monthly standing order from end users for fulfilment by the network's fishers.	Underway. Network is set up and working, Frequency of orders depend on what fishers catch.	-Section 3.1, Items 1.5, 1.6 -Annex 7, figures 1 - 7	
Indicator 1.6	Six training sessions held with system users with additional sessions occurring regularly in Year 2 as necessary.	Completed in Year 1.	Section 3.1, Items 1.2, 1.7	
Indicator 1.7	Two annual reports prepared and provided to stakeholders, one guidance document prepared with advice, recommendations and flowchart on system components and setup (for future project scaling or use by other fisheries).	This report is the second annual report.	Section 3.1, Item 2.5	
Indicator 1.8	One Master's Thesis (UoE) and two undergraduate theses (UCS) completed assessing the project and	UoE Master's Thesis completed. One UCS undergraduate thesis completed, both UCS	-Section 3.1, Item 1.9 -Annex 6 -Annex 7, figures 9 - 13	

	its impacts on the fishery and bycatch.	students identified.		
Output 2:	**Fishers organized and participating in sustainable fishing. Fishers in the network will benefit from training and technology transfer to reduce their bycatch of threatened and endangered species and will benefit from access to the product tracking system and availability of buyers.**			Comments (if necessary)
Indicator 2.1	Through engagement and awareness raising activities, participation in the fisher network in the port of San Jose will be doubled to 10 vessels (~70 fishers, 10 vessel owners) by the end of Year 1 with these vessels employing the recommended sustainable fishing practices and equipping their vessels to participate in the vessel to market monitoring system.	Four vessels active as of Year 2, Q4. 12 fishing vessels in San Jose have been provided bycatch mitigation equipment which they continue to use.	-Sections 3.1, Item 2.1 -Annex 7, Figures 18 - 22, 26 & 27	
Indicator 2.2	2 students and 1 ProDelphinus project coordinator identified and trained in project goals, methods and protocols.	1 PD coordinator identified, 2 of 2 students identified	-Section 3.1, Items 1.2, 1.9 -Annex 6 -Annex 7, figures 11 to 13	E. Alfaro, coordinator. A. Pasara, and E. Segura (students).
Indicator 2.3	Mitigation technologies and strategies will be identified and implemented consistently by fishers in the network to reduce the bycatch of marine mammals and sea turtles. We estimate a decline in small cetacean catch rates of approximately 40% and decreased sea turtle mortality of 30%.	Mitigation technologies have been identified and implemented. Bycatch rates are assessed through trip reports and data analyses. Fishers trained in animal safe handling and release procedures.	-Section 3.1, Item 2.6 -Annex 7, figures 18 – 24, 26, 27 -Annex 8 -Annex 9	Bycatch rate reductions are estimates based upon previous and ongoing research testing these methods in similar fisheries in Peru.
Indicator 2.4	Self-reporting and independent onboard observer monitoring will be initiated with participating fishing vessels beginning in Year 1 and continuing throughout the project to allow for monitoring and quantification of fishing effort and bycatch rates. (approx. 48 self-reported trips over 2 years, per vessel; approx. 480 total reports). At least 75% participating fishers submitting self-report forms per month regarding their catch and bycatch.	96 trip reports in Year 2. 7 total vessels self-reporting catch and bycatch from San Jose. 100% of the participating vessels are submitting monthly reporting forms.	-Section 3.1, Item 2.3 -Annex 7, figures 18 to 22, 26, 27 -Annex 8 & 9	
Indicator 2.5	24 workshops held with fishers over 2 years to	10 workshops held in Year 2 in 7 ports,	-Section 3.1, Item 2.1	

	promote participation in the project.	including 4 in San Jose. A total of 44 workshops over 2 years.	-Annex 10	
Indicator 2.6	100% of necessary equipment is obtained, imported into Peru or fabricated domestically.	During Year 2, 4 main vessels continued to be equipped with camera and mitigation gear.	Section 3.1, Items 1.4, 2.4	
Indicator 2.7	A minimum of three reporting forms with guidance documents prepared covering fisher self-reporting, product tracking and product commerce.	Completed in Year 1. 3 fishing and 1 camera guidance forms completed. Product and commerce forms pending. A commerce form is pending.	Section 3.1, Item 2.5	Tracking and commerce forms will be completed with end-user partners.
Indicator 2.8	12 onboard observer trips completed as an independent assessment of fishery catch and bycatch and to augment fisher self-reporting forms.	2 observer trips completed from Mar 2016 - Apr 2017.	Section 3.1, Item 2.6	
Indicator 2.9	2 annual reports prepared summarizing fisher participation in the project and fishery impacts (catch and bycatch levels and characteristics).	This report is the second of 2 annual reports.	Section 3.1, Item 2.5	
Indicator 2.10	6 meetings with local and regional government officials to promote the project.	14 meetings held in Year 2 at national level, and 1 at local level.	-Section 3.1, Items 1.8, 2.8 -Annex 10	
Output 3:	**End-users engaged and participating through fish purchases. End users (restaurants, distributors, markets) will have more direct communication and access to fishers allowing for a predictable supply of sustainably caught products and allowing for differentiation of their product or service in the marketplace.**			Comments (if necessary)
Indicator 3.1	Through engagement and awareness raising activities throughout Year 1, 5 restaurants, 1 supermarket chain, and 1 distributor will begin buying products from the fisher network by the beginning of Year 2.	Underway. By end of Year 2, 3 end-users have participated in test orders, and 1 national supermarket has established a procedure for continued orders.	-Section 3.1, Items 3.1, 3.3 -Annex 7, figures 1 to 7, 16	
Indicator 3.2	16 workshops held over 2 years to promote growing participation in the project by end-users (e.g. markets, distributors, restaurants).	8 meetings held in Year 2. A total of 14 meetings over 2 years.	-Section 3.1, Item 3.1 -Annex 10	This activity will be completed in Q1 and Q2 of Year 3.
Indicator 3.3	3 interchange events held with at least 15 participants to promote raised awareness among stakeholders of the tasks and challenges faced by each, and to promote opportunities for additional, unforeseen collaborations.	Completed. Three events held in Year 2	-Section 3.1, Item 3.2 -Annex 7, figures 14, 16 -Annex 10	Bringing fishers to meet end-users was the most efficient dynamic and focused efforts on that type of event.
Indicator	A minimum of 30 end-	31 end-users have	-Section 3.1,	

3.4	users identified who are interested in receiving more information on the project and for possible participation in the product tracking system (to make purchases through the system).	participated in workshops and meetings where project objectives were introduced.	Item 3.1 -Annex 7, figures 7, 14, 16 -Annex 10	
Indicator 3.5	8 education materials designed in a variety of formats and 2 press releases prepared.	8 educational materials produced. 2 press releases prepared.	Annex 4, Figure 7	Press coverage re: net illumination research has been extensive (50+ follow-up stories, >13 nations).
Indicator 3.6	In project Year 2 the monitoring system shifts to full implementation with regular, reliable monthly deliveries (one delivery per month for first quarter, and 2 per month minimum for remainder of year).	Underway. The system is in place with 1 end-user, Tottus supermarket, making regular orders.	Section 3.1, Item 3.5 Annex 7, figures 1 to 7	Order dynamic is different than originally envisioned: orders are dependent on what species are caught, not on time.
Indicator 3.7	1 video produced about the project and the BoVeda smartphone application updated to include information for consumers and end-users about the project.	Two project videos produced. One linked to in BoVeda app. Final BoVeda app updates are planned for Q1 and Q2 of Year 3.	Video hyperlinks: San Jose video Pez cacheton	

Checklist for submission

	Check
Is the report less than 10MB? If so, please email to Darwin-Projects@ltsi.co.uk putting the project number in the Subject line.	Yes
Is your report more than 10MB? If so, please discuss with Darwin-Projects@ltsi.co.uk about the best way to deliver the report, putting the project number in the Subject line.	No
Have you included means of verification? You need not submit every project document, but the main outputs and a selection of the others would strengthen the report.	Yes
Do you have hard copies of material you want to submit with the report? If so, please make this clear in the covering email and ensure all material is marked with the project number.	No
Have you involved your partners in preparation of the report and named the main contributors	Yes
Have you completed the Project Expenditure table fully?	Yes
Do not include claim forms or other communications with this report.	