Darwin Plus:
Overseas Territories Environment and Climate Fund

Final Report

To be completed with reference to the "Project Reporting Information Note":
(https://dplus.darwininitiative.org.uk/resources/information-notes/ /).

It is expected that this report will be a **maximum** of 20 pages in length, excluding annexes.

Darwin Plus Project Information

Project reference	DPLUS087
Project title	Transitioning the Blue Iguana Recovery Programme to Sustain Conservation Success
Territory(ies)	Grand Cayman
Lead organisation	National Trust for the Cayman Islands
Partner institution (s)	Wildlife Conservation Society (WCS), San Diego Zoo (SDZ), Queen Elizabeth II Botanical Park (QEIIBP)
Darwin Plus Grant value	GBP 197,902
Start/end date of project	1 April 2019 – 31 March 2022
Project leader name	Luke Harding
Project website/Twitter/blog etc.	https://www.nationaltrust.org.ky/our-work/conservation/ Facebook; Instagram: @blueiguanaconservation
Report author(s) and date	Luke Harding and Annette Gunn, 30th May 2022

1 Project Summary

The Cayman Islands are located in the western Caribbean, south of Cuba and northwest of Jamaica (*Figure 1*). The country is made up of three islands - Grand Cayman, Cayman Brac, and Little Cayman.

Figure 1. Maps showing the location of the Cayman Islands, the three Cayman Islands and Grand Cayman (Graphic Maps and World Atlas)

Grand Cayman is the largest of the three islands and is home to most of the human population. It is approximately 35 km in length and 6 km wide. The majority of the population are based

around George Town and the western side of the island, whilst rural populations are found towards the East End.

The Grand Cayman blue iguana (*Cyclura* lewisi) is an endemic species which in the early 2000s was threatened with functional extinction. In response to this conservation crisis, the species was classified as Critically Endangered on the IUCN Red List of Threatened Species, with fewer than 25 individuals left. Urgent action was necessary to save the blue iguana from extinction and Blue Iguana Conservation (BIC), formerly the Blue Iguana Recovery Programme (BIRP) was set up by the National Trust for the Cayman Islands (NTCI) with the support by off-island stakeholders and other partners. This stimulated long-running and extensive efforts by BIRP to capture remaining wild specimens for breeding and head-start hatchlings at the captive facility and then to release and rebuild wild populations. Through on-island selective captive breeding efforts for population and genetic recovery, by 2012, blue iguanas had been down-listed to Endangered. Recovery and release efforts of captive-bred and head-started blue iguanas continued and, in 2018, the project celebrated the release of the 1,000th blue iguana into the Salina Reserve.

Since 1987, annual field census surveys have been carried out to monitor the wild blue iguana populations across three sites: Queen Elizabeth II Botanic Park, Salina Reserve and Colliers Wilderness Reserve (*Figure 2*). Through field data analysis, it has become apparent that there is little evidence of blue iguana hatchling survival mainly due to predation by feral cats, which are abundant in these three sites. In addition, adult blue iguanas are threatened by predation by stray dogs and collisions with vehicles. These threats have proven that the captive breeding facility is highly essential to continue aiding the conservation strategy of this species and the need to support and sustain conservation success for this species.

The BIC facility also provides the human resources and financial support to monitor 1,500 ha of natural blue iguana habitat. Three sites are surveyed in rotation over three years. Gap analysis indicated that the ageing BIC facility was in need of an upgrade to sufficiently hold the breeding captive population, whilst also generating species awareness and sustainable revenue through ecotourism and on-island capacity building. Key to the success of the captive breeding facility was the need to ensure greater biosecurity to protect the captive iguana population and prevent interactions with threatening invasive alien species. Alterations to the facility, such as the purchase and installation of better perimeter fencing was deemed essential. In addition, analysis showed that other necessary improvements should include raising the standards of captive husbandry, health and welfare, behavioural and veterinary research, on-site nutritional resources and reproductive success.

Preliminary genetic research shows that the preservation of founder lines has resulted in the on-island captive population not expressing any inbreeding depression, therefore demonstrating that this conservation breeding programme is successful and continues to be genetically viable.

A revised Strategic Species Action Plan (SSAP) has been created (Annex 6.4) and is a projection of the major objectives of this programme over the next five years (2021–2026), providing direction for the conservation of blue iguanas on Grand Cayman. The new SSAP was formed by an appointed Secretariat, with input from key project stakeholders and partners through a five-day workshop (2019) and a three-day meeting (2021) and additional reviews. The SSAP document serves as the most updated and accurate presentation of knowledge regarding captive and wild blue iguana populations and proposes achievable future plans for the project, including population data techniques, legal frameworks and permits, veterinary science and educational outreach.

Figure 2. Distribution of potential blue iguana populations (green dots) on the East End of Grand Cayman and project sites: 1: QEII Botanic Park and BIC facility; 2: Salina Reserve; 3: Colliers Wilderness Reserve (2002, Cayman Islands Department of Environment)

2 Project Stakeholders/Partners

Blue Iguana Conservation (BIC) is managed under the National Trust for the Cayman Islands (NTCI), a registered non-profit organisation. The NTCI leads and supports BIC through committed maintenance of the captive breeding facility, threat identification and mitigation and ensuring suitable husbandry, welfare and release site/protected area management. The NTCI provides BIC staff at all levels, to ensure successful on-island capacity building.

The aims and objectives to save Grand Cayman blue iguanas have been assisted by long-term partnerships. Through collaboration and maintenance of strategic partnerships with local, regional and international collaborations, BIC has been able to implement species recovery efforts for over 21 years. Key partners include the Cayman Islands Department of Environment (DoE), Queen Elizabeth II Botanic Park (QEIIBP), Wildlife Conservation Society (WCS), San Diego Zoo Wildlife Alliance Institute of Conservation Research (SDZWAICR). In 2020, BIC invited St. Matthew's University School of Veterinary Medicine (SMU) to be project partner, increasing links to on-island veterinary expertise and student education for capacity building.

BIC has an established Steering Committee, formed of representatives from NTCI, DoE, QEIIBP, SMU and BIC. The Steering Committee meets quarterly (Annex 6.1) to discuss issues and future plans directly involving the captive and wild populations of the blue iguanas. The last meeting was held in January 2022 and the next meeting is scheduled for June 2022.

The BIC facility is based within the grounds of the QEIIBP, a 24.3-hectare site consisting of gardens and woodland trails that is co-owned by the NTCI and the Tourism Attraction Board (TAB). The BIC facility holds up to 200 captive blue iguanas for the purposes of targeted breeding under the Grand Cayman blue iguana studbook, rescue and rehabilitation. The QEIIBP has a population of free-roaming blue iguanas which is monitored by the BIC team.

QEIIBP supports NTCI through outreach from school and educational visits and has been assisting BIC closely with the planting plot design, seed collection, storage, plant choices and plant cultivation through this project (Output 3.0; Activities 3.2 and 3.3.). QEIIBP worked closely with BIC to ensure that construction and repairs provided for in (Outputs 2.0 and 3.0) were carried out with minimal disruption to other aspects of the BIC and QEIIBP activities. Staff

at the QEIIBP have been supportive to BIC by informing park visitors about the BIC facility, opening times, available tours and additional information. They also assist with invasive species monitoring and trapping. The QEIIBP General Manager sits on the BIC Steering Committee to provide contributions to the project's progress.

TAB is the management group for the QEIIBP, where the BIC facility is based. Due to the COVID-19 pandemic, BIC suffered from a lack of revenue through limited ecotourism due to Cayman's travel borders being closed between March 2020 and November 2021. Once on-island lockdown restrictions were lifted in June 2021, BIC was keen to attract local visitors and, later in the year, NTCI and QEIIBP agreed upon an affordable, combined entry price for both entities. BIC had to be flexible to maximise revenue opportunities, therefore, although BIC offers guided tours on request, the facility has been open for self-guided tours between 10 am and 2 pm since October 2020, which has received a far better uptake and more enthusiastic feedback from on-island visitors who are able to take photographs, ask questions and walk around the facility at their own pace. Tour information and BIC facility opening times have been promoted at the QEIIBP Visitors Centre, including the placement of a standing banner advertising the options and reasons to visit the BIC facility. The QEIIBP team were supportive of BIC during several park events when BIC were conducting outreach efforts.

The Wildlife Conservation Society (WCS) Zoological Health Program has provided veterinary support to BIC since 2001, in conjunction with the IUCN Iguana Specialist Group and SMU. Typically, WCS travel to Grand Cayman to carry out annual health assessments on captive blue iguanas and also evaluate pre-release candidates through gaining culture, parasite screens and baseline haematologic and biochemical data. However, Year 2 of this Darwin grant project was affected by the COVID-19 global pandemic and the WCS veterinary team, led by Dr. Paul Calle, was unable to visit in 2020 and 2021. The health assessments were carried out in November 2020 and 2021 by BIC staff and an on-island team from SMU, overseen remotely by Dr. Paul Calle and Dr. Ken Conley from WCS. BIC is offered regular support from Dr. Samantha Shields at SMU and veterinary students from this institution, including carrying out post-mortems and some on-island sample testing. Recognised local veterinarians offer clinical support to BIC where required, should illness or injury occur.

In addition, WCS assisted BIC in Year 2 of this project by providing vital input into biological and veterinary research including publications on issue such as the on-going Helicobacter cases, supporting veterinary evidence and methods for inclusion in the Strategic Species Action Plan (SSAP) (Output 1.0) and provided advice for welfare, body condition and nutrition, in association with SDZWAICR (Output 3.0). Established partnerships with U.S. institutions enabled international momentum for the first two International Blue Iguana Days (2021 and 2022), to raise species awareness on 8th May each year (Annex 6.15).

Dr. Tandora Grant from SDZWAICR maintains the Association of Zoos and Aquariums (AZA) studbook for the captive blue iguana breeding programme and through determining critical genetic evaluation and demographic statistics, Dr. Grant has successfully managed breeding pairs and wild-release candidates for over 21 years. In this time, she has been able to avoid inbreeding depression in the blue iguana population, therefore providing more genetic diversity now than ever before. The SDZWAICR has also assisted with recommendations for the SSAP (Output 1.0) regarding breeding and releases.

BIC works closely with the government body, the Department of Environment (DoE) who provided a great deal of support to BIC and throughout this Darwin Plus project. The DoE deliver technical support and are key members of the BIC Steering Committee and the NTCI's Environmental Advisory Committee. All Darwin grant updates are discussed and reported at these committee meetings. DoE have assisted BIC with carrying out blue iguana population monitoring (Output 4) and with data analysis, including providing comparable historical data.

The entire DoE team, from Research Officer to Director level has been involved in the development of the SSAP. The BIRP programme founder is now the head of the DoE's Terrestrial Research Unit and gives a huge amount of support to BIC. The national

governmental elections were conducted amid this grant, which posed challenges regarding timing the release of the new SSAP. The decision was made to delay the release to enable the newly elected ministers to be involved in decisions and to approve the new SSAP, resulting in the Premier of the Cayman Islands writing the foreword of the document. The SSAP was published in August 2021 (Annex 6.4 and 6.5).

3 Project Achievements

3.1 Outputs

Output 1 concentrates on the Strategic Species Action Plan (SSAP) for BIC over the next five years. A SSAP was critical to ensure deliberate direction and focus for the project and transition from species recovery to species conservation. A SSAP Secretariat was appointed to prepare and host two focus workshops (2019, 2021) with a number of local and international key stakeholders and partners. The first draft was delayed due to personnel changes within the NTCI, and the BIC Project Manager was appointed to the position of SSAP Secretariat instead in 2020. The COVID-19 pandemic caused further disruption, with limited communication with partners due to off-island staff being furloughed and self-isolating (see Section 9). However, work was continued by the Secretariat through the creation of several SSAP drafts, which were frequently reviewed by the NTCI and the BIC Steering Committee. A proposed 'first' draft was then circulated to participants ahead of the second meeting in January 2021.

The focus of this second meeting (*Figure 3*) (Annex6.3) was primarily to review the necessity for and feasibility of the included objectives and actions discussed in 2019 and to update all participants on current information on captive husbandry, breeding and genetic knowledge, wild population estimates and generate ideas for education, outreach and standardisation of all BIC's aspects to ensure efficient transparency with all key stakeholders and partners. Due to restricted international travel, off-island partners attended the meeting via Zoom videoconferencing, whilst the on-island participants were able to gather in a boardroom as Grand Cayman was free of COVID-19 between June 2020 and November 2021 when international borders reopened. The broad representation of the participants made for two extremely successful events and a wealth of experience for input into the SSAP, despite the logistical complexities of a combined online and in-person event in 2021.

Figure 3. The on-island participants of the second SSAP meeting, Grand Cayman (with off-island participants via Zoom) in January 2021

A final draft was reviewed by all 2021 workshop participants in February 2021 and final edits were made by the Secretariat for completion in April 2021. The final document was launched in August 2021 (Annex 6.4) with the inclusion of the foreword from The Premier of the Cayman Islands, the Honourable Wayne Panton.

Output 2 focuses on the refurbishment and biosecurity improvements for the captive blue iguana facility. All building work associated with this grant project was completed following the proposed and slightly adjusted indicators, including repairs to existing concrete enclosures, the construction of additional concrete semi-wild habitat pens (*Figure 4*) and also the building of additional hatchling and subadult cages. The BIC team evaluated several design ideas to improve health, welfare and function of captive environments, and chose to include removable dividing walls in meshed cages to increase flexibility to cater for fluctuating numbers of iguanas within the facility.

Figure 4: Infrastructure improvements at the BIC facility from August 2020 (Left) to July 2021 (right)

Biosecurity alterations to the BIC facility perimeter fence were necessary to reduce access for invasive alien species (green iguanas, cats and dogs) in order to protect the captive blue iguanas. The 8 ft high chain-link perimeter fence has had 4 ft of ¼ inch mesh fixed to the bottom half of the fence, a 2ft cement foundation, 3 ft high sheets of flashing and rollers have been installed to replace barbed wire to exclude invasive species (*Figure 5*). The fence is 776.95 m long, which is an increase from the initial 275 m stated in the original log frame, in order to ensure exclusion around any possible entry point to the facility. Since the fence alterations began, a total of 160 green iguanas were culled in and around the facility perimeter, four dogs and 40+ cats have been trapped within the surrounding botanical park (Annex 6.10). Since completion of the fence improvements during Year 2, the last recorded green iguana within the facility was seen in October 2020 and there have not been any other invasive species recorded at the facility (Annex 6.11). The fence also prevents blue iguanas from leaving the facility (*Figure 6*).

Boundary clearing was completed by BIC staff, community volunteers and labourers and any regrowth is regularly maintained by BIC staff. Repairs and biosecurity achieved to standard as monitored by the Project Leader. Initial delays of the fence alterations and any construction were due to importation restrictions during COVID-19 (see Section 9) but all construction was completed at the facility by end of Year 2.

Figure 5. BIC facility perimeter fence in 2020/21 after the alterations.

Figure 6. A blue iguana individual being unable to get through the fence, October 2021

Indicator 2.2 required the construction of 100 new subadult and 50 new hatchling cages. The adjustment on these plans proposed in Year 1 to make semi-wild pens with mesh sides and roofing proved absolutely necessary to be completed by the 2020 breeding season due to such a successful output of eggs from the captive facility animals and reshuffling of older iguanas. In addition, the dividable wooden standing cages (Annex 6.15) enabled improved housing for the yearlings (2019 hatchlings). The flexibility of these cages has enabled the BIC team to have more effective responses to changes, for example, injured or sick animals that require temporary housing and/or veterinary attention. The wooden dividers have prevented injuries from conflicts via access with neighbouring iguanas and the animals have been observed to be much calmer due to the provision of visual barriers. In addition, we needed to respond to a continuing threat to the blue iguana population, with the re-emergence of the novel pathogen sp. Helicobacter GCBI1. The existing quarantine cages were old and no longer fit for purpose so, in order to respond to this threat and improve welfare standards, a change request was submitted and approved in August 2021 and so we built 30 additional stand-alone quarantine cages which provided extra capacity for sick animals who could be housed in isolated pens whilst being treated.

Output 3 concentrates on improving and diversifying the diet and nutrition for the captive blue iguanas at the facility. This includes a) implementation of wild food plant cultivation plots; (b) vehicle for food collection, new refrigerator; c) recruitment of partner supermarket.
A baseline report was completed, consisting of information gathered from a literature review regarding *Cyclura* diets (Annex 6.6). From this report, and from trialling additional food plant species in 2020, BIC has been able to create a useable plant handbook for staff and volunteers, consisting of over 50 plant species (Annex 6.8). The working hypothesis suggesting a link between reproductive health and diet proved likely, as the increase in quantity of food offered, as well as diversity of plants offered, may have played a part in extremely successful breeding seasons in 2020 and 2021: BIC welcomed a total of 112 hatchlings to the programme in 2021 – a new programme record.

The captive husbandry, welfare and nutritional aspects are consistently reviewed by the Operations Manager, the BIC Steering Committee and veterinarians from SMU and WCS. There have been major changes in standards since the start of this grant project, due to the application of new staff protocols and a new staff training programme. The body condition of the captive blue iguanas has been dramatically improved (Figure 10), as evidenced by the results of the annual health checks (*Figure 7*), carried out with a team comprising staff from BIC, SMU and WCS, which show that each iguana has been continually and measurably putting on weight to the present day.

Figure 7. Annual health checks completed by WCS (Bronx Zoo) and BIC staff, with observations by veterinary students from St. Matthew's University School of Medicine, March 2022

In addition to the varied diet offered each day, dry food pellets have been sourced from Mazuri Exotic Animal Nutrition for emergency use at the facility as part of our project disaster planning (e.g., in the event of hurricanes when fresh food may be in short supply).

Four pilot cultivation planters were built in 2019 to trial cultivation of plant species, such as Ganges rose, marigold and hibiscus plants. In 2021, the planters were dismantled in lieu of some large cultivation plots within the facility which were initially planted with seeds and seedlings of eight different food plant species (*Figure 8*).

The cultivation plots within the facility have been successful, particularly the large planting bed (180 ft/ 54.9 m) along two fence lines, which has increased growth of callaloo, Ganges rose, yellow root and 31 other native food plant species, due to significant seasonal rainfall on Grand Cayman. This has been an encouraging growth increase since mid-2019, when there were only three species growing, and the target of ten species by the end of the project term has been surpassed by 210%. The project has received support from the community, with numerous donations of plants from local plant nurseries Vigoro, Power Flower and also from

private donors. Irrigation systems and new hose connection points were installed and continue to maintain the cultivation plots.

Figure 8: Cultivation plot providing supplemental food plants for the facility's blue iguanas, September 2021

This output has expanded further, due to the concept of the NTCI/BIC Blue Iguana Gardens initiative, which was launched across island in 2021 (Annex 6.9). This enterprise started from the trials conducted at the facility and serves to provide information and support to interested community members who would like to support BIC by either purposefully growing selected food plant species from seed, or by leaving areas of their private gardens for wild plant growth. The community participants contact BIC when their produce is ready to harvest in a sustainable manner, therefore providing additional supplementary food resources for the captive blue iguanas. This initiative was derived having assessed the threats of increasing rates of anthropogenic activity on wild plant areas around Grand Cayman, which reduces the available food collection sites from which BIC staff can collect to feed the captive iguanas.

In 2019, a partnership was formed with Fosters supermarket to provide donations of suitable food items for supplementary iguana diet. These donations occur on a monthly basis or when we make a request depending on demand and availability. This new partnership has also led to the donation of gift cards so that we can use the fund to purchase fresh produce if required for key items such as different locally grown fruits.

During 2020, several members of the local community, including farmers, came forward to become 'Blue Iguana Champions', by assisting BIC with food donations and this continues into 2022. This, and the Blue Iguana Gardens initiative enable the community across Cayman to become better engaged and raise awareness for this endemic species.

The hybrid motor vehicle that was purchased (Annex 6.15) for food collection has been a great asset for the project. BIC staff are easily able to travel around the island to seek natural food collection sites, liaise with landowners about food donations and access supermarkets. Food plant diversity has now reached over 63 species, from an original six species, including new discoveries such as wild lettuce, though diversity, volume and plant quality is seasonally dependent.

The project target was to reduce staff time for food collection by 25% and this has now been achieved. The planters within the facility have also contributed to lowering the need to travel as far for all the food required as has focused collection points from the iguana gardens initiative.

The new, economical refrigerator is in daily use, providing ample storage and increasing freshness of higher quantities of collected leaves, fruits and flowers, reducing total food collection time for the BIC staff (Annex 6.15).

Output 4 encompasses the annual wild blue iguana surveys of Colliers Wilderness and Salina Reserves. In 2019, a group of suitable candidates were selected and preparation was made for their arrival, including preparing Colliers Wilderness Reserve trails and erecting a temporary shelter for the surveys in March 2020 (*Figure 9*). The results of this successful survey were reported within the Colliers Wilderness Reserve Report for March 2020 (Annex 6.12).

The March 2021 surveys were carried out in the Salina Reserve using a solely on-island team, selected as planned in January 2021, as international candidates were not permitted to travel to the Cayman Islands due to the COVID-19 global pandemic. The survey team was compiled of six, skilled people from BIC and DoE, in three teams of two each day. The weather mid-survey became changeable and this caused interruptions to the survey, however, the work was completed successfully and within the allotted time period. One of the 2020 volunteer survey members had stayed on island throughout the pandemic to assist with BIC and NTCI work, helped to prepare trails for the 2021 surveys and also led a team during the 2021 surveys.

Results from the survey are in the Salina Reserve report of March 2021 (Annex 6.14). In brief, the surveys showed that wild iguana sightings were comparable to previous years surveys and they also still no recorded sign of natural recruitment. A positive observation of the 2021 Salina survey was that there was a notable growth difference with a number of individuals recorded to have gained size and weight in comparison to the previous surveys in this area. Survey results from both years were discussed at length amongst the BIC Steering Committee and both highlighted knowledge and data gaps and the importance and need for continued field research. Post survey evaluation also considered the methodologies used on both 2020 and 2021 surveys and whether the use of distance sampling was suitable moving forward. The committee considered if alternative or complementary surveys methods might be needed to determine the population and the effects of the changing size and age structure of the current population.

Figure 9: Colliers Wilderness Reserve Survey team in March 2020 comprising international volunteers, BIC staff and DoE staff

3.2 Outcome

To transition from recovery to stabilised conservation requires the realisation of several key outcomes.

1. The SSAP workshops, collaboration between partners and introduction of new, relevant partners, has enabled the Strategic Species Action Plan (2021-2026) to be drafted, reviewed and completed. The SSAP will guide the direction of BIC over this time period, in order to maximise opportunities for research and filling data gaps, standardise records and other methods and also capitalise on the purpose of the BIC facility (husbandry, conservation breeding, education, fundraising, etc.). The second SSAP meeting was carried out in January 2021 and the final document was launched by the NTCI in August 2021 and published on NTCI Website (Verification 1.1).
2. The reconfigured captive blue iguana facility has been adapted to cater for future longevity due to current threats to blue iguanas still prevailing on Grand Cayman,

through incorporating flexibility into pens and cages (Indicator 2.2). Measurable animal husbandry and welfare standards have increased, and there has been less behavioural conflict between iguanas since these changes due to more appropriate housing. Alterations to the fence were made (Indicator 2.3) to significantly reduce the opportunity for invasive alien species to enter the captive breeding facility and the effects of this have been monitored (Verification 2.3) and have shown to be successful in keeping green iguanas out of the facility, whilst also keeping blue iguanas in.

3. Veterinary health has improved through increased nutritional diet and diversity (Indicator 3.5). The body condition of captive blue iguanas has improved within the duration of this project and has been documented through weight measurements and increases can be seen on individual weight graphs (Figure 10). Efforts to raise food plant diversity has shown a significant difference in egg yield and hatchling survival.
4. Trained candidates were recruited for annual surveys 2020 (international) and 2021 (on-island) (Indicator 4.1). Survey preparation, such as trail clearing, equipment and required signage were completed on time. Surveys were carried out to the highest standard, in order to ensure optimal data collection and accuracy, keeping in line with previous surveys to allow for data comparisons (Verification 4.3). Results have been able to benefit knowledge regarding wild blue iguanas, the objectives of the captive facility, alternative field methodologies that have been discussed with all partners to drive the focus for the SSAP up to 2026. All agreed time frames set out in the log frame were met and the surveys were successfully completed (Indicator 4.3).

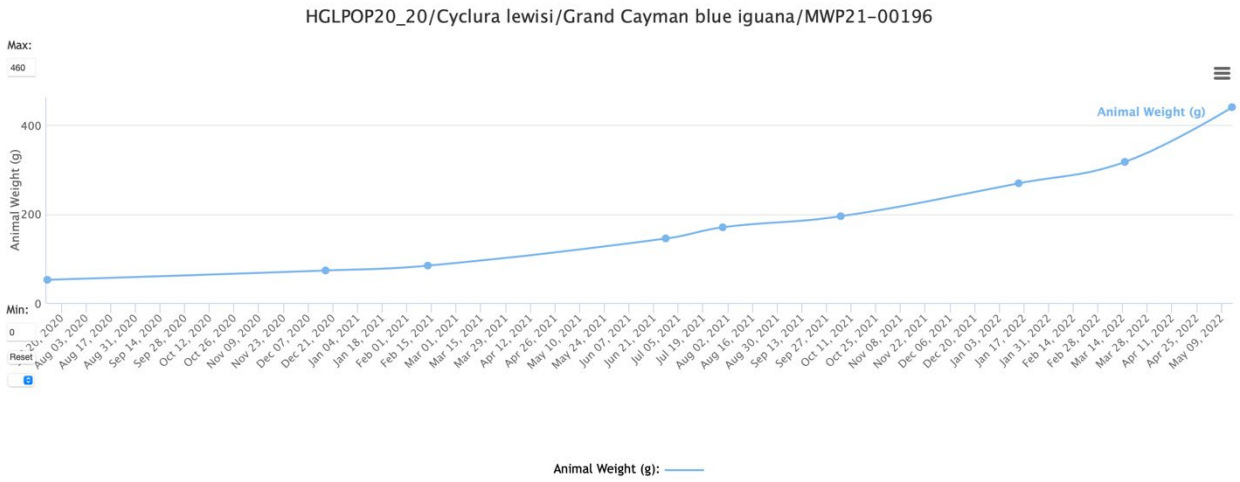

Figure 10. Weight graph, showing a rise during this grant, from a 2-yearling housed at the Blue Iguana Conservation facility, Grand Cayman

3.3 Monitoring of assumptions

Some of the assumptions regarding the project objectives have changed and some were realised during the project. Please refer to Section 9 for aspects of the project that were impacted by COVID-19.

Assumption 1: SSAP

Comments: The risk that the SSAP was rejected by governmental bodies as a key source for a statutory species conservation plan was mitigated by DoE as a key stakeholder, held true throughout the duration of the project. The DoE staff, including senior level directors, were involved in all stages of the development of the new SSAP. Their support was invaluable, such as their knowledge on planning permits for housing and road developments in areas surrounding the protected reserves. The new SSAP document was completed during the time of on-island general elections and so a decision was made to slightly delay putting it forward to government for approval and publication so that the new government officers could be involved in this important final phase of the SSAP. This decision proved successful as the document

was well received by the new government and the SSAP for 2021-2026 was approved and put forward for publication, including the foreword by the new Premier of the Cayman Islands.

Assumption 2: Change of Personnel
Comments: Assumption 2 indicated that unanticipated staff turnover might cause delays in delivery and that no significant risks were otherwise assumed which could cause delay in the delivery of the project outcomes. The assumption regarding the impact of staff turnover was proven true. Whilst there were several changes to personnel in Year 1, the second year saw only two changes to personnel, but these did not affect the delivery schedule of this grant. There was one change in the Blue Iguana Warden role at the captive facility in 2020. Additionally, Executive Director, Nadia Hardie, was replaced by Annick Jackman in September 2020. Any time lost or delayed from Year 1 was regained in Year 2 and there were no changes to personnel in Year 3. The Strategic Species Action Plan was compiled using the same methodologies as past SSAPs but in a revised format in accordance with SSAPs for other species and to use the platform to offer the most updated information about the species.

Assumption 3: Cultivation of native plants at the captive facility
Comments: The unknown capacity for native plant cultivation at the captive facility has been counteracted by a great effort from the BIC team to achieve improved yields and plant diversity. The cultivation plots have become highly valuable for supplemental food resources and cooperation with the QEIIBP, Vigoro Nursery and the Blue Iguana Gardens initiative has enabled further plants to be propagated within their native plant nursery. The 2020 and 2021 hurricane seasons provided a considerable amount of heavy rain, eventually becoming evident in the booming growth and health of the facility's plants, both in and out of the semi-wild habitats. The plots continue to be nurtured to ensure long-term success (Annex 6.7)

Assumption 4: Field survey teams
Comments: Assumption 4 is regarding sufficient field team capacity is recruited within budget and that surveys are not delayed or extended by weather conditions (it is impossible to conduct the surveys accurately when overcast or in rain). These risks were mitigated in 2020 by offering funding for international volunteers and by conducting surveys in March (dry season) each year, also avoiding hurricane risks. The annual blue iguana survey in 2020 was successful, with a team of international volunteers coming to assist the survey team in Colliers Wilderness Reserve. All survey members left Grand Cayman just before the borders closed, ending a successful survey season. An international volunteer, stayed to assist BIC throughout the pandemic. As Grand Cayman remains closed to visitors, the volunteer was subsidised by this Darwin Plus grant to assist with the March 2021 surveys, including preparation, methodologies, survey logistics, data collection, equipment, post-survey trapping and analysis.

In 2021, Cayman's closed travel borders due to the COVID-19 global pandemic meant that an international survey team could not be recruited. The on-island team were affected by changeable weather in March 2021, although surveys were completed in the allotted time, several days were postponed due to unsuitable survey weather.

By March 2022, Cayman's borders were back open and international volunteers were able to assist with the Year 3 survey in QE11BP; the work was supported by several international field-team members who were either financially supported by their institutes or self-funded in order to come to island for these surveys. This investment is a result of the close working partnerships which have been developed due to the funding by the project which enabled the first teams to come to island. It has developed partnerships and a culture of commitment which we hope will continue to engender a sustainability in for future international field team involvement

Assumption 5: Veterinary Partners
Comments: Output 1 assumed that partner WCS would continue to fund its attendance for annual veterinary monitoring and this remained the case up to the end of the project. The veterinary team were unable to visit in 2020 and 2021 due to Cayman's closed travel borders, however, a relationship was developed with St Matthew's University School of Veterinary

medicine (SMU) to ensure on-island veterinary support, along with assistance with the annual health checks each year during the pandemic. A working partnership continues with SMU who now assist with post-mortems and some routine veterinary care throughout the year, whilst veterinary students gain hands-on experience at BIC. SMU are now official project partners, and we will continue to develop relationships with the vets and students to provide ongoing health monitoring for the blue iguanas.

Assumption 6: Facility breeding levels and construction of habitats
Comments: Output 2 assumed that resuming breeding blue iguanas to the same levels as that of the original recovery programme would not be necessary, no special assumptions were required and no significant risks relating to the configuration and biosecurity elements, materials and capacity were readily available in the Cayman Islands and unanticipated staff turnover could affect delivery schedule for those elements to be performed by BIC staff. The assumption about the level of breeding required at the captive facility was largely false, as surveys and data between 2018-2021. This resulted in a critical need to increase breeding efforts within the captive breeding facility. The SSAP workshop participants (both 2019 and 2021) agreed that the facility is no longer viewed as a temporary measure, hence why alterations were made to make facility reconstruction efforts more permanent, to ensure conservation breeding in the longer term. Materials for the construction work were delayed due to COVID-19 but all work schedules reached completion within Year 2.

Assumption 7: Cultivation plots and nutritional diversity
Comments: Output 3 assumed that time spent on wild food collection would not be reduced due to the expectation of time taken to maintain cultivation plots. However, BIC staff were able to manage this expectation by being present at the facility more often to facilitate increased self-guided and guided tour opportunities that generate income and increased outreach for the programme. Plant beds continue to be managed effectively and efficiently, ensuring that appropriate watering, harvesting and preening activities are carried out whenever necessary.

Replacement of aged or defunct donated equipment was necessary to alleviate staff shouldering financial burdens/depreciation of personal vehicles and to provide capacity for storage of donated produce. The purchase of the new hybrid vehicle in Year 1 has continued to be an invaluable asset to the project into Year 3.

The supermarket partnerships have been developed and they have been very supportive with food sources where they are able. This strategy was not considered to be a significant risk as they supply hundreds of kilos of produce to a population of 70,000 people daily. The partnership with Fosters, a large supermarket chain on Grand Cayman, enabled additional support with food donations, despite the challenges presented by COVID-19. However, supermarkets have been unable to supply surplus produce at level of demand currently required and so a much greater focus was needed to develop and promote community involvement, such as the Blue Iguana Garden Initiative.

4 Project support to environmental and/or climate outcomes in the UKOTs

The Darwin Plus grant was awarded to assist the National Trust for the Cayman Islands with environmental protection through conservation and education across our three islands. The ongoing work by the NTCI is in line with the Environmental Charter signed by the UK government and Cayman Islands Government in 2001, along with the 2009 National Biodiversity Plan objectives. Blue Iguana Conservation also works in accordance with the Species Conservation Plan under the National Conservation Law, 2013.

Blue Iguana Conservation was originally founded to improve the recovery of the blue iguana population, which, in 2002, was classified as Critically Endangered on the IUCN Red List of Threatened Species. Although the species has made some recovery, the conservation programme still endeavours to safeguard the wild and captive populations. There is a clear need to conserve this species, due to remaining and ongoing threats across Grand Cayman.

The Blue Iguana Conservation captive breeding facility, supported by the NTCI and key partners, has been empowered by this grant project to provide captive blue iguanas with improved housing, diet and health, behavioural welfare and protection from threats, along with the opportunity for a more aesthetically pleasing and educational experience for visitors. A vital component of this project has been the development of the SSAP, projecting until 2026, in collaboration with key partners via two focused workshops. The SSAP will become the foundation of the National Conservation Council's statutorily mandated Species Conservation Plan.

The achievements within the first two years of this grant directly support Point 7, under the Guiding Principles of the UK/CIG Environment Charter 2001. In addition, this project supports the Cayman Islands under the Convention of Biological Diversity (Articles 6a, 7b, 8d, f, 9b, c, d, 10e, 13a), and Specially Protected Areas and Wildlife, Aichi Biodiversity Targets (1, 12, 17).

The Darwin Grant project has helped to elevate the work of BIC and promote this across island and on an international platform. Government involvement with the SSAP and support from the head of the government with the Premier agreeing to write the forward for the document has helped to raise awareness of the environmental issues facing this key endemic species. Issues such as the threats from invasive alien vertebrate [IAV] species are now more at the forefront of discussion and new government IAV management plans are due to be released soon. Project successes such as the new fencing provided by Darwin grant for the BIC facility have led to discussions about using such fencing around the whole of the QEIIBP to create a further layer of protection from IAVs for the flora and fauna within the park.

5 OPTIONAL: Gender equality

This project does not require the address of gender quality issues; however, we do monitor gender equality in our training programmes, events and volunteers' activities.

6 Sustainability and Legacy

It is anticipated that the completion of this project will help to ensure the continuation of BIC's efforts and will continue to complement other projects aimed at developing greater sustainability though the ecotourism value of the programme.

The objectives outlined at the commencement of this project will be sustained after the project is finished, through: (a) adoption of the new five-year SSAP (covering the period from 2021–2026). The SSAP is not expected to require further major revisions after the expiry as the programme transitions to a stable state of conservation management; (b) the purchase of a low-mileage, low maintenance, recent model year, hybrid vehicle; (c) the upgrades to the captive breeding facility have a conservative life-expectancy of at least 20 years.

It is recognised that funding for future wild population surveys will need to be obtained, but the development of new survey methods should mean that there are less requirements for off-island assistance, which will help to minimise future costs for carrying out these surveys and build on-island capacity and skills; and it is hoped that self-funding by some international partners will continue as in 2022.
The capacity of trained individuals on- and off-island has been developed through the project duration and good working relationships have secured commitments from existing partners to maintain levels of support and involvement in the future.

A SSAP working group has been set up will help to monitor and assess the outcomes and outputs of the SSAP and ensure that work to achieve success, such as seeking new funding streams, are fully realised.

Health monitoring has been a key part of the project and this focus on utilising data to inform and improve best practice will continue. Partners will continue to advise upon and monitor the health of the iguanas throughout the year not just at the annual health inspections and surveys.

Changes to facility have had a huge effect on the health and wellbeing of the iguanas within the captive facility. Maintenance of the new enclosures, and further development and research into nutrition and husbandry, will help to raise performance levels for the BIC team and partners moving forward. Using the centralised records system, Species360 (ZIMS) which was part of the grant, investment has been a key feature in improving standards. These records are computerised and so accessible to all partners and can be readily updates and analysed. The NTCI will continue to support this by funding the annual renewal fees for the licence and helping to fund laptops and training for data input.

It is anticipated that project staffing levels will remain the same after this project by seeking other revenue streams. This project has enabled the creation of an acclaimed breeding facility and the popular facility tours are an important source of revenue for the project. This income stream will help to mitigate some of the future staff costs. We will seek to add new tour packages, VIP events, educational tours, special events, such as International Blue Iguana Day (Annex 6.15) and maintain and improve facilities to build on the great work achieved through the grant funding. This will all help to generate much needed revenue for the support of adequate staffing levels and the continuance of the BIC facility and programme.

7 Lessons learned

During Years 1 and 2 there were several changes in personnel within the NTCI and BIC teams. These changes did not create major delays to the project progress overall.

No assumption was made regarding the impact of a global pandemic and this has been an enormous challenge during 2020-2022 (see Section 9). The closed travel borders between March 2020 – November 2021, uncertainties and limitations of shipping and sending products in and out of the country proved to be difficult. The prolonged lack of tourism affected tour revenue, delays with veterinary assistance, shipping samples, sourcing equipment and other essential project supplies.

The second SSAP meeting was held via a half in-person, on-island group and half off-island, virtual Zoom group. This was a complex method and although was a successful meeting, it did create issues when a power cut occurred and the meeting had to be recovered.

The lack of an international team for the 2021 surveys reiterated the importance of ensuring that there are enough on-island skills that, should travel borders need to be closed in future at this time of year, there are still enough trained candidates for survey participation. Future volunteer initiatives may include training opportunities which will build on-island skills and experience enabling volunteers to work along aside BIC and partner staff to carry out vital field and survey work.

The improved knowledge of cultivating target food plant species, combined with the losses of food collection sites has driven BIC and the NTCI to consider alternative methods for sustainably feeding the captive blue iguana population over the long term. The Blue Iguana Gardens initiative is an example of potentially successful mitigation of this issue and has been widely received.

If the NTCI were doing this project again, we would complete the action plan meetings earlier as this would have given better focus to the tasks which needed to be carried out. All the proposals were agreed upon but had they not been, this could have delayed work and jeopardised the efficacy and successes of the project.

Planning is key and involving others and facilitating regular meetings so all partners can contribute. This grant has been a great example of the benefits of long-term partnerships and collaborations, with most of the partners having been involved with the blue iguana project for over 21 years. The benefits of creating such stable partnerships have been seen in both the collaborative work throughout the duration of this grant and in the commitment to continue the work after the grant duration has passed.

7.1 Monitoring and evaluation

BIC considers monitoring and evaluation to be central to the project and a key tool in assessing the progress and success of the outcomes and outputs. The log frame was constantly used as a reference point for the tasks agreed and deadlines set. In addition, the completion of documents, such as the nutrition baseline report and the SSAP, remain in use to reflect project progress and reflect information, for example, from the population monitoring results. These documents are shared with the key stakeholders to keep them informed and also to gain their input and expertise into the content of these documents. Project activities and outputs are monitored regularly by the team, management and at the quarterly steering committee meetings and form the basis of regular discussions with our key stakeholders.

7.2 Actions taken in response to Annual Report reviews

Our annual report in 2019/2020 was successful and we achieved an overall score of 2, which was well received by all project partners. It was recognised that changes in project staffing, initial budgeting issues and the COVID-19 global pandemic all affected the project timetable and outputs, but overall, the project was on target to meet all the agreed outcomes.

One issue highlighted to be improved from the Year 1 Annual Report was that the contents of supporting evidence provided were only snapshots of documents and were not legible because of poor quality imaging to reduce file size. The request was for the Year 2 Annual Report to have copies of original materials submitted alongside the report. We have ensured that all documents of supporting evidence are original and clear to read.

The Year 2 Annual Report was awarded an overall score of 1, which gave the NTCI team much encouragement to head into the final project year.

8 Darwin Identity

Every effort is being made to publicise the Darwin Initiative, both for its support for BIC and the valuable work it carries out on a global scale. The Darwin logo is used alongside the NTCI logo and the newly created BIC logo in many documents publicising the work relating to this grant, such as the NTCI Annual Reports, SSAP and presentations at conferences. Online publications are available from the NTCI website, the Darwin Initiative website and social media platforms (Annex 6.13). The Darwin Initiative is discussed during the Blue Iguana Conservation facility tours, where visitors are informed of the need to explore streams of funding and revenue to support the continuance of the project. BIC staff have informed visitors about this Darwin Plus grant and how it has been utilised by BIC.

Darwin Initiative funding has been recognised as a distinct project, in order to keep identity of the outputs and outcome to which it relates. The Darwin Initiative is globally renowned and we are able to reference other Darwin projects which relate to the origin countries of our tourist visitors. The Darwin Initiative has a high public profile and so many of the residents and visitors to the island have a prior understanding and awareness of some of the Darwin projects and work. There is certainly knowledge of the Darwin Initiative within key on-island partners, e.g., partnership staff at the DoE and the QEIIBP.

As of 2019, BIRP was rebranded to Blue Iguana Conservation (BIC), which has active Facebook and Instagram accounts. Posts have mentioned the Darwin Initiative grant and the work we have been able to carry out due to the support from Darwin funding (Annex 6.13). Any public announcements relating to construction work were not deemed in good taste due to the hardship experienced by many during COVID-19 lockdown, therefore social media posts featuring construction work relating to this grant were released after July 2020, but especially at the ‘reopening’ of the newly renovated BIC facility in October 2020.

The BIC social media channels have been successful in attracting more followers and recently our Facebook social media platform reached almost 11,000 followers with these numbers continuing to rise. We seek to promote awareness of both the species and also of the work at BIC. Through the relevant project work, the social media posts link back to the Darwin Initiative, informing followers on how the grant supports our work and our appreciation for receiving the grant (Annex 6.13).

9 Impact of COVID-19 on project delivery

The COVID-19 global pandemic had an impact on the project schedule in a variety of ways. Unforeseen COVID-19 restrictions delayed construction work and imports of specific materials, as despite the log frame assumption, not all materials were readily available in the Cayman Islands. There were delays for materials and supplies getting to the island and/or in short supply during lockdown.

Despite the completion of the March 2020 field surveys, one original team member decided against flying to Grand Cayman due to COVID-19 risks. This was mitigated by two additional volunteers joining the survey team. Follow-up capture surveys with San Diego Zoo representatives were scheduled for the end of March but were cancelled due to international borders closing and in-country staff were on restricted journeys across Grand Cayman during lockdown. By the end of 2020, it was apparent that the borders would not open in early 2021, therefore, making it impossible to bring international expertise to assist with the 2021 survey in Salina Reserve. A change request was submitted to Darwin Initiative in December 2020, to enable a volunteer from the first survey team to be supported with a stipend to carry out survey preparation, including equipment, trail clearing and to participate in the 2021 survey and make up the required minimal number of people for the survey team and assist with the post-survey analysis.

The second SSAP meeting originally proposed to be held in 2020 was delayed due to difficulties arranging off-island partners to either come to Grand Cayman due to restricted travel or being contactable due to work arrangements, furlough and health. Darwin Initiative approved the second meeting for January 2021, with the Secretariat arranging online videoconferencing via Zoom for off-island participants to attend. The SSAP draft was initially delayed, however, reviews and edits were completed quickly to ensure a completed SSAP by the end of April 2021. The Honourable Wayne Panton, Premier of the Cayman Islands, wrote the foreword for the SSAP, demonstrating governmental support for the project and the plans, and the SSAP was finally launched in August 2021 (Annex 6.4).

The global pandemic impacted donations from the community, not only during lockdown but also afterwards, as Grand Cayman began to struggle with fewer produce shipments arriving on the island. This result in less fruit donations and temporary reduced assistance from Foster's supermarket.

Health and safety of project staff was paramount at the height of the COVID-19 pandemic on Grand Cayman. All staff were provided with hand sanitisers, gloves, masks and other personal protective equipment where necessary. The BIC team worked in split shifts to reduce the risk of the entire team being affected by COVID-19. The COVID-19 restrictions impacted the income-generating facility tours, as the QEIIBP and BIC facility were closed to the general public and exempted staff have kept necessary food collection during lockdown to a minimum. The lack of facility revenue from visitors was mitigated by a drive to increase online support, i.e., monetary donations and symbolic adoptions.

Grand Cayman was in lockdown for three months between March and June 2020, after which, there were no fatalities and the virus was restricted to the quarantine airport hotels. This meant that mask-free island life could resume and businesses were reopened, including the QEIIBP and the BIC facility. Grand Cayman remained in this locally open state since June 2020 and reopened in November 2021, however, the lack of tourism greatly affected the island's

economy. BIC and the NTCI were forced to rethink opportunities for gaining revenue from the community, rather than that of tourists. Facility revenue was mitigated by offering a new style of tour: two guided tours daily, whilst also having the facility open for self-guided tours at a cheaper rate and in conjunction with a special deal with the QEIIBP. In addition, BIC launched the first ever International Blue Iguana Day in May 2021 to attract visitors, support and international awareness for the species. Aside from facility revenue, there were no other long-term delays regarding the impact of COVID-19 to complete this Darwin Plus grant project.

Since the introduction of Zoom videoconferencing, the NTCI and BIC have utilised this platform regularly to keep in regular contact with partners and the BIC Steering Committee. It is expected that Zoom may be used in this manner wherever necessary to improve relations, facilitate accurate and speedy communication and reduce carbon emissions through travel.

10 Finance and administration

10.1 Project expenditure

Project spend (indicative) since last Annual Report	2021/22 Grant (£)	2021/22 Total actual Darwin Costs (£)	Variance %	Comments (please explain significant variances)
Staff costs	[redacted]	[redacted]	[redacted]	
Consultancy costs				
Overhead Costs	[redacted]	[redacted]	[redacted]	Overheads reduced to match budget and includes max of audit fees [redacted]
Travel and subsistence	[redacted]	[redacted]	[redacted]	
Operating Costs	[redacted]	[redacted]	[redacted]	
Capital items				
Others				
TOTAL	[redacted]	[redacted]	[redacted]	

Staff employed (Name and position)	Cost (£)
SSAP – Luke Harding	[redacted]
M&E	[redacted]
TOTAL	[redacted]

Consultancy – description and breakdown of costs	Other items – cost (£)

TOTAL	

Capital items – description	Capital items – cost (£)
TOTAL	

Other items – description	Other items – cost (£)
TOTAL	

10.2 Additional funds or in-kind contributions secured

Source of funding for project lifetime	Total (£)
Disney Foundation 2019/20 (additional funding)	[redacted]
Overseas stakeholder (WCS, SDZ) – in kind contributions	[redacted]
NTCI Staff	[redacted]
Botanic Park	[redacted]
Department of Environment and WCS	[redacted]
TOTAL	[redacted]

Source of funding for additional work after project lifetime	Total (£)
Darwin R10 (years 2022-2025)	[redacted]
TOTAL	[redacted]

10.3 Value for Money

The purchase of a hybrid car provided good value for money as it had a lower import duty rate than fuel vehicles. The workshop for drafting new SSAP were carried out with some delegates in attendance in person and other contributing remotely which eliminated air travel costs for some delegates. Local accommodation was used where possible to reduce costs and some and accommodation was provided free of charge by DoE. Some delegates also had their travel costs covered by their institutes or covered some costs themselves.

Labour costs were significantly reduced by using NTCI staff which saved money and allowed all areas around the BIC facility to be fenced.

Rather than funding a facilitator, the Project Lead/Secretariat completed training which enabled facilitation of the Year 2 SSAP meeting, thereby, lowering costs.

The very high cost of living on Cayman means that goods are more expensive due to high import taxes and labour costs are also very high compared to other parts of the regions/world.

The life expectancy of building material is much lower due to adverse climate conditions, heat and rain especially during the wet season; therefore, cheap materials cannot be used. The team used proven building methods and materials to negate the need to rebuild too often and gain maximum longevity from resources.

11 OPTIONAL: Outstanding achievements of your project during the (300-400 words maximum). This section may be used for publicity purposes

I agree for the Darwin Secretariat to publish the content of this section (please leave this line in to indicate your agreement to use any material you provide here).

The funding received enabled the BIC programme to work towards developing a world-class captive breeding facility, significantly elevating the infrastructure and facilities at the centre for the iguanas and visitors, creating enclosures which are fit for purpose, aesthetically pleasing and highly adaptable has given BIC the foundations to support the conservation efforts outlined in our new SSAP and become a local and regional level training hub for capacity building.

These changes meant after 31 years of conservation efforts, we continue to redefine success and 2020/21 breeding season has been the most successful ever recorded at the facility, setting a record for numbers of eggs laid and hatchling survival and supports a correlation between the improvements to the infrastructure, diet care and management of the iguanas.

(Pictures attached in separate email for Question 11).

Checklist for submission

	Check
Is the report less than 10MB? If so, please email to BCF-reports@niras.com putting the project number in the Subject line.	✓
Is your report more than 10MB? If so, please discuss with BCF-reports@niras.com about the best way to deliver the report, putting the project number in the Subject line.	✓
If you are submitting photos for publicity purposes, **do these meet the outlined requirements (see section 11)?**	✓
Have you included means of verification? You should not submit every project document, but the main outputs and a selection of the others would strengthen the report.	✓
Do you have hard copies of material you need 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. However, we would expect that most material will now be electronic.	✓
Have you involved your partners in preparation of the report and named the main contributors	✓
Have you completed the Project Expenditure table fully?	✓
Do not include claim forms or other communications with this report.	