# Darwin Plus:
# Overseas Territories Environment and Climate Fund

# Final Report

## Darwin Project Information

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| Project Ref Number | DPLUS026 |
| Project Title | **British Virgin Islands MPA and hydrographic survey capacity building** |
| Territory(ies) | British Virgin Islands (BVI) |
| Contract Holder Institution | Cefas (Centre for environment, fisheries and aquaculture sciences) |
| Partner Institutions | National Parks Trust of the BVI & United Kingdom Hydrographic Office |
| Grant Value | £253,443 |
| Start/end date of project | 01/04/2014 – 31/03/2016 |
| Project Leader | Koen Vanstaen |
| Project website | n/a<br>Updates available on Twitter: @KVS1979<br>Data can be explored at http://tinyurl.com/DPLUS026 |
| Report author and date | Alex Callaway, Koen Vanstaen, David Parker and Nancy Pascoe (31/12/2015) |

## 1 Project Overview

The British Virgin Islands (BVI) is a UK Overseas Territory in the east of the Caribbean Sea. Comprising over 50 islands, the BVI has a large marine area of 638,568 km$^2$, which significantly exceeds its terrestrial area (153 km$^2$). Managing a marine area over 4,000 times larger than the terrestrial area presents challenges in protecting biodiversity and sustainable development. This project focussed on an area south of the main island of Tortola and Beef Island which was selected through stakeholder engagement to provide the greatest benefit to all departments of the BVI Government. The area included the approach to Road Harbour which is the main shipping route to the islands; an area south of Hans Creek which is of importance as a fish nursery area; and a section of Sir Francis Drake Channel which encompassed the main shipping channel and the Rhone Marine Park, the first Marine Protected Area (MPA) in the BVI (*Figure 1*).

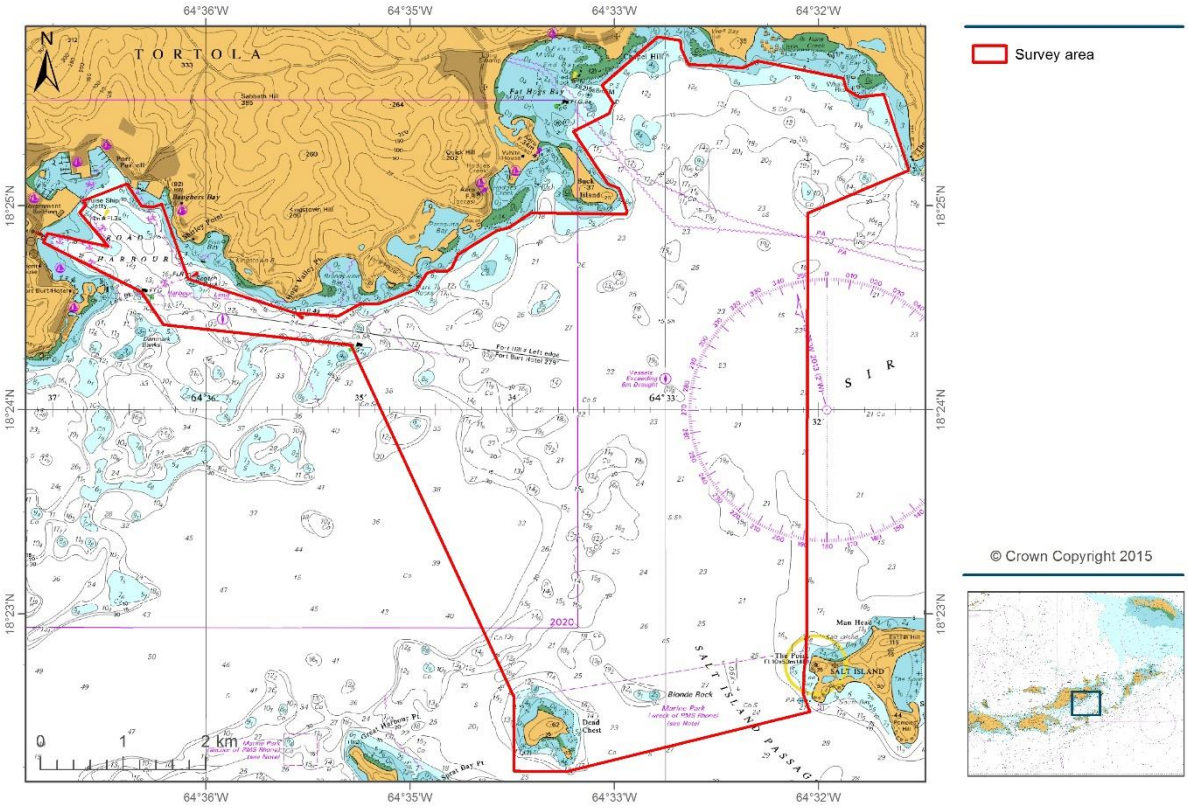


*Figure 1. Survey area identified by stakeholders at start-up meeting in June 2014.*

There has been a strong commitment towards marine conservation by the BVI Government including the development of a Protected Areas System Plan, which aims to protect 33% of the near-shore marine environment. This plan includes a number of long term aims to establish a network of marine parks and protected areas, to ensure their sustainable use and contributing to economic development. As part of that plan, maps of the shallow coastal habitats were produced over 10 years ago from aerial photographs. However, large areas further offshore remain unexplored due to the inability of optical methods to penetrate deeper water and divers to explore deeper habitats.

Across large areas of BVI territorial waters the most recent depth survey data are over 150 years old with smaller regions of data approximately 40 years old. There was therefore a need to bring local stakeholders up-to-date with modern survey tools and approaches, and effectively transfer knowledge and skills on their usage. This was to be done alongside the acquisition of data for improved navigation and the production of a seabed habitat classification map for an area beyond the nearshore which would contribute to MPA management, selection and designation.

The MPA network will support the Convention on Biological Diversity target to have 10% of the world's oceans protected by 2020, and the UK Government's desire to have the rich environmental assets of the Overseas Territories protected for the future (UK Government White Paper on the UK Overseas Territories, June 2012).

The project was designed to increase stakeholder knowledge of the natural marine resources in the study area and provide information and materials that would enable more effective conservation alongside sustainable blue growth. The project also aimed to improve the safety of lives at sea for those navigating at sea in the BVI and enable spatial planning to take place with greater knowledge of the offshore marine environment.

The BVI relies on importing the majority of food and goods to fulfil the everyday requirements of the population. These goods are almost entirely imported by sea, entering through Road Harbour which is the main port on the islands. The second largest industry for the BVI after financial services is tourism which includes the yachting and cruise industry [http://www.bvi.gov.vg/content/our-economy; checked 10/12/2015]. This makes safe navigation fundamental to the economy and functioning of the islands. A marine accident would severely impact the islands' infrastructure and potentially damage natural resources of which there is currently limited knowledge. Groundings are reported regularly, with impacts ranging from a

yacht releasing 30 tonnes of lead pellets in the marine environment, to cargo barges grounding and damaging coral reefs.

Demonstrating the efficacy of modern multibeam echosounder (MBES) data collection with multiple use intended from the outset, this project set out to gather data that can be used at all levels of governance. This will enable the BVI institutions to identify further priority areas for survey whilst maximising the benefit to all stakeholders. In turn, this will result in identifying areas that are under pressure from industry and selecting new areas to manage for conservation and tourism.

In the chosen survey area, data on topography and hardness of the seabed were gathered using a MBES system mounted on a local survey vessel. Bathymetric data collected were utilised by the UKHO to revise internationally recognised navigational charts for the mapped area. These bathymetric data along with simultaneously acquired backscatter (hardness/roughness) data were used in conjunction with underwater video ground-truthing data (Figure 2) to create seabed habitat classification maps. These maps provide information on the type of seabed and taxonomic assemblages present in area to help inform environmental management decisions.

Maps of the benthic habitat types recorded in the study areas were produced via statistical analysis of dependencies between the ground-truth data and the Geographic Information System (GIS) layers. The environmental GIS layers and habitat maps were delivered in a GIS database with a set standard structure enabling the addition of further layers from future mapping exercises. The BVI has a national GIS which includes layers on the environment that are utilised in planning and management decision making. The data produced by this project will be available for use within the BVI National GIS.

Training and capacity building courses aimed at local partners were held during each stage of the project, each in turn detailing: 1) the acoustic data acquisition and processing methods, 2) the ground-truthing survey methods and 3) methods for habitat analysis and the production of habitat maps. This in turn will provide essential information for spatial planning, sustainable use of marine resources, marine conservation and ensure safe navigation at sea.

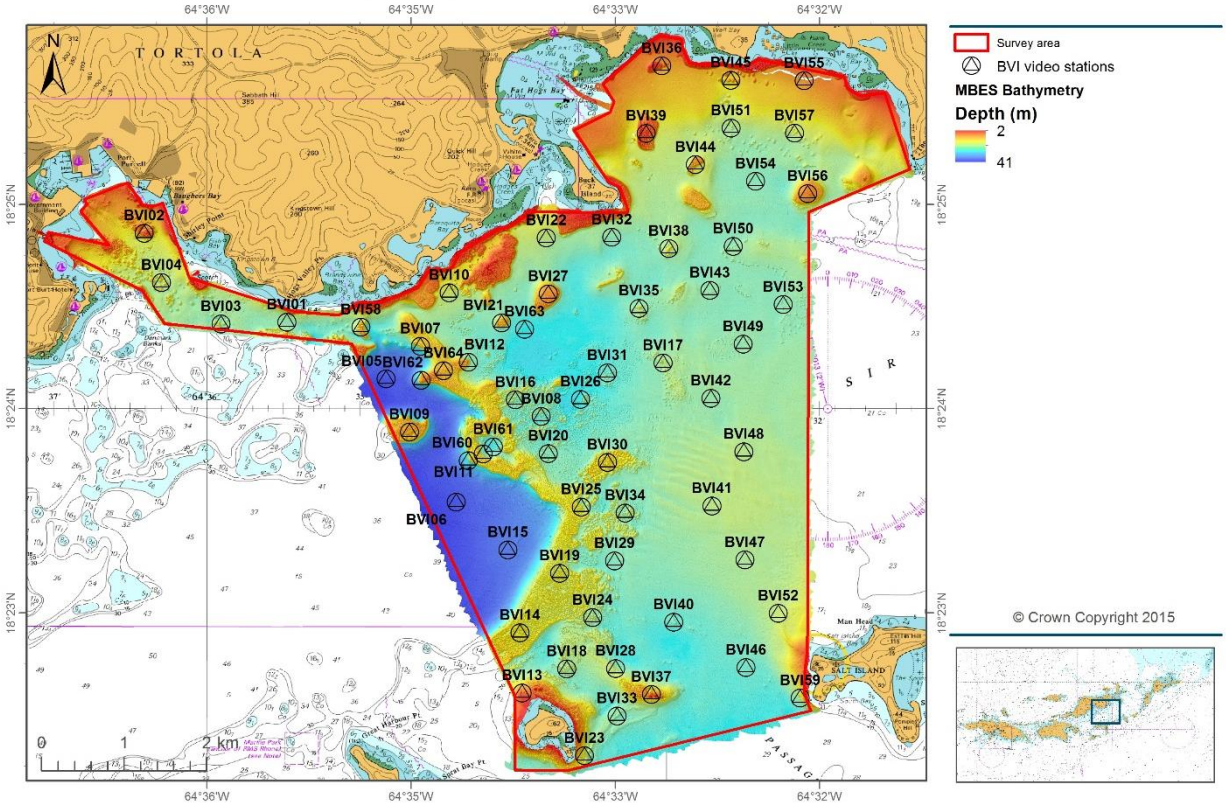


*Figure 2. Multibeam echosounder bathymetry data coverage and planned video stations.*

# 2 Project Achievements

## 2.1 Outcome

*"The project will result in the transfer of skills in mapping marine habitats using modern acoustic survey tools from UK organisations with proven expertise to the stakeholders in BVI. This in turn will provide essential information for spatial planning, sustainable use of marine resources, marine conservation and ensure safe navigation at sea."*

In our assessment this project has achieved the intended outcome as outlined above. Mapping skills have been demonstrated and various training courses offered. Stakeholder engagement from the outset has ensured that data were collected from an area that provided the greatest benefit to multiple stakeholders. These data were deliberately collected under a multidisciplinary mind-set which has ensured that a single survey initiative provided information that satisfies numerous application, without reducing suitability for any purpose (Figure 2). Stakeholders were involved in all aspects of planning and data collection and have received training at various stages on the different techniques involved in data acquisition through analysis to the creation of the final map products. Skills transfer has been limited by the availability of equipment and software utilised in the project to the stakeholders immediately beyond the project. This has been recognised locally and plans are under development to bring these tools to the territory. This is discussed further in section 4. All training was tailored to suit stakeholders needs and where possible adapted so that similar results could be achieved with available hard- and software products.

A partner from NPT also visited the UK and took part in survey aboard RV *Cefas Endeavour* where they were involved in all aspects of survey data collection using a wide range of tools and techniques, and data recording. We acknowledge that at present, it is unlikely for these techniques to be implemented within the BVI due to the relative lack of equipment. However, the insight gained by the NPT partner will provide valuable experience for future, from choosing the right tools for the job to sound data management.


*Figure 3. Knowledge exchange – National Parks Trust staff on Cefas survey.*

Navigational charts for the BVI were based on data comprising various sources from ~40 year old single beam echosounder transects to >150 year old lead-line measurements. The vintage of these data increase the risk to vessels visiting the BVI with subsequent potential risk to the marine environment.

Beyond the immediate nearshore waters, there were no environmental maps that could be used for marine resource management resulting in decisions being made with limited evidence. The scarcity of evidence in these areas also reduces the ability for governmental departments

to engage with stakeholders when imposing restrictions. This is because there is limited information to demonstrate the underlying rationale in an accessible and easy to digest format.

Both of these issues, protecting the islands from potential marine disaster and ensuring conservation of marine biodiversity could be addressed in part by utilising state-of-the-art survey techniques to acquire high-resolution data that could be used for multiple purposes both within the framework of this project and in the future.

The principal achievement of the project has been in demonstrating that multidisciplinary, cross-departmental working increases the value of a single survey campaign, and recognition by local stakeholders of this approach as a model for the future.

During the final stakeholder meetings the value of the acoustic data and seabed classification map were regularly extoled by all stakeholders. The controlling depth of the approach to road harbour has been increased from 9.8 m to 11 m and modifications to the navigation charts have been provided in the form of 'Notice to Mariners'. Updated charts will be created in the near-future (Section 2.2. Output 3) (Figure 4).

Demonstration of ships' approach to Road Harbour using 3D visualisation has also sparked debate over whether the removal of the relatively small obstructing reef would better serve the overarching conservation aims of the BVI. These conversations are an immediate benefit of the project.

A seabed classification map was produced for a previously uncharacterised 'offshore' area which was of higher resolution than the existing Coastal Atlas. The Coastal Atlas is a nearshore classification covering all coastal regions of the BVI and the new classification map was demonstrated to link with the Coastal Atlas effectively. This ensures that the stakeholders have a greater knowledge of the natural resources beyond the immediate nearshore in the study area but can relate this to existing data. The classification map provided an increase in knowledge of both the presence and expanse of seagrass beds in Sir Francis Drake Channel. This directly increased local stakeholders' knowledge of their natural resources. The map also enables stakeholders to more accurately define areas for conservation and/or mooring selection by providing tangible information on the relative contribution to natural resources of a specific site within the wider area. The map enables quantification of marine resources for both conservation and sustainable exploitation assessments and will help inform the decision over reef removal for safe navigation in the future by providing understanding of environmental impact for potential conservation gain.

## 2.2 Outputs

### Output 1: Project Steering Group and collaboration group established

A project kick-off meeting was held in June 2014 attended by 19 people from six local stakeholder institutions. At the kick-off meeting the group agreed to survey an alternative area to the proposed Anegada MPA due to logistical issues surveying off Anegada. The group unanimously agreed to survey the Rhone MPA, Sir Frances Drake Channel, Beef Island fisheries MPA, approaches to Paraquita Bay hurricane shelter and approaches to Road Harbour (Figure 1). Representatives of the stakeholders were also present at meetings and workshops held in March and December 2015. Through interaction with stakeholders, a key question was raised about how the map produced could be related to fisheries and what advice could be provided for fisheries management, which resulted in the engagement of a Cefas specialist on fisheries management.

### Output 2: Knowledge transfer on bathymetric survey and post-processing methodology

During the July-August 2014 survey local stakeholders were invited and participated in the field surveys. Participants were involved in the process of setting up all survey equipment and introduced to data acquisition. All attendees were given the opportunity to lead the data acquisition. Due to the duration of the MBES survey (18.5 days), a large number of NPT staff had the opportunity to learn more about the survey work and gain new skills.

A training event was provided in March 2015. The training introduced NPT staff to new data acquisition systems and provided training operating the hardware and software, three NPT staff were present for the on-vessel training. A workshop on acoustic and video data analyses was also held which was attended by 16 people from NPT, Town and Country Planning Department, Conservation and Fisheries Dept., Dept. of Disaster Management, Shipping Registry and the Ministry of Natural Resources and Labour. A one day seminar providing an overview of hydrographic seabed mapping was delivered by David Parker (UKHO) and was open to staff from all BVI stakeholder institutions. Lectures were adapted from previous courses run for International Maritime Organisation/International Hydrographic Organisation and were given to 18 attendees. Organisations represented included Virgin Islands Shipping Registry, BVI Port Authority, BVI Survey Department, BVI Public Works Department and the BVI Maritime College. These courses have raised conversations between the stakeholder institutions regarding whether the BVI would benefit from further capacity building or would gain more from employing expert contractors to fulfil those needs. Stakeholders now have the knowledge to ensure future training for capacity building is selected to best suit their needs or alternatively, if survey work is tendered they can request the survey parameters that best suit requirements.

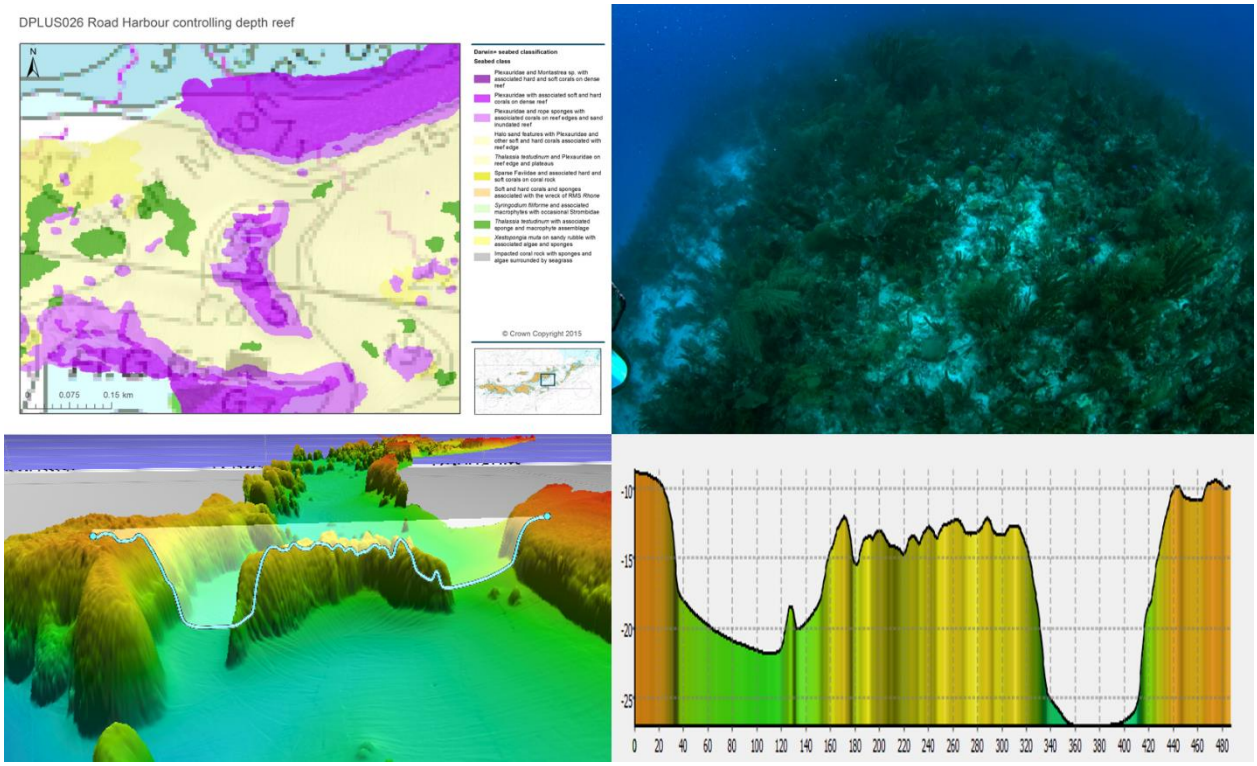


*Figure 4. Illustration of reef which contains the controlling depth point on approach to Road Harbour*

**Output 3: Data for improved navigational chart**

The project delivered 18.5 days of actual survey days. This exceeds the 14 days specified in the project proposal significantly and can mainly be attributed to the location of the survey site (as opposed to Anegada) and efficiencies made by the project team thanks to efficient planning and execution (less time required to mobilise all equipment on/from the vessel). The result is that a significantly larger area than originally planned has been surveyed, to the benefit of local stakeholders. All data were reviewed by the UKHO validation departments. The validation concluded: "*It is considered that all bathymetric data have been collected in accordance with the Hydrographic Instruction. A review of the data indicates that their overall quality, completeness and reliability are good and to the standard required by the scope of work. It is recommended that a new edition is published for the charts covering the area surveyed.*" The new edition of the chart is yet to be created but this work is already in UKHO plans. The results of the survey are already being implemented through 'Notice to Mariners' so that navigation safety has been improved prior to the chart updates.

During workshops in December 2015 discussions were held around the controlling depth of the approach to Road Harbour (Figure 4). The MBES bathymetry data collected as part of this project have enabled the depth to be reviewed from 9.8 m to 11 metres. As a cautionary note delegates were made aware that in accordance with appropriate international standards, these measurements have an uncertainty of up to ±0.5 m. Shortly before the workshops, one of the largest cruise ships in the world, Cunard's Queen Mary 2, had visited the BVI and navigated the approach successfully. However, the vessel has a draught between 10 and 10.5 metres (depending on loading and source). Whilst the Notice to Mariners have indicated that the navigable depth exceeds the draught of this vessel, the clearance could be as little as 0.4 m. When considered against the 0.5 m uncertainty and prevailing state of the tide the potential for an incident is clear. Therefore, stakeholders have begun contemplating the merit of removing the reef that is responsible for the controlling depth. The Shipping Registry and Ports Authority have a clear agenda to ensure the safety of mariners visiting the BVI and advocate removal. The removal of an area of reef does not immediately appear to be a conservation measure. However, other stakeholders from NPT, Conservation and Fisheries Dept. and Dept. of Disaster Management also discussed removal favourably as they considered such an impact acceptable in the context of a potentially more disastrous marine incident. Such an incident could result in the release of hydrocarbons and other pollutants into a rich ecosystem, the wreckage would represent an obstruction to all aspects of BVI life for an indeterminate length of time and removal could result in further adverse effects on the marine environment.

**Output 4: Knowledge transfer on analysis of acoustic and ground-truthing data to produce marine habitat maps**

Discussions in early 2015 with local stakeholders identified a greater need for further data acquisition training. Therefore, a three day training allocation in March 2015 was split into 1 day on data analysis and 2 days on data acquisition. The final workshops in December 2015 then detailed analysis techniques and habitat map production (Figure 5). A member of the NPT, Fin Peters attended Cefas from 19th October - 7th November. The first week was spent in Cefas' Lowestoft laboratory where the techniques and results of video analysis and map creation were demonstrated and discussed to ensure the final map suited the needs of NPT. There was also an opportunity for 'hands-on' map creation using various methods. The remaining two weeks saw Fin join RV *Cefas Endeavour* for survey work and was involved in all aspects of data acquisition, physical sampling and metadata recording (Figure 3).

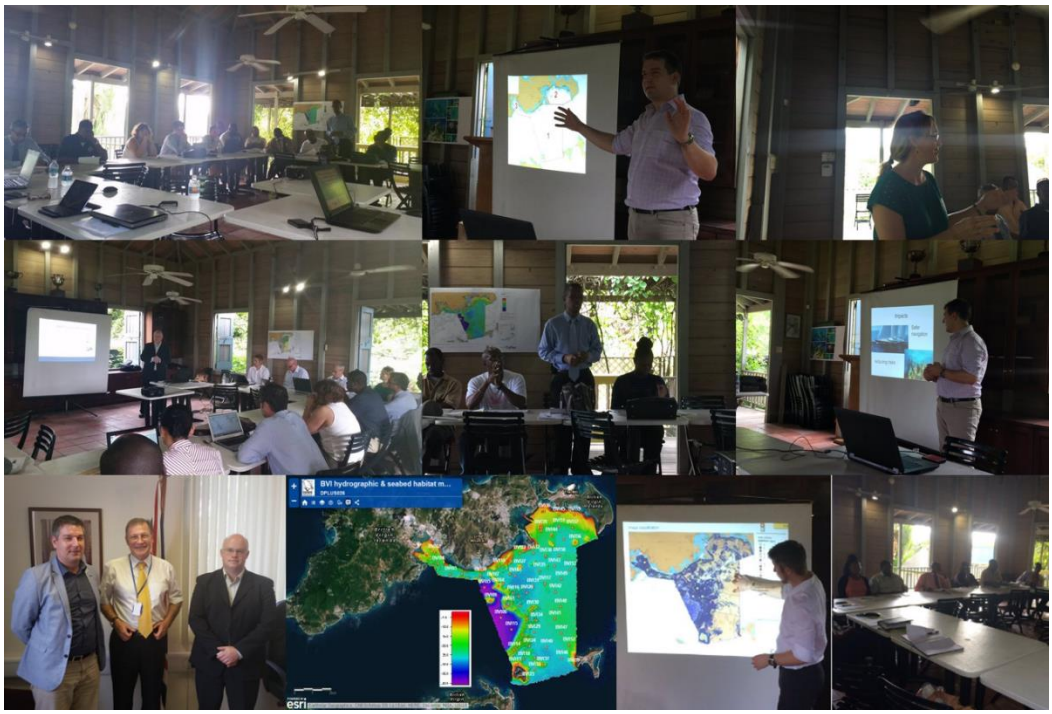

*Figure 5. Stakeholder engagement – Workshops, online materials and meetings*

**Output 5: GIS Database with environmental layers and maps of marine benthic habitats in shelf waters**

A 10 day survey was delivered in August 2014. This surveyed focussed on collecting ground-truthing data of the different seabed types identified from the hydrographic data. A high resolution underwater video and still photography system was used and deployed from the National Parks Trust vessel *Rhone* Ranger. 10 minute video tows were collected at 64 stations. Simultaneously, over 5,000 still photographs were collected. This survey again exceeded the original target of seven days due to similar reasons as described in Output 2.

The classified habitat map, ground-truth samples and acoustic data were provided in a GIS geodatabase where appropriate, all GIS data were provided to NPT on USB memory sticks for distribution to other stakeholders. Video and photographic imagery alongside the acoustic and GIS data were provided to NPT on an external hard-drive for archiving and uploading to the BVI National GIS, for sharing with all GIS users in the BVI.

Univariate statistics showed no significant results although indication of species rich and biodiverse areas could be illustrated. Multivariate community analysis resulted in discrete classes that formed the basis of the map classification (Figure 6). These classes represent a more detailed classification of seabed habitats than the Coastal Atlas but can be used alongside the older classification (Figure 7).

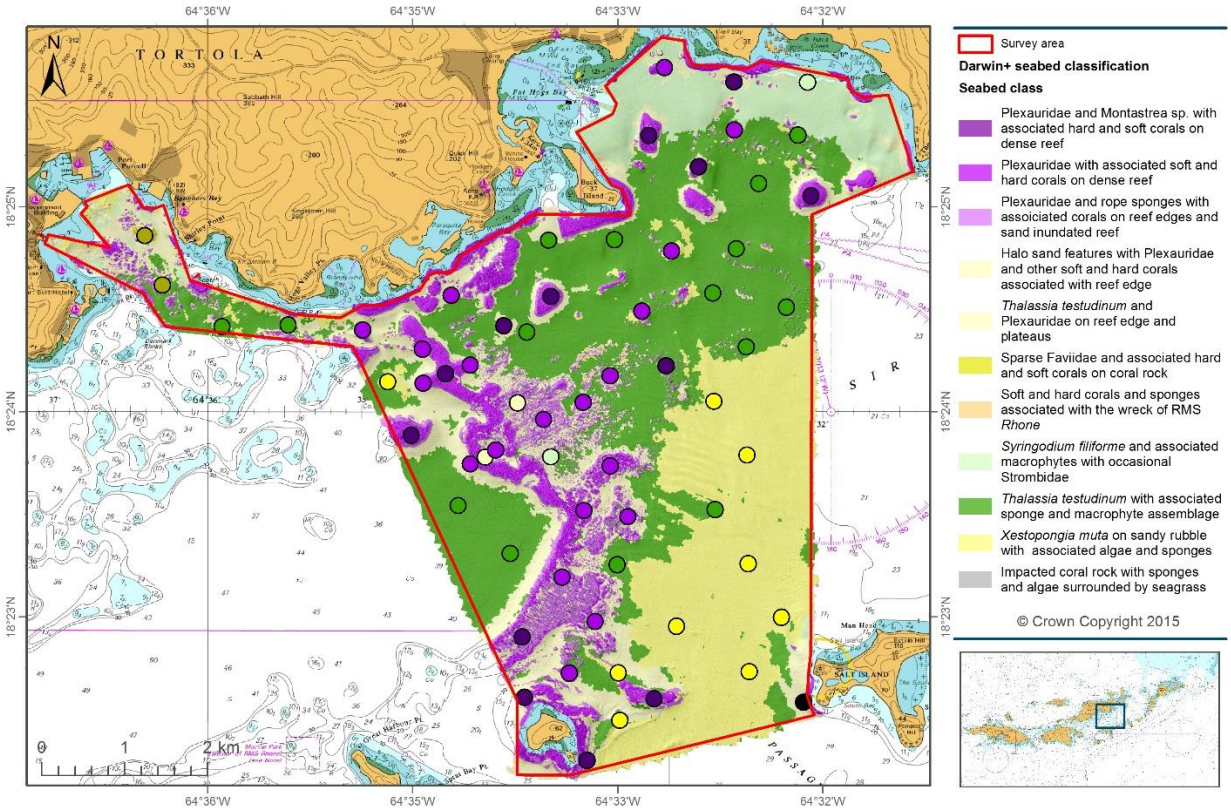


*Figure 6. Seabed classification map showing nature and extent of habitats within the area surveyed.*

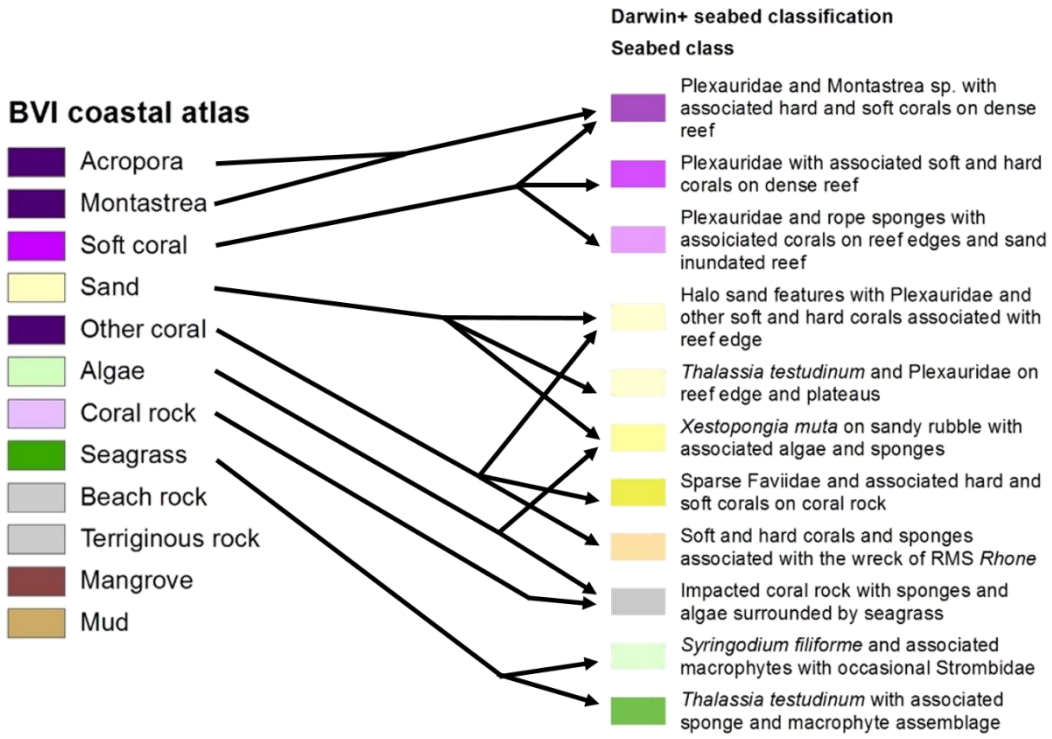


*Figure 7. Class comparison between the Coastal Atlas and the DPLUS026 classification map*

**Output 6: Knowledge of the distribution of marine biodiversity at shelf depths (10 – 40m)**

The project increased knowledge of the presence and expanse of seagrass beyond the immediate coastal zone. This has resulted in an 800% increase in known seagrass area compared to that detailed in the Coastal Atlas. The survey area of this project represents approximately 5% of the BVI marine area suggesting this value would increase further with future surveys of a similar design. Analysis of video and still image data identified 73 taxa. Plexauridae (colonial octocorals) were the most abundant taxa with a maximum of 135 individuals recorded at a single station and 9654 observed in total. *Thelassia testudinum* (turtlegrass) displayed the greatest percentage cover with up to 90% coverage observed at a single station.

Data have been made available through an online GIS and Cefas' DataHub so that any interested party can acquire the information for their own knowledge base.

The work has been presented through various fora to increase awareness including:

- A contribution was provided for the UKOTCF Newsletter in August 2014
- World Hydrography Day event at Defra in October 2014.
- Defra's International Biodiversity team as well as Ian Boyd, Defra's Chief Scientist.
- Updates were provided to the BVI Governor and Permanent Secretary of the Ministry of Natural Resources and Labour.
- Stakeholder workshops & individual meetings with the Shipping Registry, the Permanent Secretary of the Ministry of Natural Resources and Labour, the Deputy Premier and Minister Natural Resources and Labour and the Governor
- Cefas Marine Evidence Conference (01/07/2015)
- Shallow Survey 2015 international conference (14-18/09/2015)
- Reef Conservation UK conference (28/11/2015)
- Meso American & Caribbean Sea Hydrographic Commission Annual Meeting (13/12/2015)

The presentation at Reef Conservation UK was particularly well received and increased audience knowledge on the capability of acoustic systems for high-resolution mapping of reef areas (Figure 8).

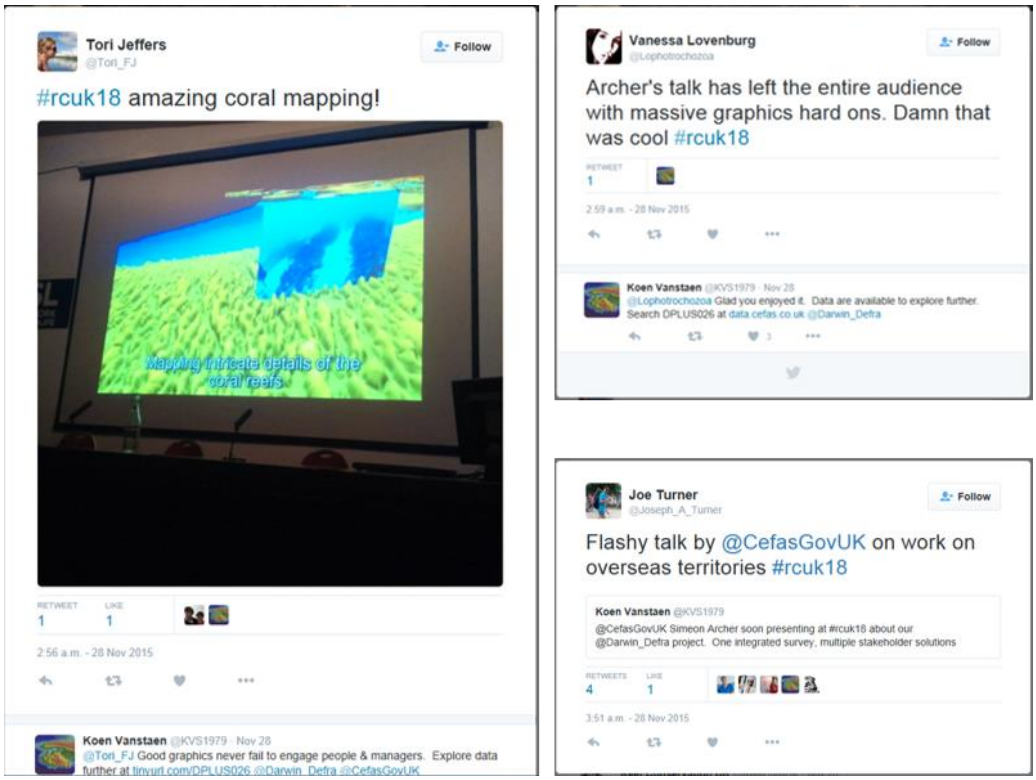


*Figure 8. Twitter reaction to Simeon Archer's RCUK presentation*

### Output 7: Training materials

All presentations were provided to workshop participants. In addition participants were provided with training datasets and relevant materials (e.g. standard video interpretation spreadsheets, bespoke GIS software and instructions). Recommended operating guidelines from the Mapping European Seabed Habitats project, of which Cefas was a project partner, were followed throughout this project and were also introduced at training workshops and provided in the final data package to all stakeholders.

A final video illustrating hydrographic data and imagery of different environments was created and presented at Reef Conservation UK and the final stakeholder workshops. It has also been uploaded to YouTube (https://www.youtube.com/watch?v=4tYMusQ63Cc).

## 2.3 Sustainability and Legacy

The hydrographic data collected will provide a lasting legacy by ensuring that navigational charts within the area are updated using the highest quality modern data which will improve the safety of lives at sea in the area, and promote commerce by increased assurance of safe passage into the port.

The seabed classification map will also provide a valuable reference for marine management in the study area into the future. The final workshop demonstrated how to modify the map to ensure that it may be updated as new information become available and can be adapted to the specific needs of the department utilising the map (Figure 9).

As a result of the project illustrating the need for high quality survey of marine resources, the Ministry of Natural Resources and Labour has tasked the Survey Department with expanding their remit from exclusively terrestrial environments to include marine environmental survey within their day-to-day business.

It is hoped that communication between partners will remain open. Cefas and the UKHO have committed to providing support wherever possible following the end of project funding.

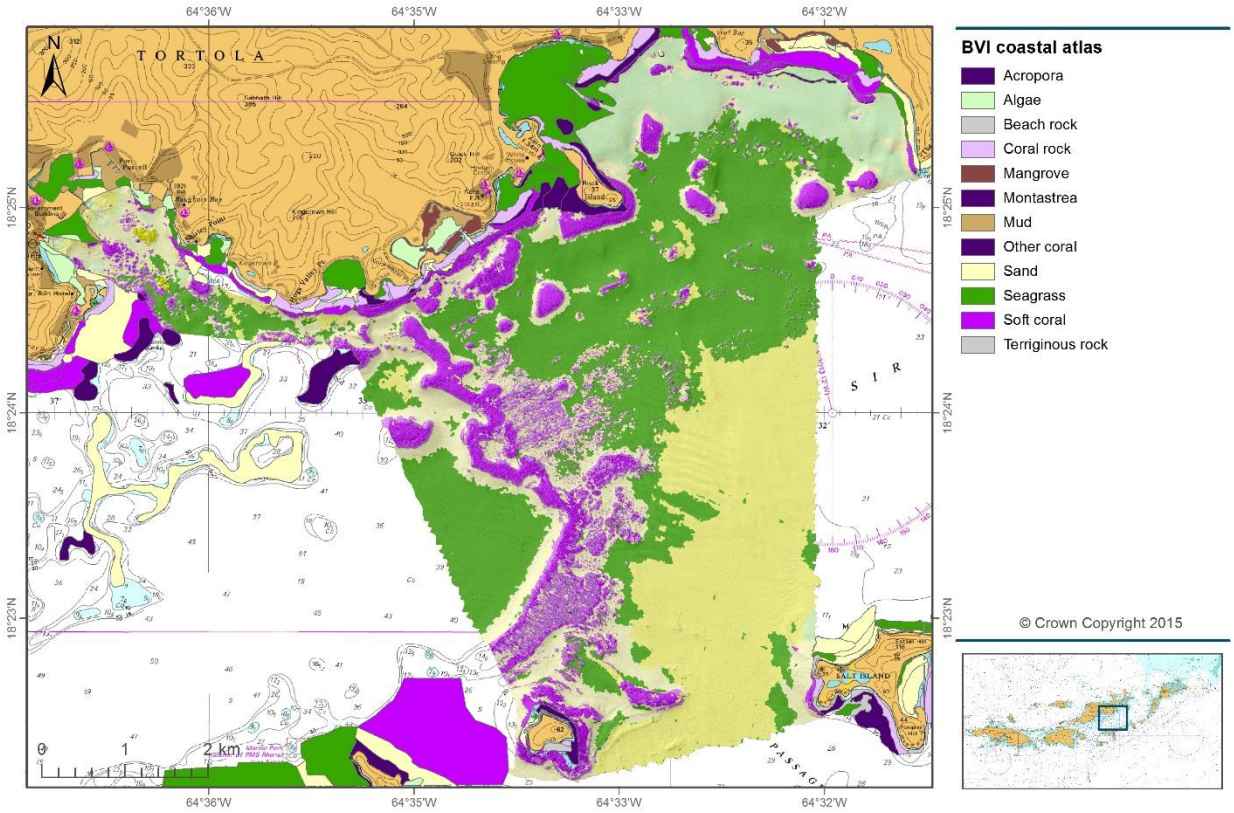


*Figure 9. Comparison of the BVI coastal atlas and the DPLUS026 seabed classification map*

## 3 Project Stakeholders

Stakeholders were involved at all milestone stages of the project to ensure that the project delivered the most valuable outputs for all stakeholders (Section 2.2, Output 1; Output 4).

The greatest achievement of stakeholder engagement was to enhance the communication between BVI departments to ensure multipurpose data were collected in the most efficient way whilst delivering greatest impact for all stakeholders. This was best demonstrated by the location of the study area which maximised benefit for all stakeholders in all aspects of the project.

A great advantage to the project was the position of NPT staff as lead partners in the BVI. This ensured effective communication of the project intentions to other BVI stakeholders. The contribution of Nancy Pascoe to the project was invaluable in offering clear communication on what stakeholders required and ensured timely stakeholder awareness of upcoming project activities and attendance at workshops.

The project has been well recognised within the BVI. The approach to “Collect once, Use many times” implies that the outputs are relevant to more than one organisation. The large number of stakeholders engaged is testimony to this. Through this engagement, we engaged departments and raised awareness within 4 of the 7 BVI Government Ministries.

The original stakeholder group of 7 organisations expanded to 10 during the lifetime of the project, as more people became aware of the work and wanted to get involved in learning more and steering the future work.

In response to feedback on the Year 1 Annual Report, a table detailing engagement with each stakeholder and resultant benefits has been provided on the next page.

| Stakeholder | Engagement | Benefits |
|---|---|---|
| Ministry of Natural Resources and Labour | The Ministry of Natural Resources and Labour (MNRL) oversees departments such as Conservation & Fisheries, Land Survey, as well as the National Parks Trust. The MNRL therefore is a key stakeholder in ensuring the long term sustainability of the project. Regular meetings were held with the Deputy Secretary, Permanent Secretary, as well as two briefings with the Minister. Ministry representatives attended stakeholder meetings and training workshops. | The Ministry had a very clear interest in this project from the outset and always welcomed updates on the project. Based on the outcomes of the project, the Ministry has been keen to continue this work in the BVI and has expanded the remit of the Land Survey Department to include marine surveys.<br>See MNRL statement for more details (Annex 3). |
| Conservation & Fisheries Department | The Conservation & Fisheries Department (CFD) are responsible for managing natural resources in a sustainable manner. Data are key to allow CFD to fulfil this role, hence CFD have been interested in project outputs. CFD attended stakeholder meetings and training workshops. | Fishery officers have been trained in the use of the data and were provided a copy of all project outputs. |
| Land Survey Department | The Land Survey Department survey services to the Government, private sector and public of the BVI. Due to their terrestrial focus, the department were initially not a major stakeholder. Since their scope expanded to include marine, considerable time was spent with the Chief Surveyor and his staff to assist in developing a pathway to setting up a full marine survey capability in the BVI. Land Survey attended stakeholder meetings and a bespoke training session was organised in December 2015 for staff. | The department has gained significantly from the engagement, especially in terms of preparedness to take on a wider role, including marine survey. The majority of the staff of the Department attended a full one-day introduction to hydrography course, normally delivered as part of a full International Hydrographic Organisation accredited training course. |
| Department for Disaster Management | The Department for Disaster Management (DDM) had an interest in the bathymetry data collected by this project to inform disaster modelling. The approach to Paraquita Bay was also surveyed as part of this project as it is a major hurricane yacht shelter area. DDM attended stakeholder meetings and training workshops. | Data have been made available to DDM to allow the data to be used in future scenario modelling. DDM were also the only department who previously commissioned marine bathymetry surveys. Whereas previous surveys had been undertaken in isolation and not to international standards, DDM have recognised the opportunity of working together with other departments as demonstrated by this project. |
| Virgin Islands Shipping Registry | The Virgin Islands Shipping Registry (VISR) seeks to ensure that ships can safely, securely and efficiently navigate the seas of the BVI. The age of survey data underpinning | VISR acknowledge the significant improvement made by the hydrographic surveys. Improved knowledge of the presence of navigational dangers will improve safety. BVI |

| Stakeholder | Engagement | Benefits |
|---|---|---|
| | modern charts is therefore a key concern to VISR. Several one to one discussions with the Director and demonstration of project outcomes to VISR staff were undertaken. VISR attended stakeholder meetings and training workshops. | pilots have adjusted navigation routes based on new data. See VISR statement for more details (Annex 3). |
| BVI Ports Authority | The BVI Port Authority is responsible for port facilities and services. BVI PA attended some of the stakeholder meetings and hydrographic training workshops. | Ensure safe navigation within Ports Authority limits. |
| Governor's Office | The Governor's Office keeps oversight of the activities of the BVI Government. The Governor's Office is part of the FCO. As part of every visit to the BVI, the project manager arranged a meeting with the Governor's Office. | The Governor's Office were kept up to date on project progress and provided updates to FCO London on the achievements of this Darwin funded project. The Governor and his office recognised the relevance of this work in the context of the BVI's future growth plans. |
| Town & Country Planning ***(not part of original stakeholder group)*** | The Town and Country Planning department host the National GIS database for the BVI. They provide a centralised facility for all Government spatial data. Several staff members attended training workshops to gain an understanding of the data and how best to make the data available and use the data within existing data systems. | Town & Country Planning will make all spatial data collected during this project available through their National GIS system to all Government staff. This will include bathymetry data, habitat data and sample location data. Having gained an understanding of the data, GIS experts will also be able to support other GIS users in the BVI. |
| H. Lavity Stoutt Community College ***(not part of original stakeholder group)*** | Lecturer and archaeologist Dr. Michael Kent from the Virgin Islands Studies Institute, Lavity Stoutt Community College found out about the project in the latter stages of the project and attended the final stakeholder meeting. Following the stakeholder meeting project outputs were reviewed from an archaeological point of view with Dr. Kent. Dr. Kent also attended all training workshops held in December 2015 and was provided a copy of the project data. | Dr. Kent will use the project outputs as part of the courses he teaches at the College, informing younger generations about the underwater world of the BVI. Dr. Kent is also writing a book on the history of the RMS Rhone and is keen to use some of the project outputs, surveying the wreck with multibeam echosounder for the first time, to illustrate his book. |
| Water and Sewerage Department ***(not part of original stakeholder group)*** | The Water and Sewerage Department are responsible for a number of discharge structures in the coastal zone. WSD staff attended GIS training workshops to find out more about the data collected and how to use the data for their purposes. | The survey found one pipeline in a different location than shown on local charts. WSD staff were trained in using the data. |

***Not part of original stakeholder group***: This organisation was not identified within the original project proposal as a stakeholder, but was engaged during the process after becoming aware of the project and its relevance for them.

# 4 Lessons learned

The project management within Cefas was good with ISO9001 standards being followed. The overall cost of travel and subsistence was underestimated but this was essential expenditure to fulfil the project aims. All staff that were active within the project were of good ability. Cefas' pool of staff ensured that where resource was not available within the original project team suitable staff were able to come into the project without affecting the final outcomes.

There was difficulty in making finalised plans more than one month ahead of any event. Attempts to do so were well managed by NPT, who informed Cefas of the right lead-in time to ensure attendance by local stakeholders (Section 3). This had knock-on effects with regard to advance booking of travel and accommodation but was certainly the best way to ensure effective stakeholder engagement.

The BVI climate presents a challenge to the use of highly-sensitive equipment. Survey equipment previously purchased by NPT was damaged due to the high humidity, which presents challenges for storage of electrical equipment. The climate also proved a challenge for the MBES equipment used in the project. The survey equipment was pushed up to the upper limits of their thermal tolerance resulting in sonar malfunction, and a requirement for a replacement sonar. This issue was managed by installing a portable air conditioning unit to provide cool air direct to the processing unit.

Problems were experienced with courier companies. A two-day shipping option was purchased to transport the MBES equipment to BVI. The package was delayed in East Midlands airport due to its size and DHL incorrectly assigning the destination as the US Virgin Islands, which required further customs declarations, resulting in a 10 day transport period. Fortunately, the expertise of the project team ensured the delay had minimal impact and key sonar mounting components were fabricated on Tortola.

As stated in section 2.1, skills transfer was limited by the availability of suitable equipment to BVI partners outside of the project arena. The project has been successful in demonstrating the strengths of the systems used for data acquisition and the quality of outputs that can be generated from those data. Training has also focussed on the basic concepts rather than detailed operation, so necessary skills were transferred to allow setting up of a hydrographic capability. The Organisation of Eastern Caribbean States are currently in the process of implementing a regional survey strategy to ensure capability and capacity for hydrographic survey and promulgation of information exists within the Caribbean. The new responsibilities of the BVI Survey Dept. (Section 2.3) could augment this.

Having Fin Peters join a research survey aboard RV *Cefas Endeavour* is likely to have been of greater benefit than attendance at a series of intensive courses. This is because of the hands on experience gained of multiple techniques enabling him to gauge what could or should be implemented at NPT rather than being presented with theoretical scenarios. In future projects we would focus more on exchanges and less on training courses.

Ultimately, the selection of partners proved the ideal balance for the project aims.

## 4.1 Monitoring and evaluation

This project was managed in line with Cefas' ISO9001 project management processes. As part of these business processes, regular meetings between project manager and project sponsor occur to monitor and evaluate project progress. This ensures that all elements of the project are under control and discussions take place at an early stage when issues arise. No major changes to the project plan have been necessary over the lifetime of the project as a result. Smaller changes were made to the project implementation, but did not alter project outcomes.

All hydrographic data collected as part of this project were submitted to relevant UKHO departments for validation. This involves an in-depth review of every step in the data collection and detailed scrutiny of the data collected, to ensure it meets the minimum requirements to be included in navigational charts. The UKHO has confirmed that its evaluation has found that the data meet the IHO Order 1a standard as intended.

The video analysis results were fully QA'd in line with existing Cefas processes. This ensures consistency in identification and enumeration. In addition, Shannon Gore of Coastal Management Consulting (BVI) provided identification guidance for taxa observed in ground-truthing data based on her extensive knowledge of benthic species of the BVI.

An external audit is scheduled for March 2016 in line with project funding requirements.

As requested following the Year 1 Annual Project review, a “measurable summary output table” is presented in Annex 4.

## 4.2 Actions taken in response to annual report reviews

The project team received feedback on the annual report in July 2015. The feedback document was circulated to all project partners to consider how to address these comments in the remaining 6 months of the project. The Half Year report for FY15/16 already addressed one of the comments (No. 6). Other comments have been addressed in this report as detailed below:

| Annual report comment No. | Response |
|---|---|
| 1 | Table added to section 3 of this report with details of engagement and benefits. |
| 2 | Due to the predefined structure of this report, there is no specific “Materials and methods section. Details have been provided within the different sub-section of section 2.2. |
| 3 | As described in section 4.1, a table has been provided in Annex 4. |
| 4 | Success of the capacity building is described in this report. |
| 5 | The sustainability beyond this project is discussed in section 2.3. Action has been taken at BVI Government level to develop a future plan beyond this project. |
| 6 | Provided as part of Year 2 half year report, as well as in Section 6 of this report. |

# 5 Darwin Identity

The project actively engaged with external organisations and individuals using Twitter (@KVS1979) (Figure 8). Individual tweets about the Darwin work regularly saw over 1,000 impressions. Tweets were found to be picked up by organisations in the UK, but also by some organisations in the BVI. The NPT also posted updates on the project on their Facebook page, informing local stakeholders and the general public about the work. The project team sought regular opportunities to raise awareness about the project, its objectives and its achievements. This included contributions to the UK Overseas Territories Conservation Forum and Darwin Initiative newsletters, meeting with BVI London Office, presentations at 4 conferences, poster and interactive display at World Hydrography Event at Defra (October 2014) and many more.

A leaflet was produced at the beginning of the project to inform of the project aims and another at the end to highlight achievements (Figure 10).

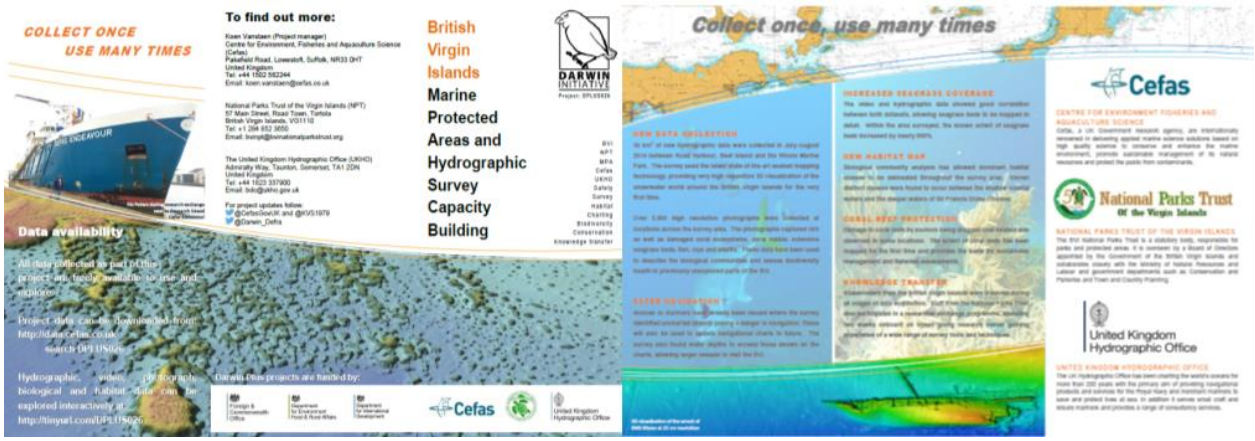


*Figure 10. Leaflet produced to advertise project achievements*

All communications highlighted the contribution of the Darwin Initiative using the logo on the front page as a minimum.

The project team maintained close contact with Government officials in the BVI throughout the project. As part of every visit to the BVI, meetings were arranged with Ministry officials, including the Deputy Premier on two occasions, as well as the Governor's office, including two meetings with the Governor himself. These meetings ensured awareness of the work and the outcomes at the highest levels within Government, and has led to the impact as described in sections 2 & 3. The role of the Darwin Initiative funding in making this project happen is widely recognised within the BVI Government.

# 6 Finance and administration

## 6.1 Project expenditure

| Project spend (indicative) since last annual report | 2015/16 Grant (£) | 2015/16 Total *actual* Darwin Costs (£) | Variance % | Comments (please explain significant variances) |
|---|---|---|---|---|
| Staff costs | | | +1.5% | |
| Consultancy costs | | | 0.0% | |
| Overhead Costs | | | -3.0% | |
| Travel and subsistence | | | +9.8% | Peak season workshops resulted in higher rates |
| Operating Costs | | | n/a | |
| Capital items | | | n/a | |
| Others<br>Audit fee | | | -12.0%<br>-4.7% | Lower fees for arranging workshops, venues, materials etc. |
| **TOTAL** | **71,802** | ***71,685*** | **-0.2%** | |

*The figures in the table above are indicative as Cefas are still awaiting a few travel and other invoices in relation to December travel and BVI workshops.*

| Staff employed (Name and position; Cefas employee unless specified) | Cost (£) |
|---|---|
| Koen Vanstaen - Project Leader | 4,536 |
| David Parker (UKHO) - Lead Hydrographic surveyor | n/a – subcontract arrangement |
| Nancy Pascoe (BVINPT) – NPT project leader | n/a – in kind support |
| Alex Callaway - Cefas project management; video survey, data analysis & mapping | 35,090 |
| Simeon Archer - Video data analysis | 3,786 |
| Hayden Close – Online GIS | 647 |
| Stuart Reeves – Management & fisheries advice | 2,157 |
| **TOTAL** | **46,216** |

The figures provided in this table include overheads

| Consultancy – description of breakdown of costs | Other items – cost (£) |
|---|---|
| The consultancy cost in this project covered the project contribution by UKHO. This mainly consisted of delivering BVI hydrographic training course and contribution to final reporting. | 12,600 |
| **TOTAL** | **12,600** |

| Capital items – description | Capital items – cost (£) |
|---|---|
| n/a | |
| **TOTAL** | 0 |

| Other items – description | Other items – cost (£) |
|---|---|
| Items included under the "Other costs" included:<br>Personal protective equipment for field survey as part of researcher exchange<br>Stationary and consumables for workshops<br>Conference fees for presentations at 2 conferences<br>Venue and materials hire for workshops | |
| **TOTAL** | **2,200** |

## 6.2 Additional funds or in-kind contributions secured

In-kind contributions as outlined in the project proposal were made available by Cefas and NPT.

The project proposal also made reference to unsecured funding for satellite derived bathymetry data. This was not pursued during the project, as it appeared that the initial indicative costs provided by an external supplier were not realistic and that further additional work would be required to complement this work, making it a project on its own.

| Source of funding for project lifetime | Total (£) |
|---|---|
| In-kind: Cefas provision of survey equipment at no cost to project | |
| In-kind: NPT staff time cost | |
| **TOTAL** | **£52,590** |

| Source of funding for additional work after project lifetime | Total (£) |
|---|---|
| | |
| **TOTAL** | **£0** |

## 6.3 Value for Money

The project team feels that this project has delivered value for money. In our project proposal we explained that the type of surveys proposed come at a significant cost due to the technology used and the use of vessels to deliver the work. We managed to deliver additional survey days compared to the original proposal, delivering even better value for money compared to the original forecast.

No equivalent surveys or work has been undertaken in the BVI, which could have been used for comparison purposes. The HMS Protector survey, undertaken to the north of Tortola in 2014, was delivered at a significantly higher expense, but this wouldn't be a fair comparison as the vessel was primarily in the area for disaster relief operations, and only as a secondary task for the mapping of the seabed.

Cefas has compared the daily cost to deliver the hydrographic survey in the BVI against quotations Cefas has received in the past to undertake similar work in UK waters using small vessels. The commercial company quoted around £8,450 per day (all-in) whereas this project delivered the hydrographic survey element and deliverables for £8,400 per day of survey. Considering that this includes the mobilisation to the BVI and installation from scratch of a complete survey suite on a vessel of opportunity, we believe this demonstrates excellent value for money.

Finally, by making use of existing Cefas infrastructure, including survey equipment and software, online data distribution and visualisation platforms, we have been able to deliver outputs without incurring costs, which other organisations may have to charge for to deliver. Examples include the availability of survey data for download by the general public on the Cefas DataHub (http://data.cefas.co.uk) and the interactive data exploration website (http://tinyurl.com/DPLUS026).

## Standard Measures

| Code | Description | Totals (plus additional detail as required) |
|---|---|---|
| **Training Measures** | | |
| 1 | Number of (i) students from the UKOTs; and (ii) other students to receive training (including PhD, masters and other training and receiving a qualification or certificate) | |
| 2 | Number of (i) people in UKOTs; and (ii) other people receiving other forms of long-term (>1yr) training not leading to formal qualification | |
| 3a | Number of (i) people in UKOTs; and (ii) other people receiving other forms of short-term education/training (i.e. not categories 1-5 above) | (i) 38<br>Through various workshops and training sessions organised over lifetime of project |
| 3b | Number of training weeks (i) in UKOTs; (ii) outside UKOTs not leading to formal qualification | (i) 6 days workshops of in BVI<br>6 weeks of at sea survey participation<br>(ii) 3 week researcher exchange in UK |
| 4 | Number of types of training materials produced. Were these materials made available for use by UKOTs? | Training materials provided as paper formats to supplement workshop activities. All materials and presentations were made available. |
| 5 | Number of UKOT citizens who have increased capacity to manage natural resources as a result of the project | 38 |
| **Research Measures** | | |
| 6 | Number of species/habitat management plans/ strategies (or action plans) produced for/by Governments, public authorities or other implementing agencies in the UKOTs | |
| 7 | Number of formal documents produced to assist work in UKOTs related to species identification, classification and recording. | |
| 8a | Number of papers published or accepted for publication in peer reviewed journals written by (i) UKOT authors; and (ii) other authors | 0<br>The project team aims to submit a paper to a peer reviewed journal before the end of FY 15/16. |
| 8b | Number of papers published or accepted for publication elsewhere written by (i) UKOT authors; and (ii) other authors | |
| 9b | Number of computer-based databases enhanced (containing species/genetic information). Were these databases made available for use by UKOTs? | |
| 9a | Number of species reference collections established. Were these collections handed over to UKOTs? | |
| 9b | Number of species reference collections enhanced. Were these collections handed over to UKOTs? | |
| **Dissemination Measures** | | |
| 14a | Number of conferences/seminars/workshops/stakeholder meetings organised to present/disseminate findings from UKOT's Darwin project work | 3 stakeholder meetings organised<br>3 workshops delivered in BVI<br>1 seminar programme delivered in BVI |

| Code | Description | Totals (plus additional detail as required) |
|---|---|---|
| 14b | Number of conferences/seminars/ workshops/stakeholder meetings attended at which findings from the Darwin Plus project work will be presented/ disseminated | 4 conferences attended (Shallow Survey 2015, Reef Conservation UK 2015, Cefas-UEA Science Conference, Meso American - Caribbean Sea Hydrographic Commission Annual Meeting 2015)<br>Project outcomes presented at DPAG in November 2015.<br>Initial project results presented at World Hydrography Event – October 2014. |
| **Physical Measures** | | |
| 20 | Estimated value (£s) of physical assets handed over to UKOT(s) | |
| 21 | Number of permanent educational/training/research facilities or organisation established in UKOTs | |
| 22 | Number of permanent field plots established in UKOTs | |
| 23 | Value of resources raised from other sources (e.g., in addition to Darwin funding) for project work | £52,590 (estimated in-kind contribution) |

# Annex 1 Publications

| Type * (e.g. journals, manual, CDs) | Detail (title, author, year) | Nationality of lead author | Nationality of institution of lead author | Gender of lead author | Publishers (name, city) | Available from (e.g. contact address, website) |
|---|---|---|---|---|---|---|
| All project data | DPLUS026 project data. Koen Vanstaen. 2015 | Belgian | British | Male | Cefas, Lowestoft | http://data.cefas.co.uk<br>Also available from data.gov.uk<br>(at time of writing this report some data are still in the process of being uploaded) |
| Online GIS | DPLUS026 online GIS. Koen Vanstaen. 2015 | Belgian | British | Male | Cefas, Lowestoft | http://tinyurl.com/DPLUS026 |
| Video data | BVI underwater – Darwin Plus. Koen Vanstaen. 2015 | Belgian | British | Male | Cefas, Lowestoft | https://www.youtube.com/channel/UCR1uEFtPcxcr8Bx4yVslEyw |
| Twitter feed | Koen Vanstaen. 2015 | Belgian | British | Male | Cefas, Lowestoft | https://twitter.com/KVS1979 |
| Chart updates | Notice to Mariners, UKHO, 2014 and 2015 | n/a | British | n/a | UKHO, Taunton | 2014: see page 105 or 1.93 - http://www.ukho.gov.uk/ProductsandServices/MartimeSafety/WeeklyNms/48snii14_week48_2014.pdf<br>2015: see page 100 or 1.87 - http://www.ukho.gov.uk/ProductsandServices/MartimeSafety/WeeklyNms/09snii15_week09_2015.pdf |
| Press release | Cefas to Lead Marine Protection Project in British Virgin Islands, | n/a | British | n/a | Cefas, Lowestoft | https://www.cefas.co.uk/news/cefas-to-lead-marine-protection-project-in-british-virgin-islands/ |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Cefas, 2014 | | | | | |
| Conference presentation | Challenges and opportunities surveying the UK's remote Overseas Territories, Koen Vanstaen, 2015 | Belgian | British | Male | Cefas, Lowestoft | http://www.slideshare.net/KoenVanstaen/challenges-and-opportunities-surveying-the-uks-remote-overseas-territories |
| Conference presentation | Finding the coral reefs of the British Virgin Islands to allow effective management, Simeon Archer, 2015 | British | British | Male | Cefas, Lowestoft | https://youtu.be/4tYMusQ63Cc |
| Project flyer | Project kick-off flyer, Koen Vanstaen, 2014 | Belgian | British | Male | Cefas, Lowestoft | http://defra.maps.arcgis.com/sharing/rest/content/items/50c050c6d5a540d29a4f6daccc0c7179/data |
| Project flyer | End of project flyer, Koen Vanstaen, 2015 | Belgian | British | Male | Cefas, Lowestoft | http://defra.maps.arcgis.com/sharing/rest/content/items/4b080de69beb4dde83556505abc75560/data |

# Annex 2 Darwin Contacts

| | |
|---|---|
| **Ref No** | DPLUS026 |
| **Project Title** | British Virgin Islands MPA and hydrographic survey capacity building |
| | |
| **Project Leader Details** | |
| Name | Koen Vanstaen |
| Role within Darwin Project | Project lead |
| Address | Cefas Laboratory, Pakefield Road, Lowestoft, Suffolk, NR33 0HT, United Kingdom |
| Phone | |
| Fax/Skype | |
| Email | |
| **Partner 1** | |
| Name | David Parker |
| Organisation | United Kingdom Hydrographic Office (UKHO) |
| Role within Darwin Project | Lead hydrographic surveyor |
| Address | Admiralty Way, Taunton, Somerset, TA1 2DN, United Kingdom |
| Fax/Skype | |
| Email | |
| **Partner 2 etc.** | |
| Name | Nancy Pascoe |
| Organisation | National Parks Trust of the Virgin Islands |
| Role within Darwin Project | NPT coordinator |
| Address | 57 Main Street, P.O. Box 860, Road Town, Tortola British Virgin Islands |
| Fax/Skype | |
| Email | |

# Annex 3 Stakeholder feedback

Feedback on DPLUS026 by Joseph Smith Abbot, Deputy Secretary at the Ministry of Natural Resources and Labour.

> *The Darwin Initiative Plus Project built upon the previously funded Overseas Territories Environment Programme (OTEP) update of the coastal atlas for the Territory and as a principal output, generated a highly resolved marine map of the Sir Francis Drake Channel. The site, which was selected in consultation with the Ministry of Natural Resources and Labour, the National Parks Trust of the Virgin Islands, the Conservation and Fisheries Department, the Virgin Islands Shipping Registry and the BVI Ports Authority, encompassed an area which included the Territory's Marine Park, a Fisheries Protected Area, the entrance to the largest hurricane shelter (which comprises part of the Territory's disaster risk reduction framework) and the principal approach into the port by cruise ships and cargo vessels into the Territory. The project demonstrated an incredible amount of value as it amply demonstrated the manner in which a joined up approach can aid the Territory in meeting its obligations under not only the Convention on Biological Diversity, but the Safety of Life at Sea Convention. The marine habitat and bathymetric maps have proven to be invaluable in our understanding of the richness of biodiversity within a frequently traversed but poorly understood area. The project mapped the presence of sea grass beds within the channel, which represented an 800% increase over the known areas with that habitat type assessed under the OTEP project. Additionally, the intense mapping of the Wreck of the Rhone has added a new dimension in our awareness of the marine archaeology of the Territory.*
>
> *The Darwin Plus project has been of tremendous value to the Territory. The addition of new layers of ecological data and bathymetry have further aided in the Territory's understanding of its biodiversity and will facilitate efforts to better conserve resources. Moreover, the data has further facilitated navigation of a critical navigational lane important to the economic development of the Virgin Islands. The project serves as a model for future studies which will harness the power of the principle of collecting once, using many times in deriving accurate benthic and bathymetric maps for the Territory.*

By email dated 22nd December 2015.

Feedback on DPLUS026 by Captain Raman Bala, Director Shipping at the Virgin Islands Shipping Registry.

> *The Darwin Project has been remarkable in the outcomes that were achieved. The survey area was carefully selected to provide maximum impact to the varied users of the database. Road Harbour is visited by several scores of Passenger cruise ships with hundreds of thousands of passengers each year. In the perspective of SOLAS (Safety of Lives at Sea convention) and Safety of Navigation, the project report has not only affirmed our local knowledge of known shoal depths but also opened our eyes to new dangers existing in the channel. We now know where we need to blast some underwater rocks to enable safe passage of deep draught vessels. The project was also very useful in our capacity building in Hydrography. The training and experience gained working with the experts from this project will go a long way in assisting us complying with SOLAS requrement on hydrography.*

By email dated 23rd December 2015.

# Annex 4 Summary output table

In the table below an attempt is made to provide a measureable summary output table presenting output level indicators. Numbering in the table refers to the numbering used in the original project proposal (Section 25. Expected Outputs and Section 27. Main Activities).

| Project output | Before project | After project |
|---|---|---|
| 1. Project Steering Group and collaboration group established | n/a | The target to have at least 3 local stakeholder organisations on the project steering group was exceeded as detailed in the list of stakeholders in Section 3 who joined the stakeholder meetings. |
| 2. Knowledge transfer on bathymetric survey and post-processing methodology | There was no in-country experience and very limited knowledge of bathymetry surveying.<br><br>0 people in country with knowledge of multibeam echosounder survey technology. | Throughout the project at least 38 individuals participated in training activities.<br><br>2.2 16 individuals participated in a one day acoustic survey data training course in March 2015, covering all aspects of different acoustic remote sensing surveys.<br><br>2.3 NPT staff gained experience on the operational side of running bathymetry surveys during the 4 week survey period.<br><br>2.4 18 individuals participated in a detailed one day "Introduction to hydrographic surveying" training course in December 2015, covering all aspects of acquisition and data processing. |
| 3.Data for improved navigational Chart | Navigation charts often rely on 19th century lead line observations and have poor accuracy.<br><br>0 $km^2$ of the seabed around the BVI surveyed to International Hydrographic Office Order 1a standard. | 3.1 An 18.5 day hydrographic survey was delivered (against target of 14 days) covering 36 $km^2$.<br><br>The stakeholder steering group identified 3 priority areas, with all of priority area 1 and 3 completed, and over 90% of priority area 2.<br><br>3.2/3.3 All bathymetry data were independently verified by UKHO specialist departments and confirmed that all data exceeded the minimum requirements of international standards (IHO Order 1a).<br><br>Data are passed on to the RT6 – The Americas charting team within UKHO and data are part of the future workstack to publish a new chart for |

| | | |
|---|---|---|
| | | the area. Notice to Mariners, informing navigators of significant changes have already been issued as a result of this survey on 27/11/2014 (22 changes) and 26/02/2015 (19 changes).<br><br>3.4 Not provided as a stand-alone output, this topic was discussed at training events and a training exercise was held where specific features of interest were isolated from the remaining habitats to develop "protection zones". |
| 4. Knowledge transfer on analysis of acoustic and ground-truthing data to produce marine habitat maps | Previous knowledge was mainly limited to shallow water satellite remote sensing and diver surveys. | 4.2 A 1.5 days training workshop was delivered in March 2015, plus a 1 day at sea demonstration. A further 1 day training course on the use of final habitat map project outputs and data was held in December 2015, plus a further 1 day at sea demonstration.<br><br>4.3 Mr Fin Fun Peters, marine warden at NPT visited UK for 3 weeks in October/November 2015. 1 week was spent in the office working alongside Cefas staff to finalise the data interpretation and habitat map. 2 weeks were spent onboard RV Cefas Endeavour with active participation in data collection using a vast range of techniques and tools. |
| 5. GIS Database with environmental layers and maps of marine benthic habitats in shelf waters | Knowledge of marine habitats was limited to the coastal atlas produced in 2004, which only covered shallow coastal areas (<5 or maximum 10 metres water depth).<br><br>Zero knowledge of habitats in deeper waters.<br><br>Zero bathymetry data available from public portals. | 5.1 A 10 day physical and biological validation survey using optical survey techniques (video and still camera) was undertaken (against target of 7 days) and sampled 64 stations across the survey area.<br><br>5.2 Bathymetry derivatives and backscatter data maps were produced from the hydrographic survey data. Data are available from the Cefas DataHub and the project online GIS portal (see links in Annex 1).<br><br>5.3/5.4 All analysis were undertaken using tried and proven routines used as part of UK MPA characterisation and monitoring.<br><br>5.5 All project data are available from the Cefas DataHub and the project online GIS portal (see links in Annex 1). The online GIS portal currently has 4 project datasets.<br><br>A 1 Terabyte hard drive with all project data in GIS or raw data format was provided to project partners and |

| | | |
|---|---|---|
| | | GIS data will be shared through the National GIS Committee and Town & Country Planning GIS server. |
| 6. Knowledge of the distribution marine biodiversity at shelf depths (10 - 40 m) | Grey literature with limited peer-review research publications | The first benthic habitat map of the deeper parts of the Sir Frances Drake Channel was delivered.<br>6.1 No publication has been submitted yet to a peer-reviewed journal, but we still plan to have this achieved by March 2016.<br>6.2 Project specific presentations were given at 4 conferences.<br>6.3 Beyond the stakeholder meetings, meetings were held with individual stakeholders to discuss relevance of project outcomes in the context of their specific department. |
| 7. Training materials and operating procedures | National Parks Trust recognised lack of skills and knowledge to undertake field surveys | 7.1 All presentations and training materials from March and December 2015 training workshops were made available to project partners and attending staff members.<br>7.2 Recommended Operating Guidelines for survey tools used as part of the project (3) were made available to BVI staff. The project team stuck to recognised European guideline documents, as they were found to be applicable to the work undertaken in the BVI.<br>Further recommended operating guidelines for other survey tools and techniques which may be relevant to BVI organisations were also made available (12).<br>7.3 A range of images and videos of project data were made available to BVI stakeholders. This included detailed images of the wreck of RMS Rhone, coral reef features and impacted coral reef. One 3D fly-through was also produced incorporating both hydrographic and underwater imagery (see YouTube link in Annex 1).<br>The hydrographic data was also provided in free viewer software for exploration and investigation by stakeholders (Caris EasyView and QPS Fledermaus iView4D). |