CAYMAN TURTLE CENTRE
ISLAND WILDLIFE ENCOUNTER

2016 Annual Report Extracts regarding Conservation, Education & Research

Collated from:
ANNUAL REPORT
CAYMAN TURTLE FARM (1983) Ltd
for the year ended 30th June 2016

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Note:

This document contains extracts from the *Annual Report for Cayman Turtle Farm (1983) Ltd for the year ended 30th June 2016*. That 2016 Annual Report has been produced in compliance with the *Public Management & Finance Law* of the Cayman Islands. Under the official protocols the entire Report became a public document upon its presentation in the Legislative Assembly on 22nd February 2017.

FOREWORD FROM MANAGING DIRECTOR

Cayman Turtle Farm (1983) Ltd. is the official registered name of a Government Company that is 100% owned by the Governor in Cabinet of the Cayman Islands. This Company is comprised of several major functions:

- **Conservation, research and education:** It remains **the only institution of its kind in the world** where scientists and students can have access up-close and in person, to captive-bred sea turtles of the full range of ages and life-cycle stages.
- **Tourist attraction:** Cayman Turtle Centre's **conservation and education missions have the opportunity for very broad reach and impact** because the company's site is the most-visited single land-based attraction in the Cayman Islands. With over a quarter million visitors each year, it remains consistently popular with tourists arriving both by air and by cruise.
- **Sea turtle meat production:** Cayman Turtle Products' sea turtle husbandry provides a reliable source of high-quality turtle meat products, sold at affordable prices, to satisfy the continuing strong local culinary traditions. **This availability of farmed meat is proving to be a major contributor to keeping sea turtles in the wild around the Cayman Islands because of its impact in greatly reducing incentives to poach turtles.**
- Landlord: The Company is the landlord to a dolphin park which is another major tourist attraction on the island.

As an employer the Company has been particularly exemplary in its success in hiring and developing local people. Of an authorized headcount of 90 Full-Time Equivalents (FTE's), as at the financial year-end 30th June 2016 there were only three (3) employees on Work Permits.

Highlighting the high ratings of the guest experience that Cayman Turtle Centre provides, during the financial year ended 30th June 2016 the Company was awarded the TripAdvisor Certificate of Excellence 2016, repeating an achievement from the previous year 2015. Cayman Turtle Centre has also been awarded the distinction of Experts' Choice by TripExpert.

Cayman Turtle Farm (1983) Ltd has a strong strategic focus emphasizing further development of its activities in conservation, research and education. From 12th September 2016 the Company does business under two new and separate brand-names:

- **Cayman Turtle Centre: Island Wildlife Encounter** for its conservation, research, and tourist attraction lines of business; and
- **Cayman Turtle Products** for its turtle aquaculture production lines of business including turtle meat products and polished turtle shells.

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Following are extracts from the Annual Report 2016, focused on our Conservation, Research, Captive Breeding and Release programs.

EXTRACTS

- **Nature and Scope of Activities**

The major portion of the company's revenues is derived from the tourist attraction components of the business, as the site remains the most-visited land-based tourist attraction on the island.

The captive breeding activities involve the husbandry of marine turtles both for conservation and display purposes, as well as for the supply of farmed turtle meat to the resident population. **The Company remains the only such enterprise anywhere in the world to have achieved the second generation and beyond of sea turtles bred, laid, hatched and raised entirely in captivity.** The research activities also continue, with over 150 scientific papers having been published or presented over the years from 1971 shortly after the inception of our predecessor Mariculture Ltd., with two more papers submitted for peer review and publication during 2016; a number of research projects have been on-going during the financial year.

- **Activity: Conservation, Education and Research**

Our sea turtles at the Centre range in size from 6 ounces to over 500 pounds, apportioned among specifically designated tanks. Visitors are able to observe turtles in various stages of growth and development. The Company also exhibits indigenous and regional birds, fish, sharks, a crocodile, butterflies; the National Bird, the National Tree, the National Flower; and several other types of flora and fauna.

Guided tours, informational signage and park maps, and an informational video educate visitors on the life-cycle of sea turtles and various related conservation topics. In addition CTC hosts over two thousand students per year on various programs educating them about sea turtles and other conservation topics, while giving them the opportunity to interact in person with turtles and other wildlife.

The Company's major strategic thrust during the past year and continuing into the 2016-2017 fiscal period is developing, expanding and enhancing its activities in the fields of conservation, research, and education. Details of the Company's activities and achievements in these key functions are contained in

- "APPENDIX 4. Research and Conservation at Cayman Turtle Centre" which covers a broad range of activities and achievements in conservation, education and research, and
- "APPENDIX 5. CTC's Aviary Captive Breeding & Release Programs" which focuses on the CTC Aviary's captive breeding and release programs.

The conservation of sea turtles has been an overarching objective from the initial creation of the Company's predecessors in 1968, and turtle conservation remains the central focus at the heart of the Company's mission. The Company's other functions are vital means of supporting the aims and outcomes of that central objective and are best understood in that context.

- **Activity: Tourist Attraction**

Another key national role that the Company plays is providing a world-class tourist attraction. Cayman Turtle Centre: Island Wildlife Encounter remains the country's most-visited land-based

attraction site. By far the greatest portion of the Company's revenues comes from its "tourist attraction" lines of business: a combined total of 85% of our revenue.

As a tourist attraction, Cayman Turtle Centre offers two different types of admissions:

- Turtle Centre Exploration Tour - turtle exhibits zone only (excluding Turtle Lagoon)
- Turtle Adventure Tour - entire park

  - ***Turtle Centre Exploration Tour (turtle exhibits only)***

The "*Turtle Centre Exploration Tour (turtle exhibits only)*" admission gives visitors access to the following features and exhibits:

- The Green's Breeding Pond - The Breeding Pond is home to our green sea turtles which have matured and are at the age to start reproducing, which is usually at about 16 years of age. Green Sea turtles are the largest of the sea turtles and here guests will find a few weighing in at more than 500 pounds.
- Turtle Touch Tanks - Here guests will find yearling turtles swimming and playing. This zone includes the Turtle Touch Wading Pool where guests are allowed into the shallow pool where the young turtles are swimming. The interactive exhibit pools in this zone are supervised by a Lifeguard and/or a Security Guard, and under supervised instructions guests are allowed to touch or pick a juvenile turtle up for a photo or video.
- Smiley's Saltwater Lagoon – "Smiley" is a 9 foot hybrid (saltwater + freshwater) crocodile of the same species that in the mid to late 1500's gave our country the transliterated name "Caimanes".[1] "Smiley" has been trained to jump and put on a show during enrichment exercises and health observations at her feeding times.
- The Education Centre & Hatchery – Guests visiting the Education Centre can learn more about the turtles, in a short continuous-loop video playing in a mini theatre, in various static displays, on a computer provided for the purpose, and in various literatures in a library in the public access area. Guests can also view our turtle Hatchery where during breeding season (May – October) guests can witness new hatchlings making their way up through the sand of our incubation boxes specially designed and purpose-built to enable our scientific team to monitor selected clutches of eggs as they incubate, hatch, and make their way up through the sand column to the surface as they would do at the normal depth of a nest in the wild.[2]
- Schooner's Bar and Grill - an open-air bar and grill where diners can relax on a covered screened deck overlooking Turtle Lagoon. The menu boasts a selected range of Caribbean and international items to tease and please every palate. Guests can enjoy a tropical drink or select from the brands of the island's very own brewery - Caybrew.
- Toddler's Playground, a partially shaded safe dry play area for children 1 to 5 years old with swings, slides and playhouses. It is conveniently located between Schooner's Bar & Grill and our fresh-water Breakers Lagoon.
- Local artisans' booth, where we host local craftspeople from the community, offering local handcrafted items made mainly from silver thatch and jewellery made primarily from various local shells and seeds.

[1] Transliterated from the Taino language word meaning "crocodile", and pluralized by early Spanish explorers and cartographers.

[2] Our scientific team also uses these boxes to monitor the progress of the "control group" of siblings of the eggs assigned to our egg translocation program which places half of a selected clutch in a created nest on a wild beach to hatch and emerge into the sea, in our program of education and tourism outreach to selected tourist accommodation properties with suitable beaches.

- Splash Gift Shop – Our retail store has an attractive range of gifts and souvenirs, and also functions as the exit for both types of admissions. The product selection protocols emphasize locally-sourced products as much as possible, featuring a range of made-in-Cayman products including pepper jelly and other condiments, locally roasted coffees, soaps and lotions, jewellery using local materials such as black coral and the semiprecious stone Caymanite, artwork, Christmas ornaments and other types of giftware.

    - ***Turtle Adventure Tour (Entire Park)***

The "*Turtle Adventure Tour (Entire Park)*" admission gives guests access to all of the "*Exploration Tour*" features and in addition a unique opportunity to interact with island wildlife in aquatic and other features and exhibits:

- Turtle Lagoon - Swim in the lagoon with juvenile green sea turtles up to two years old, and enjoy this wonderful experience of observing them "up close and personal". It is supervised by a team of trained Lifeguards. There are also hundreds of colourful reef fish and little islands where our breeding peacocks and their offspring live. One of the islands houses our model lighthouse display.
- Predator Reef - Watch sharks, Great Barracuda, tarpons and other predators through the underwater or dry view panels, or from the bridge. On weekdays (Monday to Friday) at the 11:00 AM feeding time guests can view our marine animal programs team as they give a narration while hand-feeding our sharks and doing their health observations.
- Caribbean Free Flight Aviary - Caribbean birds, including our islands' **National Bird the Cayman Parrot** fly freely in this large aviary. The several different species include colourful nectar feeders, seed eaters, and pellet feeders especially the impressive Scarlet Ibis native to Trinidad and the White Ibis native to the Cayman Islands and other Caribbean islands. There are 10:00 AM to 3:00 PM daily bird hand-feeding opportunities for guests. Our experts are on-site during the feedings, to assist guests with the various types of feeding and to answer guests' questions about the various species in the sanctuary. This facility also incorporates our White Crowned Pigeon captive breeding and release program that has helped to replenish Cayman's population of this species (locally called "Bald Pate") that had been somewhat depleted over the years as a target for sport shooting. There is also a breeding pair of the indigenous parrots, the offspring of which are released annually after habituation to transition to wild food sources.
- Other exhibits showcase other wildlife such as the Agouti or "Cayman Rabbit", the Sister Islands Rock Iguana, and our Shoreline Nursery habitat complete with young mangroves, conch, juvenile fish, tube worms and other shallow-water flora and fauna.
- Butterfly Garden, a free-flight open-air habitat, hosts indigenous and migratory butterflies in the various stages of their life-cycle.
- Breaker's Lagoon is the largest fresh-water swimming pool in Cayman with two waterfalls and an underwater view of the predator tank. It is supervised by a team of trained Lifeguards.
- Turtle Twister Waterslide at the Breaker's Lagoon accommodates guests of a wide range of ages and features two loops for over 100 feet of sliding thrills and having a pumping capacity of some 600 gallons of rushing water per minute.
- Blue Hole Nature Trail - Stroll along this trail and view the beautiful nature that Cayman has to offer, including the **National Flower the Wild Banana Orchid**. The Wild Fig trees growing out of the Blue Hole cavern host the rare endemic Ghost Orchid, rescued by the National Trust from other locations and planted there for safety. The trail also hosts both native and

migratory butterflies, and various birds also frequently visit. This zone incorporates an original forest where several of Cayman's indigenous species of trees and bushes have been growing for hundreds of years. The Blue Hole itself is the name given to a cave that contains a natural pool in which scientists have discovered a rare endemic subspecies of the tiny aquatic Blind Cave Isopod[3] (a white crustacean related to shrimps). Cayman Turtle Centre's Blue Hole site has been found to be the only known habitat for this particular subspecies remaining anywhere on the planet.

- Cayman Street - Walk down this gravel street to view old Cayman architecture, featuring sand gardens and a variety of local garden trees, shrubs, and herbs such as "Fever Grass" (Lemon Grass) and "Cayman Mint". The various species of flora on display include the **National Tree the Silver Thatch**, which also grows in the landscaping of various other parts of the park. This tree was vital to the island's economy up to a generation or two ago, used in the local production and export of Cayman thatch rope that earned the reputation of being "the strongest natural fibre" that was in demand by mariners in Cayman and in other countries as it was much more resistant to usage in seawater than its counterparts back in the day before nylon and other synthetic fibres were invented to manufacture rot-resistant ropes. Silver Thatch is still important in the creation of various crafts by local artisans. The Cayman Mahogany, a hardwood that was used in past years in the islands' shipbuilding industry, is also featured in various areas of the park.

  - ***Sales Channels for Tours***

The admissions are sold as "tours" or "shore excursions" through various sales channels:

- The majority of visitors comprise "turtle farm" admissions sold as a key feature of island tours offered to cruise visitors by Independent Tour Operators (ITOs) whose customers are primarily cruise tourists.
- The Company sells tours directly to customers at full price at its Ticket Counter in the Reception building at the park entrance. The "*Turtle Adventure Tour (**Entire Park**)*" admission is available for online purchase through the Company's website www.turtle.ky at discount prices. There are also admission discounts available by association with various "partners" such as *Explore* magazine, Cayman Airways (upon presentation of a boarding pass), car rental companies (Andy's and Budget), concierge coupons, and certain taxis.
- During the year the Company introduced a second minibus providing free shuttle service for stay-over visitors, with pick-up and drop-off at various resorts in the Seven Mile Beach area.
- The Company sells wholesale to some cruise lines the equivalent of "*Turtle Adventure Tour (**Entire Park**)*" admissions including a guided tour. Those cruise lines in turn market them to their cruise passengers as shore excursions. These tours include ground transportation from and to the cruise terminal. In some cases these tours include a buffet lunch at the Company's on-site Schooner's Bar & Grill.

[3] Bass, D. "The Status of Four Aquatic Crustaceans from Grand Cayman, West Indies." *Living World*, Journal of The Trinidad and Tobago Field Naturalists' Club (2012): 77-78.

- **Activity: Sea Turtle Captive Breeding and Turtle Meat Production**

    - ***Product lines***

The Company is still the only aquaculture enterprise in the world that has achieved the second generation and beyond, of sea turtles bred, laid, hatched and raised in captivity in a closed cycle that takes no eggs or animals from the wild.

Several decades ago the farm assisted the US and Mexican authorities in captive breeding the very endangered Kemp's ridley sea turtles which replenished the wild population especially in the Gulf of Mexico. However the Company's primary breeding focus has been and remains on the Green sea turtle, having been the first aquaculture establishment anywhere to have succeeded in breeding sea turtles in captivity.

After the Company's predecessor had established the farm and its operations commencing in 1969, exports of sea turtle products of the families *Cheloniidae* and *Dermochelyidae* were added to Appendix I of the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) in 1977, which therefore banned commercial trade in such products between member nations. In light of that, the Company's predecessor ceased production of turtle oil, turtle shell jewellery and turtle leather products which together had been a significant source of revenue.

Since that time, product lines have been limited to meat products and polished whole turtle shells, all of which are **sold strictly for consumption and use within the Cayman Islands**, thereby remaining in strict compliance with the CITES convention.

During the fiscal year ended 30th June 2016 total turtle meat products sold was 71,735 pounds, an increase of 13.1% against the prior year. Income from turtle meat products comprised 8.7% of the Company's revenues.

Although turtle meat product revenues are a small percentage of the Company's income, the fact that the Company makes readily available, at affordable prices, a supply of captive-bred (farmed) sea turtle meat is one of the most impactful components of the Company's strategies to help conserve wild sea turtles. Further analysis of this impact is contained in Appendix 4, in a spreadsheet showing a hypothetical analysis of the conservation effect of turtle meat production.

In its Splash Gift Shop the Company sells polished cured whole turtle shells (carapaces) taken from turtles harvested for meat production, on strict documented condition that they must not be taken out of the Cayman Islands.

- **Activity: Landlord**

During the financial year ended 30th June 2016, this segment of the Company's business comprised a property lease to a dolphin park: Dolphin Discovery Ltd., and individual leases to tenants of four retail kiosks[4] in the courtyard area at the entrance to the park.

[4] The leases of those four retail kiosks in the courtyard area have subsequently ended, and the Company is in the process of converting and equipping them to become additional outlets for its retail gift shop and its food and beverage operations respectively.

These rental incomes totalled 3.1% of the Company's revenues.

- **Our People**

  - ***Personnel***

Being majority (100%) owned by the Governor in Cabinet, the Cayman Turtle Farm (1983) Ltd is classified as a Government Company and for HR matters we fall under relevant sections of:

- the Public Service Management Law (PSML) and its relevant Personnel Regulations;
- the Public Management and Finance Law (PMFL) and its relevant Financial Regulations;
- however although all our employees are Public Servants they are not Civil Servants, and therefore we also come under the Labour Law, and other related legislation which include the Immigration Law, the Health Insurance Law, and the National Pensions Law.

Consistent with the Company's marine-related themes in its cultural portrayals and tourist attraction functions, within the Company and in corporate communications its employees are typically referred to as "Crew Members".

  - ***Headcount***

As at 30th June 2016, the Company employs 92 persons some of which are part time. Together they comprise of 90 Full Time Equivalents (FTE).

  - ***Demographics of Immigration Status***

Of all these 92 employees, as at 30th June 2016 we have only 3 (three) employees on Work Permits.

This ratio of 97% (of locals) : **3% (of expatriates requiring Work Permits) is exemplary and particularly outstanding in our nation where consistently approximately half of the workforce on a national basis is non-Caymanian.** It demonstrates the results of years of dedicated efforts in our deliberate, determined strategy to hire and develop local people wherever possible, consistent with the Cayman Islands Government's *2015-2016 Strategic Policy Statement Broad Outcome 2: A Work-Ready and Globally Competitive Workforce*.

MANAGEMENT DISCUSSION AND ANALYSIS

- **Highlight of Achievements**

  - ***Huge Strides in Conservation***

In October 2015 the results of a Darwin Plus study conducted by the Department of Environment were published, revealing that by providing affordable captive-bred sea turtle meat, the Company has a huge positive conservation impact in the reduction of the likelihood of turtles being poached. **In Grand Cayman, Green turtle nest totals for 2011-2015 were 410% higher than the corresponding total for the 5-year period ten years earlier.**

In May 2016 after two years of painstaking sample collection, independent laboratory testing and assessment of the health of the Company's herd of turtles in comparison with the wild population, the Company resumed periodic turtle releases; and in June 2016 the Company

commenced an exciting new programme of translocating captive-bred eggs to hatch out and be released on beaches around the island. This program has huge potential for enhancing our tourism product by developing "turtle tourism", while also directly contributing additional numbers to the wild population of sea turtles.

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- ***TripAdvisor Certificate of Excellence***

Long recognised as the country's most-visited land-based tourist attraction site, during the previous financial year for the first time ever the Company won the (2015) TripAdvisor Certificate of Excellence. The Company achieved that same accolade in the 2016 TripAdvisor Certificate of Excellence, which is awarded solely upon unsolicited customer reviews and the ratings they attach to those reviews.

- **Summary Results of Key Ownership Agreement Strategic Goals & Objectives**

The full set of Strategic Goals and Objectives of the Company from an ownership perspective for the three financial years 2015/16 to 2017/18 are contained in the official document entitled "*BUDGET 2015/16 Ownership Agreement Between The Cabinet of the Cayman Islands Government and Cayman Turtle Farm (1983) Ltd*"[5]. The following analysis summarises achievements against key strategic objectives for the financial year ended 30th June 2016.

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Turtle Conservation & Culture

- *Contribute to the conservation of sea turtles in the wild around the Cayman Islands, and to sustaining local culinary traditions, by making available from self-sustaining closed-cycle farming a stock of green sea turtle meat for local consumption thus avoiding turtles being taken from the wild legally or illegally.*
    - *Production Rate: Maintain turtle meat products production capacity of at least 40,000 pounds per annum (equivalent to at least approx. 900 turtles per annum).*
        - Achieved.
        - Meat production total: 62,198 lbs
        - 1182 turtles processed.
- *Resume annual releases of turtles into the wild as soon as the following have been done:*
    - *Pre-release quarantine tests completed to confirm no significant risk of released turtles introducing diseases to the wild, and*
        - Achieved.

[5] Cayman Islands Government, comp. *Cayman Islands Government: Ownership Agreements: 2015/16.* (2015): 241-80. Legislative Assembly of the Cayman Islands. Web. 1 Jan. 2017. <http://www.legislativeassembly.ky/portal/pls/portal/docs/1/11946109.PDF>.

- **Turtle releases re-commenced in May 2016.**

  - *Data and sample collections completed on the Darwin Plus study on contribution of CTC-released turtles to the wild population around Grand Cayman.*

    - Achieved. This study[18] awaits completion by the authors (Project Leader Dr Janice Blumenthal of the DoE, et al) and subsequent publication.

- **SPS alignment:** These initiatives contribute to achievement of the Strategic Policy Statement of the Cayman Islands Government ***2015/16 SPS Broad Outcome 10: Conservation of our biological diversity and ecologically sustainable development;*** and more specifically ***Outcome 10(b): Contribute to the conservation of sea turtles in the wild around the Cayman Islands, by resuming annual releases of turtles as soon as the appropriate tests and sample collections are completed.***

Research & Education

- *Continue participation in research on sea turtles in-house and in collaboration with overseas researchers.*

  - Achieved.

  - In addition there have been many months of detailed discussions and communications with the University of Georgia exploring the potential for several future collaborative projects. That educational institution was founded in 1785, also referred to as UGA or simply Georgia, is "an American public Land-grant, Regional Sun Grant, National Sea Grant, and National Space Grant research university" whose primary location is Athens, Georgia, USA. It is "a flagship university that is ranked tied for 18th overall among all public national universities in the 2017 U.S. News & World Report rankings." The university is "classified in the highest ranking, 'R-1: Doctoral Universities – Highest Research Activity'", with "the Carnegie Classification of Institutions of Higher Education classifying the student body as 'More Selective,' its most selective admissions category. The university has been labelled one of the 'Public Ivies,' a publicly funded university considered to provide a quality of education comparable to those of the Ivy League."[6]

- *Host students from local and overseas schools, educating them on sea turtles and other island wildlife.*

  - *Host at least 2,000 students and chaperones per year.*

    - Achieved and exceeded.

    - Total 2,765 students for the fiscal year.

  - *Host interns where possible.*

[6] "University of Georgia." *Wikipedia*. Wikimedia Foundation, n.d. Web. 01 Jan. 2017. <https://en.wikipedia.org/wiki/University_of_Georgia>.

        - Achieved: two graduate interns were hosted during the year: one Caymanian, and one US national.

    - *Continue collaboration with St. Matthew's University School of Veterinary Medicine in hosting international veterinary students on the annual MARVET (Marine Veterinary Medicine)[7] workshops* http://www.marvet.org/workshops/focus/30

        - Achieved. The MARVET 2015 workshop took place 13th - 24th July 2015.

        - 30th September 2016 update: The MARVET 2016 workshop took place 1st – 16th August 2016.

- **SPS alignment:** These initiatives help overall to contribute to achievement of the Strategic Policy Statement of the Cayman Islands Government ***2015/16 SPS Broad Outcome 7: A centre of excellence in education***

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Employment

- *Recruitment practices to continue to prefer Caymanians or those with Permanent Residency with the Right to Work, minimizing the number of Work Permits required for the CTC workforce.*

    - *Target is to maintain less than 10% of employees on Work Permits.*

        - Achieved and target exceeded. **Only 3% of employees are on Work Permits**.

- **SPS alignment:** This contributes to developing local talent toward achievement of the Strategic Policy Statement of the Cayman Islands Government ***2015/16 SPS Broad Outcome 2: A work-ready and globally competitive workforce.***

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Reputational Risk:

There are various potential sources of reputational risk therefore the prime ones are discussed below along with our mitigating actions:

Reputational Risk Mitigation:

- Misunderstanding of the Company's role in turtle meat production, and lack of understanding as to why that is essential for sea turtle conservation in our country, subsequent to the financial year-end has been partially mitigated by the creation of a separate brand for those functions.

[7] MARVET (Marine Veterinary Medicine) is an educational program, hosted by St. Matthew's University (SMU) School of Veterinary Medicine on Grand Cayman, which offers courses in marine animal medicine for veterinary students and veterinarians who would like to become more acquainted with the expanding field of marine animal health and conservation medicine. Instructors include internationally recognized experts from the frontlines of marine animal health, welfare and conservation in a global context; they represent a diverse range of facilities and organizations, including oceanaria, aquaria, zoological parks, rehabilitation units, wildlife organizations and SMU and other universities.

- *"Cayman Turtle Products"*, the new brand applied for that purpose, was launched mid-September 2016 and will hereafter be the identity under which those aspects of our operations are conducted.

- Complementary to that change, the Company's functions as a tourist attraction and as a leading centre for sea turtle conservation, education and research have now been placed under a new brand *"Cayman Turtle Centre"*.

  - *Note:* For ease of transition and to retain customer and industry partner familiarity with those elements of our business, we have retained the same logo style and image but we no longer use the brandname *"Cayman Turtle Farm"* so as to differentiate the new identity as distinct from the aquaculture commercial "farming" aspects that are now identified under the Cayman Turtle Products brand.
- To complete the transition to identities that will go a long way toward avoid the risks of misunderstanding the Company's role and fundamental purposes, the Board of Directors has resolved that the official registered name of the Government Company *"Cayman Turtle Farm (1983) Ltd."*, should be changed to *"Cayman Turtle Conservation and Education Centre Ltd."*, and also to amend the Company's Memorandum of Association to reflect the Company's remit in the objectives of conservation, education and research. Those proposals have been presented to the Cabinet which has exercised its powers as Shareholder of the Company to approve those important corporate changes so that they will be officially registered shortly.

- <u>In the past there arose the reputational risk of Special-Interest groups attacking the Company's reputation especially with accusations of animal welfare violations and related allegations</u>. Those risks have now been mitigated by the commencement and continuation of periodic assessments by the Animal Welfare Unit of the Department of Agriculture. That Unit is the constitutional authority for animal welfare matters in the Cayman Islands, and their expert team has to this point already conducted three periodic assessments of the Company's operations in respect of animal welfare matters.

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APPENDIX 4. Research and Conservation at Cayman Turtle Centre

Our turtles in the company's captive breeding program range in size from 6 ounces to over 500 pounds, apportioned among specifically designated tanks. Researchers and visitors are able to observe turtles in various stages of growth and development.

- ***Turtle Conservation and Captive Breeding***

The Cayman Turtle Centre represents both a unique wildlife-conservation project and a commercial-breeding enterprise.

Housed, in a sense, under the same roof, the two functions at times appear contradictory, which is unfortunately where some misunderstandings and controversies arise. From the inception of Cayman Turtle Centre's predecessor companies, however, the philosophy of "conservation through commercialization" thereby giving the species a realizable value, has been both inherent and explicit. Indeed at the outset of the captive breeding initiative, green sea turtles were given the title "the buffalo of the sea."

Furthermore the commercial availability of captive-bred sea turtle meat has resulted in strong and very effective means of curtailing sea turtle poaching, thereby protecting the wild sea turtles. "Buffalo" (North American bison) farming is a very apt analogy. Cayman Turtle Products makes available to turtle meat consumers within the Cayman Islands a legal source of captive-bred, farmed sea turtle meat. The Green sea turtle captive breeding program **takes no animals nor eggs from the wild** and in so doing, in our country there is a much lower number of turtles taken from the wild than would be the case if the company were not providing the legal captive-bred turtle meat products.

While cultural norms vary geographically, few observers nowadays would argue against the clear evidence that buffalo (North American bison) farming has been hugely helpful in conserving this species and expanding its natural range and population.

One could choose almost any commonly farmed animal; a similar logic emerges. Indeed an article[8] in Drovers Cattle Network of 4th September 2013 underscores the necessity of farming to achieve the aim of *"protecting wild food animals from extinction."*

The protection of free-ranging animals from harvest or poaching is compatible with conservation of a species, and **the reality of this is clearly obvious provided observers will approach the matter without geopolitical or cultural bias and with a determination to be intellectually honest.**

Published data have shown that the sale of turtle meat has a significant positive conservation impact[9] because it greatly reduces poaching in the wild, which is often otherwise difficult to control, both in terms of numbers and indiscriminate in terms of age, sex and species.

[8] Murphy, Dan. "Commentary: Farmed Food Fallacy." *Cattle Network*. Farm Journal, Inc., 04 Sept. 2013. Web. 1 Jan. 2017. <http://www.cattlenetwork.com/cattle-news/Commentary-Farmed-food-fallacy-222358171.html?page=3>

Persons who have been visiting the Cayman Islands since the early days of scuba diving have mentioned that the chance of seeing a turtle on a dive here has improved significantly through the years. The increased numbers of turtles sighted aren't just those released from Cayman Turtle Centre; many sea turtles are in our waters today because over the years there has been a much reduced incidence of various species of turtles being caught and taken from the sea around our islands. The incentives for poaching have diminished considerably because Cayman Turtle Centre has made a legal source of captive-bred turtle meat available locally, at a reasonable price, and is sustained without the need to take any eggs or turtles from the wild. Since the farmed meat also supplies demand in Cayman Brac and occasional demand in Little Cayman, the conservation benefits also have a positive impact on the Sister Islands' wild turtle populations due to the same factors.

This vital importance of fulfilling the cultural norms for Caymanians through captive-produced and not poached turtles has now been indubitably revealed by the implications of a socioeconomics study[9] conducted by the Cayman Islands Department of Environment (DoE) funded as a "Darwin Plus" initiative by the Department for Environment, Food & Rural Affairs (DEFRA) of the United Kingdom government, and with the survey and analysis led by an expert in this specialty who the DoE recruited through the University of Exeter in the UK. Among the study's key findings[10] were:

- **30% of all residents and 62% of Caymanians by descent**, i.e., having a Caymanian grandparent, **consumed turtle meat at least once in the last year**. Key reasons given for eating turtle include taste, tradition and culture, and celebrating special occasions.
- The study found inconclusive evidence of age-related differences in turtle consumption among residents, suggesting that this behaviour is not expected to "die out" in the near future.
- When comparing current (i.e. during last year) and desired frequency of turtle meals among consumers, approximately 55% would maintain the same consumption level, 44% would like to have turtle more often, and 1% would decrease their consumption. For those that would like to eat turtle more often, restrictions mentioned by the respondents were related to price and availability. Based on the estimated 2.5 individual servings per pound of turtle meat cooked at home (information obtained in this study), an additional 31,000 lbs of turtle meat per year would be needed to meet desired consumption levels, suggesting that demand by residents is currently not being fully met. This would represent an increase of more than 50% compared to the current level of sales reported by the company in 2014. Please note this does not take price and availability into account (i.e. respondents were reporting "ideal" scenarios while ignoring potential restrictions). When compared to how often they used to eat turtle 5 years ago, 45% of the consumers reported eating less frequently now, 11% eat more frequently now and 44% kept similar frequency levels.

[9] Nuno, A., Godley, B.J. & Broderick, A.C. (2015). *Socio-economic aspects of turtle conservation in the Cayman Islands – Key results report.* University of Exeter. 38 pp. <http://www.doe.ky/wp-content/uploads/2015/04/Cayman-key-findings-report.pdf>

[10] Nuno, A., "Socio-economic aspects of turtle conservation in the Cayman Islands – Key results report", *Cayman Islands Department of Environment* (2015): 16
and
Key results report *Cayman Islands Department of Environment RSS.* N.p., n.d. Web. 27 Sept. 2016 15–17

- Findings suggest that around 38,000 – 95,900 turtle meals had been consumed in restaurants during the year studied.
- In part due to the availability of captive reared turtle meat, **no legal take of sea turtles has been recorded since 2008**.
- According to respondents' answers to a direct question about buying wild turtle during the 12 months previous to the study, 2% of all resident households bought meat of turtles illegally. 16.1% of consumers reported preferring wild turtle, with the remaining 83.9% preferring farmed meat or having a relatively neutral preference.
- **Alarmingly, 46.8% of existing consumers** self-reported being **more likely to be interested in purchasing illegally poached turtle meat in case of a closure of CTP.**
- This socioeconomics research also revealed that the age demographics of consumption and demand for turtle meat show clearly that this demand shows no signs of diminishing any time in the foreseeable future.
- The calculation revealing the order of magnitude of these realities is shown in the Hypothetical Analysis at the end of this Appendix. In summary, the Company's turtle meat production yields the numerical equivalent of leaving in the seas **approximately 18 adult breeding-size wild turtles per month;** comparing that to the estimated typical population of adult breeding green sea turtles in the Cayman Islands in recent breeding seasons, **in the absence of the Company's turtle meat production the projected take rate from the wild would remove all of those turtles from the seas around the Cayman Islands within approximately three months, as analysed on p.27. That is the stark reality of the need for the Company to continue turtle meat production to keep up with the culturally driven demand for this product within the Cayman Islands.**

Our unique management programs addressing the breeding, nesting, hatching, and raising of sea turtles has provided for better understanding and care for the turtles, their life cycle and their environment in the wild or in captivity. This knowledge has been, and continues to be shared with the national and international scientific community through several channels of outreach:

- *Publication or presentation of scientific papers:* Our website lists[11] over 150 of such papers that are available to the scientists and other interested persons involved in caring for sea turtles around the world.
- *On-site research by external institutions:* By allowing access, under specified conditions, to credentialed experts from various institutions, our Company enables those experts to gain knowledge about various practical aspects of caring for sea turtles at their various life stages in various circumstances. For example a recent project conducted by a team from such a specialist institution studied the best and safest method of attachment and configuration of acoustical tracking tags to hatchling turtles so that in turn, scientists will be able to obtain better and clearer understanding of the behavior of leatherback turtles emerging into the sea from beaches in various countries where this species still nests.
- *On-site research by our own scientists:* Our Veterinarian and our Chief Research Officer conduct various studies on our turtles and their eggs, and in some cases those studies are developed into full scientific papers which are offered to scientific journals for peer-reviewed publication thereby expanding the body of knowledge available to the world.

[11] "Scientific Papers." *Cayman Turtle Centre*. Cayman Turtle Centre, n.d. Web. 1 Jan. 2017. <https://www.turtle.ky/research-conservation/scientific-paper/>.

- *Collaborative research with various institutions:* During this year in particular, in addition to various liaisons with other institutions the Company conducted a lot of research work and collaboration with the University of Georgia as mentioned on p.19 and p.12.
- *Education and Training of other sea turtle experts and other students on-site:* The Company's scientific team trains sea turtle experts, other biologists, and a large number of other students in the science and techniques of sea turtle care and husbandry. Thus through our various channels of knowledge transfer we are able to provide invaluable and effective assistance to the conservation and management of various sea turtle species, not just green sea turtles.
    - Each year the Company collaborates with the St. Matthew's University School of Veterinary Medicine which offers **the *MarVet* program**[12] teaching marine animal health and conservation medicine. Our collaboration enables graduate veterinarians to be given closely supervised practical instruction in how to safely and effectively handle, examine and treat marine species including these unique opportunities with live sea turtles.
    - We host **scientific interns**, typically for periods of six months to a year. During the past financial year we had two graduate scientific interns working in our team, one from the USA and another from the Cayman Islands. By doing so they were engaged full-time in scientific projects that expanded their understanding of turtles at their various life stages, while enabling them to progress in their academic and career development pursuits.
    - We also train **biologists** from other nations that come to us to learn about various aspects in which we have developed expertise that is unique. For example, three of the leading biologists within the national authority of a Caribbean island nation in which leatherback turtle nesting is occurring, were on our site for two weeks being trained in the methods, techniques and key success factors to safely translocate turtle eggs when it is necessary to do such interventions for various reasons.
    - Our Curator – Terrestrial Animal Programs & Education provides **age-appropriate lectures, demonstrations, and other forms of education to the full range of ages of students** from pre-school to university and post-graduate level, primarily on our turtles but also on our other types of wildlife. Each year we reach over 2,500 students through these programs, thereby spreading the message of conservation and stimulating the desire for these students to pursue further learning and research on these important topics.
    - In addition, every guest on our tours hears as part of the narration, messages encouraging them toward greater awareness and actions beneficial to conservation of turtles and other wildlife.

    - ***Releasing head-started captive-bred turtles***

Cayman Turtle Centre (and its predecessor companies) has placed more than 31,000 endangered green sea turtles into the wild since its 1968 founding. Some of those numbers were hatchlings and others were yearlings. During the 2012-2013 financial year, a total of 163 turtles were released into the wild, and quarantine facilities were expanded to enable a greater number of turtles to be quarantined and released annually.

[12] Miller, Tom. *"Veterinary School MARVET."* St. Matthew's University, Grand Cayman, n.d. Web. 29 Sept. 2016. <https://www.stmatthews.edu/veterinary-school-marvet>
and
Marvet's Workshops. MARVET Marine Veterinary Medicine, n.d. Web. 01 Jan. 2017. <http://www.marvet.org/workshops/focus/33>.

Quarantine protocols have been expanded to include laboratory testing to confirm that turtles to be released do not have abnormality that would pose a risk of introducing diseases to the wild population. This testing required establishment of relationships and protocols with a laboratory overseas that has the equipment and competence to conduct these tests reliably. In 2013 the Company suspended the turtle release programme until such time as those arrangements were put in place, functioning and yielding positive results. In light of the Company's self-imposed suspension of the turtle release programme, there were no turtle releases from 2013 through to the beginning of 2016. Such arrangements however are now in place with a laboratory at the University of Georgia. Through developing expanded pre-release evaluation protocols and a more thorough understanding of the diseases that occur in wild turtles, on 2016-May-15 the Company has recommenced its head-started turtle release program which has been proven to make major contributions to the populations of sea turtles around the Cayman Islands.

After reaching maturity, which in the wild takes 20 years or more, nesting females seek to lay their eggs on the same beach - or as close as they can come - from which they originally left to enter the sea. Green sea turtle females that had been released from Cayman Turtle Centre decades ago, have now begun to nest on the island's beaches. There was a period during the 1980's when Cayman Turtle Centre's predecessor company marked each released hatchling with a "living tag" grafted from its plastron (the cream-coloured underside of the turtle body) onto its carapace (the dark-coloured shell on its back) that resulted in a light-coloured spot in a particular position on the carapace as it continued to develop and mature. The scientific study of this return of these marked turtles was first published in 2005.[13] Because trained spotters do not see all the nesting females, however, it is uncertain how many of the nests are from turtles that started life at Cayman Turtle Centre. It is perfectly reasonable, though, to assume that as more of the turtles that were released years ago eventually reach nesting age, many more will eventually return to Cayman waters to breed and to nest on Cayman's beaches. Furthermore, the research revealed clear evidence that the head-started turtles we have released from our captive-breeding program at Cayman Turtle Centre have contributed to the sea turtle populations in Cuba, Nicaragua, Honduras, USA, Belize, Panama, Mexico, and Venezuela.[14]

Data from the Cayman Islands Department of Environment starting from as far back as 1998 show that over the past decade there has been an upward trend in the number of sea turtles nesting in Grand Cayman, with the greatest numbers typically being in Green sea turtle nests. Given that other factors that would have influenced the re-establishment of breeding populations of green sea turtles in Grand Cayman are also present in Little Cayman and Cayman Brac, the following graph in Figure 1 provides clear evidence of the positive impact and effectiveness of head-starting programs in restoring populations of sea turtles.

This data refutes historical ill-informed assumptions or misinterpretations amongst certain entities in the international community of turtle conservationists that assert that headstarting is "an inappropriate conservation technique for marine turtles".[15] In the Cayman Islands we now

[13] Bell, Catherine D.l., Joe Parsons, Timothy Austin J., Annette Broderick C., Gina Ebanks-Petrie, and Brendan Godley J. "Some of Them Came Home: The Cayman Turtle Farm Headstarting Project for the Green Turtle Chelonia Mydas." *Oryx* 39.02 (2005): 137-48. Web.
[14] Ibid., pp140-141.
[15] For one such example of unhelpful anachronism, see the notes on Kemp's Ridley turtles, on the webpage:

have the benefit of decades of real-world experience and clear evidence that reveals the truth about the positive results of these programs over the longer term.

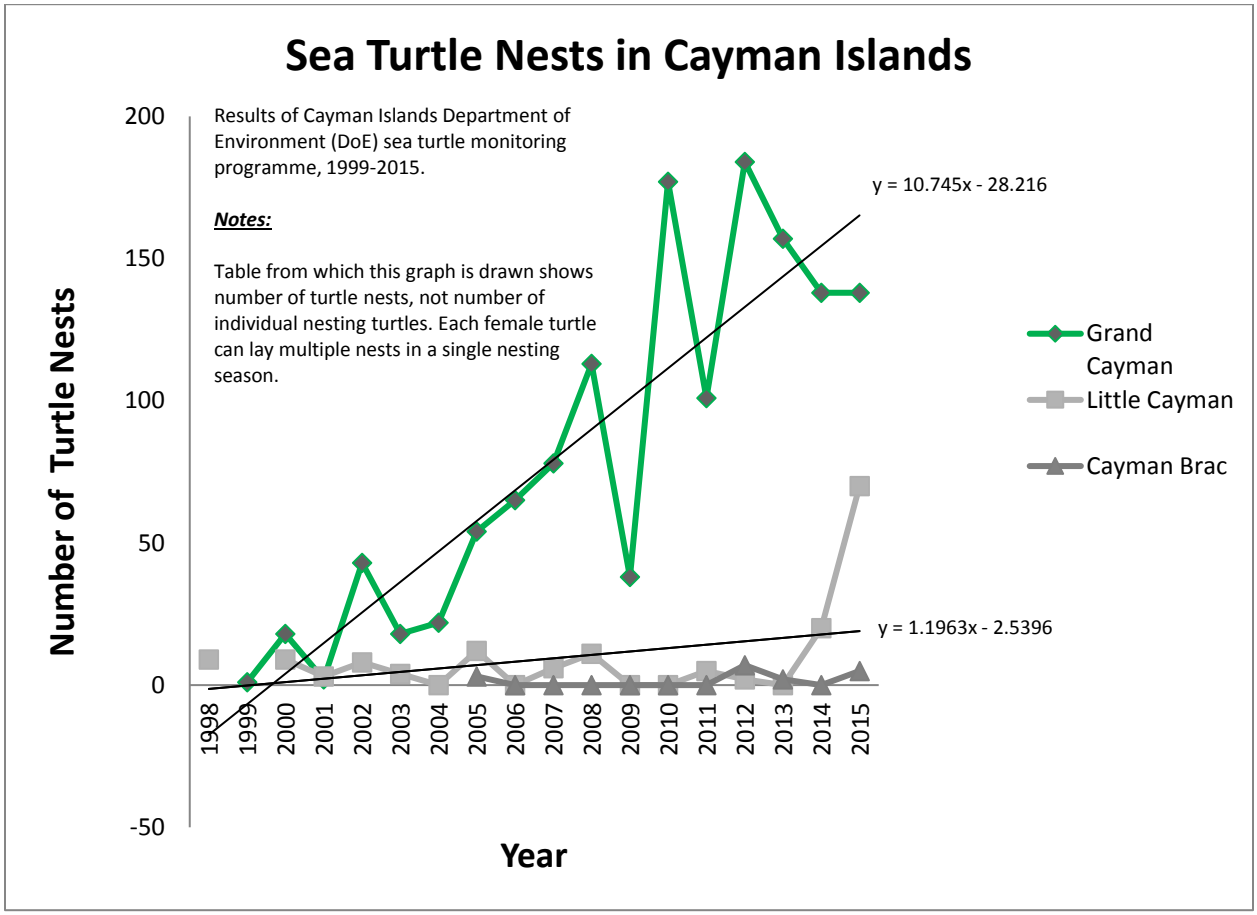

Figure 1 Number of Green Sea Turtle Nests each year – Cayman Islands[16]

Florida Fish and Wildlife Conservation Commission (FWC). *Species of Sea Turtles Found in Florida*. State of Florida, n.d. Web. 29 Sept. 2016. <http://www.myfwc.com/research/wildlife/sea-turtles/florida/species/>.

[16] Access to this data is provided in accordance with the terms of the Freedom of Information Law. Data ownership remains with DoE and data should be used and acknowledged accordingly.

The numbers of turtle nests of each of the species recorded in each of the Cayman Islands each year are shown in the graphs below.

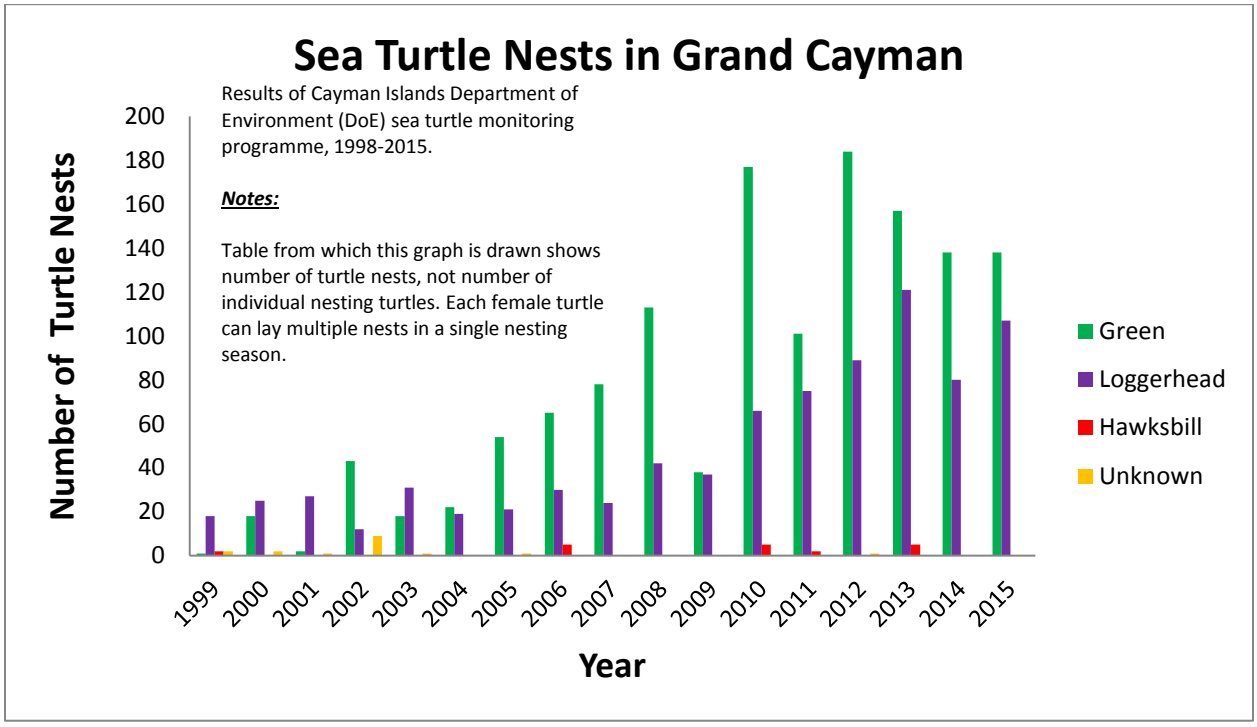

Figure 2 Number of Turtle Nests each year – Grand Cayman[16]

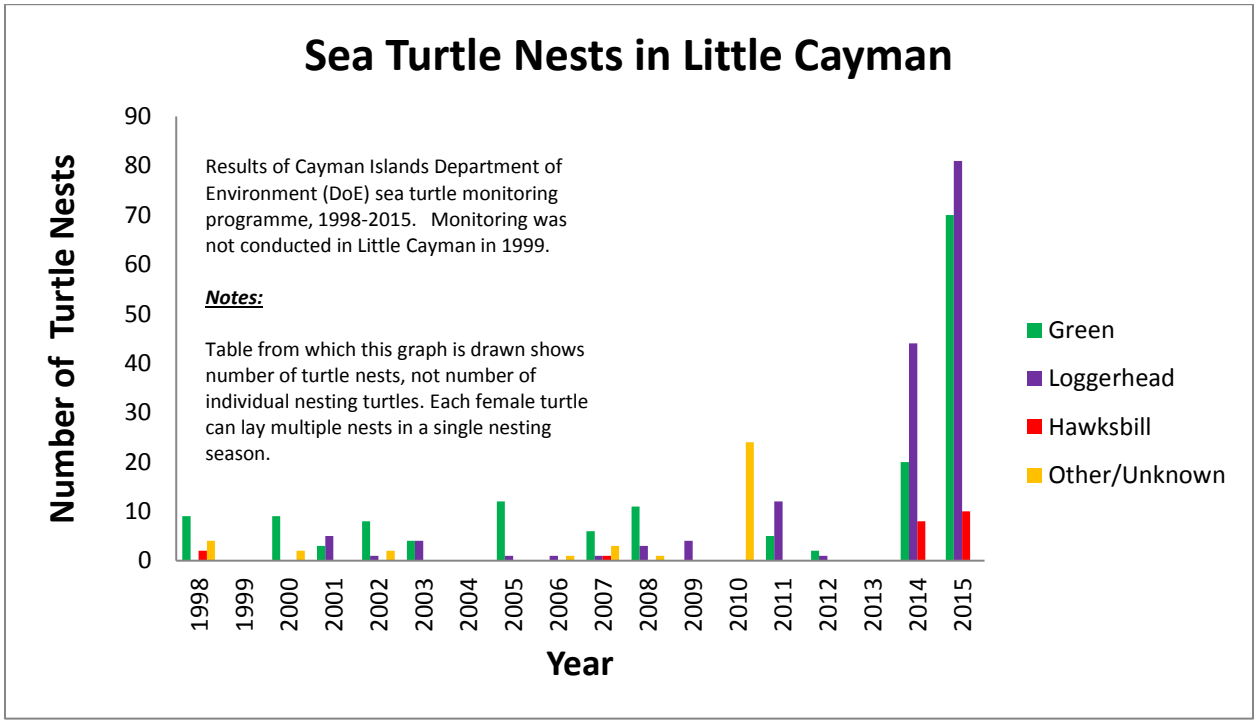

Figure 3 Number of Turtle Nests each year – Little Cayman[16]

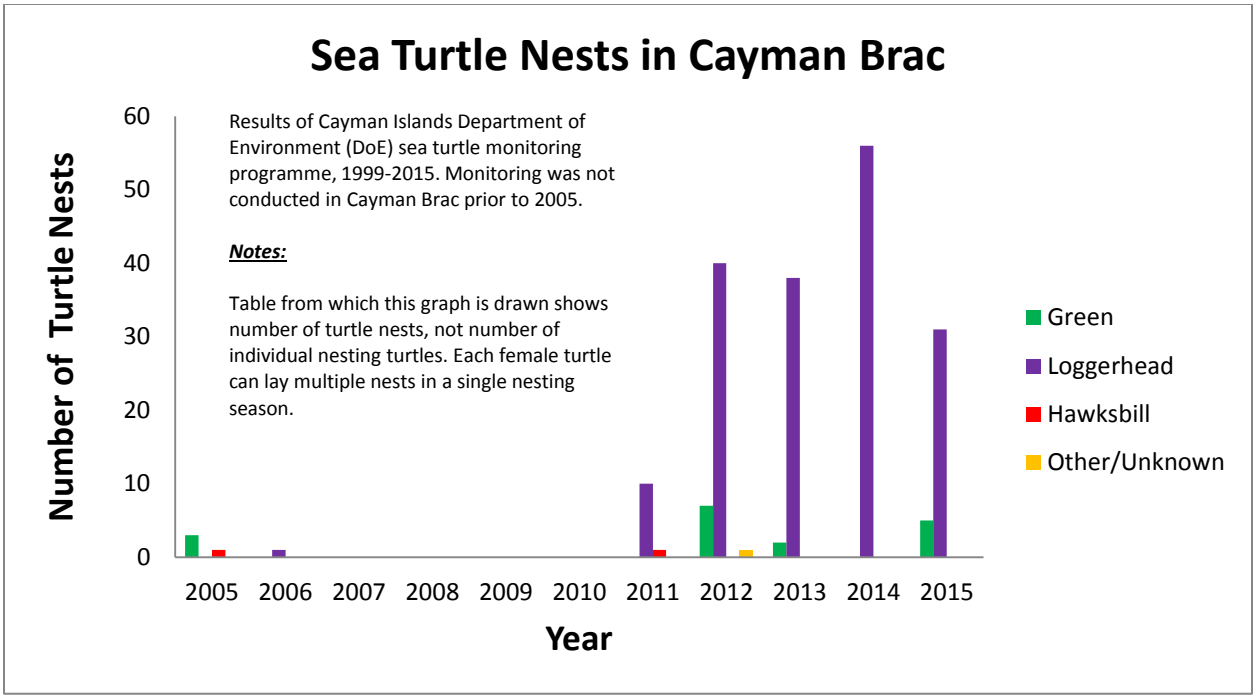

Figure 4 Number of Turtle Nests each year –Cayman Brac[16]

During the 2013 nesting season in Grand Cayman, Department of Environment spotters saw seven (7) newly identified living-tagged turtles (in addition to those previously identified as returning to nest) that had been released from CTF in the 1980's.

The Cayman Islands Department of Environment has earlier this year concluded two years of data collection for "Output 2" of a research project[17] funded by the Darwin Plus initiative of the UK, of which one of the primary aims is to evaluate by DNA analysis and other evidence the extent that turtles released from Cayman Turtle Centre have contributed to the current wild turtle population around the Cayman Islands.

The results of "Output 1" of the project, relating to the socioeconomics of turtle meat consumption, have already been published on the web[10] and presented in the Cayman Islands. The results of "Output 2" of this multi-year project[18], relating to the wild turtle population and the contribution of the Company's captive-bred turtle releases, are expected to be published shortly however the results of "Output 2" of the project have not yet been made available to the Company at the date this Annual Report was prepared.

The **remarkable difference in the trendlines for sea turtle nests in <u>Grand Cayman</u> compared with Little Cayman** reveals that there must have been some very different factor enabling the much more rapid nest number increase in Grand Cayman[19], in turn revealing a much higher

[17] Official documentation of this project taken from the *Darwin Plus: Overseas Territories Environment and Climate Fund - Annual Report*: Project Ref Number: DPLUS019. Project Title: *Socioeconomic aspects of turtle conservation in the Cayman Islands*. Contract Holder Institution: Cayman Islands Department of Environment (DoE). Partner Institutions: University of Exeter. {Note: The Annual Report for this project also lists University of Barcelona as being involved especially in respect of the elements identified in "Output 2".}

[18] Blumenthal, Janice, Ana Nuno, Gina Ebanks-Petrie, Timothy Austin, Brendan Godley, and Annette Broderick. *DPLUS019*. *Darwin Plus: Overseas Territories Environment and Climate Fund Annual Report*. N.p., n.d. Web. 1 Jan. 2017. <http://www.darwininitiative.org.uk/documents/DPLUS019/23485/DPLUS019%20AR1%20-%20Edited.pdf>.

[19] The trendline formulae reveal an average increase of approximately 10.7 nests per annum in Grand Cayman compared against the average increase in Little Cayman being less than 1.2 per annum.

growth rate in the numbers of the adult Green turtle population for Grand Cayman. **One major difference is that our Company's turtle releases over the years to date have all been from beaches in <u>Grand Cayman</u>.**

Even from as far back as 2005 however, there has been clear evidence produced by peer-reviewed scientific researchers proving that Cayman Turtle Centre's releases of head-started captive-bred turtles has a definite positive effect on sea turtle populations around the Cayman Islands, Cuba, and several other countries across the wider Caribbean region.[20] Therefore the evidence of DoE's turtle nest monitoring from 1998 onward to date, as summarized in the graphs of sea turtle nesting data in the Cayman Islands, reinforce the clear evidence that those researchers had previously found and presented in 2005 that the turtles Cayman Turtle Centre and its predecessors released over the years not only adapt to survive and thrive in the wild, but the nesting data also support the cited research showing that those released turtles are making significant contributions to the turtle populations around Grand Cayman.

- ***<u>Captive-bred Turtle Egg Translocations</u>***

Given the huge success in increasing the number of green sea turtle eggs that we are now able to produce annually in our captive breeding program at Cayman Turtle Centre, commencing **in 2016-Jun the Company launched its first-ever program of translocating our captive-bred turtle eggs to hatch out onto wild beaches**. We do this in collaboration with tourist accommodation properties in order to fully involve visitors in the ecotourism oriented conservation of sea turtle populations in the wild.

"Turtle Tourism" has been successfully developed in other countries including some other tourist destinations within the Caribbean region, so CTC has now achieved the position to enable the Cayman Islands to emerge as an innovative leader in this important sub-sector[21] of the eco-tourism industry.

In our egg translocation "beach nest creation" program:

- We survey the beach areas near tourist accommodation properties to determine which are amenable for sea turtle nests, and which are likely to remain suitable for sea turtle nesting for decades ahead so that when the hatchlings grow into breeding adults, they will be returning to beaches where the females will be able to successfully lay their eggs.
- We want to ensure that this program is beneficial to all concerned.
- We meet to discuss the program in advance with the tourist accommodation management to confirm that they will welcome the project, that they will assist with relevant facilities to enable the project to work smoothly and safely, and that they will spread the word to their guests so that we will be able to use the opportunity to spread the sea turtle conservation messages while engaging the guests in watching the nests and also assisting on the night of the hatchlings emerging on top of the sand and making their way into the sea.
- We select a clutch from one our known reliable female breeders that are laying eggs on the beach at our Breeding Pond. We randomly divide the selected clutch in two containers

[20] Bell, Catherine D.l., Joe Parsons, Timothy J. Austin, Annette C. Broderick, Gina Ebanks-Petrie, and Brendan J. Godley. "Some of Them Came Home: The Cayman Turtle Farm Headstarting Project for the Green Turtle Chelonia Mydas." *Oryx* 39.02 (2005): 137-48. Web.

[21] "Why Sea Turtle Eco-Tourism." WIDECAST - Wider Caribbean Sea Turtle Conservation Network, n.d. Web. 29 Sept. 2016. <http://www.widecast.org/TurtleWatch/Why.html>.

immediately after the clutch is laid and the retrieved eggs are moved into our Hatchery from our beach.

- We incubate the eggs in our Hatchery until at least day 50 after the date they were laid.
- Between day 50 and day 55, we dig a nest on the wild beach to the same depth and position above high tide that emulates a natural nest within the physical parameters that a female green sea turtle breeder would have followed in the wild.
- By monitoring the Control group in our hatchery, we can make good estimations as to the emergence date on the wild beach. When we estimate the emergence date is approximately three days out, we start all-night nest watches with trained spotters (typically our Lifeguards or in some cases interns) who are given special instruction and equipment for these tasks.
- Typically on the early evening of the night that the hatchlings are going to emerge, from one to as many as half a dozen of the hatchlings will raise the tips of their heads above the sand surface to peek while they wait for their chosen time to emerge. They sometimes remain in that position for hours, until the moment when as an entire group of siblings they initiate their climb-out from the sand and their rapid walk down the beach and into the sea. Once they begin that activity, typically all of the hatchlings that emerge will do so within just a few minutes of each other.
- Once the hatchlings make it to the water and imprint on the beach, once they have done all that they would have imprinted the various markers so as to have stored the various parameters in their memory to come back to the same beach area as breeding adults, we carefully catch up to half of them in a net and collect them to transport them back to our rearing tanks. We then raise those up to become head-started yearlings, so that in 12 months' time after their emergence on the beach we will take them back to the same beach in front of the same tourist accommodation property to be released into the wild with a much higher chance of survival than their siblings who began their swim as tiny hatchlings on the night they emerged from their nest.
- These events have proven immensely popular with eco-tourists, as well as with some residents, who become aware of the program when they spot the infrastructure we place on the beach to help protect the nest and to help ensure that the hatchlings make it safely to water when they eventually emerge.
- We use the infrastructure to place interpretive signage which informs the public about various aspects of sea turtles, their nests, important rules for persons observing the emergence event, and key actions that members of the public can take to help turtle conservation not only in Cayman but in coastal regions around the world Collaborative Research Projects

The turtle release programs and the egg translocation projects are important parts of our company's contribution to conservation, however our positive impact extends even further beyond that.

Another very important contribution has been Cayman Turtle Centre's research efforts, producing approximately 150 scientific papers that have been published or presented since 1968. These papers have surveyed a range of topics regarding the care, husbandry and life of sea turtles. Links to acquire those papers are provided on our website[22].

[22] Ref: http://www.turtle.ky/scientific-paper

During the previous financial year a study in collaboration with a US university was concluded and accepted for publication[23]. Toward the end of the fiscal year 2014-2015, a Purdue University Graduate student began a 6-month research program at the Cayman Turtle Centre collecting data in support of her Master's thesis. She investigated the effects of temperature and sand water content on hatching success and hatchling fitness of Green Sea turtles and has since completed her thesis.

In addition, Cayman Turtle Centre collaborated closely with researchers with the Department of Environment on two Darwin Plus research projects funded by the UK's Department of Environment, Food and Rural Affairs, one of which focuses on the socio-economics of the local supply and demand for turtle meat in the Cayman Islands, and the other aims to quantify the extent of the contribution to the wild Green Sea turtle population around Cayman from turtles that Cayman Turtle Centre released in prior years.

During the financial year a research paper was submitted for peer review, another paper is in preparation, and another was presented at a conference. Once these are published their titles will be posted on our website together with the other scientific papers[11].

- ***Education on nature and conservation***

A key part of Cayman Turtle Centre's remit is education and research on sea turtles and other island wildlife. Our Educational Programmes take place year-round catering to schools, vacation camps, as well as other local and overseas visiting groups. Educational visitations peak in the spring and lead-up to summer vacation.

Each year, Cayman Turtle Centre hosts over 2,500 school students ranging from pre-school to university level, from both local and overseas educational institutions. Educational tours are usually led by our Curator – Terrestrial Animal Programs & Education Mr. Geddes Hislop.

In the year ended 30th June 2016, more than 2,765 school children and their teachers/ chaperones visited the park for education and recreation. Over 2130 visited between 1st January 2016 and 30th June 2016, and approximately 1,411 of those partook in CTC's annual End of Term special promotion offered to schools during the month of June 2016. Also during the 2015/2016 school year, three senior high school student interns gained work experience with Marine & Terrestrial departments four (4) days a week under Cayman Turtle Centre's annual Work Experience partnership programme with CIFEC.

- ***Egg Production and Hatch rates***

The percentage hatch rate of the turtle eggs, and the egg production rate per 100 female breeders, had been gradually declining such that by around 2007-2008 there were roughly 8 thousand turtle eggs laid at Cayman Turtle Centre each season. Research in recent years indicated the most likely reasons were related to nutritional factors of the breeders. After careful study of previous scientific papers on green sea turtle nutrition, additional work by an interning

[23] Bjorndal, K. A., Parsons, J., Mustin, W.G., and Bolten, A. B. *Variation in age and size at sexual maturity in Kemp's ridley sea turtles*. Endangered Species Research, Ms. No. 201402008 (2014).

newly graduated veterinarian in 2010, and detailed research by our Chief Research Officer, a new feed formula for the breeders and new food handling procedures were developed.

By the end of the 2015 nesting season, over 106 different breeding female turtles at Cayman Turtle Centre had laid 38,493 eggs in 476 nests on our beach. The eggs were collected by our trained staff and transferred to our hatchery to be incubated in a controlled environment.

As we approach the end of the 2016 nesting season, counting the new hatchlings Cayman Turtle Centre presently has a herd of over 10,000 turtles.

- **Hypothetical Analysis: Conservation Effect of Turtle Meat Production**

Source	***Item***	
Turtles processed for meat	*Annual Demand for Turtle Meat:* (No. of 4-5y/o Captive-Bred Turtles Processed)	1,182
CTP standard procedures	*Typical live weight of each Captive-Bred Turtle processed:* (lbs)	100
(Anecdotal estimate)	Average live weight of adult Green Turtle poached: (lbs)	250
	Equivalent if poached to meet 100% of current demand: (No. of wild adult Green Turtles that would be poached per annum to meet 100% of current demand)	473
DoE Darwin Plus "*… Turtle Meat Consumption*" project summary (p.31)	"**X**" = *Share of current "legal" turtle meat consumers who would consume illegal meat if farmed meat were not available:* (%)	46.8%
	Annual average of wild adult Green Turtles that would be poached to satisfy "**X**": (No. of wild adult Green Turtles p.a.)	221
	Monthly average of wild adult Green Turtles that would be poached to satisfy "**X**": (No. of wild adult Green Turtles poached per month)	18
DoE nest count data	*Total No. of wild Green Turtle nests p.a. average last decade:* (No. of Green nests all three Cayman Is.)	132
	Estimate typical average No. of wild Green Turtle nests per female adult breeder per annum: (No.)	5
	Estimate No. of wild Green Turtle adult breeding females in all three Cayman Is. in avg. season: (No.)	26
	Nominal (non-scientific – for illustrative purposes only!)[24] *assumption/estimate of ratio of wild Green Turtle adult breeding males : females in all three Cayman Is. in avg. season:* (No.)	1
	Estimated No. of adult breeding Green Turtles in all three Cayman Is. in avg. season: (No.)	53
In the counterfactual scenario of no farmed-meat production	***Estimated No. of months of poaching*** *at average rate* "**Y**" ***to remove all wild adult Green turtles*****: (months)**	**2.9**

Notes:

1. (p.26) "*According to respondents' answers to a direct question about buying wild turtle during the 12 months previous to our study,* ***2%*** *(05% CI: 0.8 - 4.8) of all resident households bought meat of turtles illegally.*"
2. (p.28) Only "***16.1%*** *(95% CI: 11.6 - 21.4) of consumers reported preferring wild turtle, with the remaining preferring farmed meat or having a relatively neutral preference.*"
3. (p.31) "***46.8%*** *(95% CI: 36.4 - 57.5) of consumers self-reported being more likely to be more interested in purchasing wild turtle in case of a closure of [CTP].*"

[24] This estimate is very rough and is inserted for illustrative purposes only in regard to calculating the prognosis of what would happen in the counterfactual scenario. Although to the best of our knowledge there has not been an official count made of the sea turtle population around the Cayman Islands during breeding season, this assumed ratio of males:females is likely significantly lower than 1 in reality, in which case there would be even less "Estimated No. of months" to remove all wild adult Green turtles.

APPENDIX 5. CTC's Aviary Captive Breeding & Release Programs

- ***White-Crowned Pigeon breeding and release programme***

At the Cayman Turtle Centre (CTC), the Caribbean Aviary is one of the feature visitor attractions at the park, as well as the center for CTC's White-crowned Pigeon captive breeding and release project. This is one of three such conservation programmes ongoing at CTC, the others being the Green Turtle release and the more recent Grand Cayman Parrot release projects.

The White-crowned Pigeon ("WCP") was the first species selected for the Aviary's release programme because:

1) It is better to augment an existing population before the density becomes too low and cannot sustain itself;
2) WCPs readily breed on their own in the semi-natural environment of the Aviary;
3) At the start of the programme in 2008, the species was still undergoing the stress of recovering from the devastating effects of Hurricane Ivan in September 2004, both in terms of numbers of birds lost as well as loss of breeding/ feeding habitat. Also, being a designated Game Bird under the Animals Law, there was the added pressure of hunting and human disturbance;
4) The WCP, locally known as the Bald-Pate, is a familiar, iconic species and therefore relatively easy to endear and relate to the public.

Aviary-bred WCP chicks are banded with closed colour-coded metal leg bands while still two to three-week old nestlings. Once they are fully fledged (at least six to nine months old) a number of juvenile WCPs are selected from the Aviary flock for release to the wild. The birds are weighed and undergo veterinary physical assessments to qualify them for release. They are then treated for any medical issues and relocated to a separate enclosure to isolate them from the Aviary flock.

The isolation period can last from four to eight weeks, and during this time daily visual assessments along with occasional random weights are carried out to monitor the progress and health of the release flock. The isolation helps reduce the pigeons' captive-bred habituation to humans and is also an opportunity to transition the birds to a diet of native wild berries prior to their release. Some may argue that even captive-bred WCPs will still select their wild diet either from instinct or by following wild pigeons, but the feed transition process gives the captive birds a "head start", not only by teaching them to recognize their wild browse, but also by getting their digestive system accustomed to processing a much higher fibre diet than the soft commercial feed pellets they have been raised on.

Feed transition begins by offering wild berries such as Silver Thatch or Sea Grape. Initially a numbered amount of loose berries are placed in the feed bowls together with the commercial feed pellets and daily visual assessments of wild diet consumption are carried out at each feeding. Feed transition then moves on to forage recognition by offering various wild fruit on leafy branches, while the amount of pellet feed is systematically reduced, but not completely

eliminated. Daily visual assessments continue to be carried out at each feeding, noting when the birds begin to show a definite preference of wild over commercial feed.

Once the feed transition process is deemed successful, the pigeons are released into the wild via an unspectacular soft-release process, whereby the cage door is simply opened and birds exit the cage of their own volition during the course of the day. Supplemental wild diet and water are left on top of the feed cage for as long as release birds are seen in the area. Conditions for release include:

- A final visual assessment is carried out to ensure birds are in good physical condition.
- Random pre-release weights are taken, and birds that have lost more than 10% of their original capture weight are held back from release until there is weight gain.
- There is a ready availability of forage in the environs around the Release site, i.e. trees with ripe fruit.

Post release monitoring is casual. Released birds can be identified via their coloured leg bands, so CTC Animal Programmes personnel can observe and take note of WCP activity in and around the park compound.

From 2008 to 2015, the CTC programme has released 53 healthy and robust young adult captive-bred White-crowned pigeons. In 2010 and 2013 there were no releases due to insufficient captive breeding recruitment for those years. Through casual observation over the period of the release programme we have noted a number of trends:

- Released WCPs can frequent the familiar environs around the Aviary/ Release cage area for up to three weeks before dispersing.
- Released WCPs will sometimes return to the Aviary/ Release cage site during times of stress, such as in the depths of the Dry Season, or when threatened by predators.
- There has been a noticeable increase in the numbers of banded WCPs breeding and feeding in and around the CTC compound, sometimes paired with unbanded (assumed wild-born) pigeons.
- There has also been a noticeable increase in the numbers of (unbanded) juvenile pigeons residing and feeding in and around the CTC compound.
- Resident WCPs at the CTC compound tend to display an unusually high tolerance of human presence.
- Our Animal Programmes experts occasionally receive public reports of sighting banded WCPs in various parts the West Bay district.
- Our Animal Programmes experts have also received several comments from West Bay residents suggesting an increase in the numbers of WCPs seen in that district.

These observations give CTC cause to speculate that WCP numbers are returning to healthy pre-Hurricane Ivan levels. Additionally, the distribution of WCPs on Grand Cayman appears to be more widespread across the island, even nesting in trees within housing developments in the urbanized West Bay peninsula. According to public comment, this is a highly unusual behaviour for this notoriously shy species.

In general, the Cayman Turtle Centre's White-crowned Pigeon Release programme was born out of concern for the plight of an iconic species, which (we believe) has an understated key role in

the island's terrestrial ecosystem. Through the releases, the hope is to help maintain and possibly augment the island's existing WCP population before the density becomes too low and cannot sustain itself.

The White-Crowned Pigeon (WCP) *Patagioenas leucocephala* known locally as "Bald Pate" is an indigenous species distributed throughout the Western Caribbean, the Central American Caribbean coastline and the southern tip of Florida. WCPs normally feed on wild berries and fruits of hardwood trees and mangroves. Birds are usually solitary, but they can form large flocks while foraging for food, especially in the non-breeding season.

The breeding season for this species can extend from late March to early June. Breeding occurs in mangroves and tall, dense woodland areas, usually well away human disturbance. Clutches consist of one or two chicks, which both parents help to raise. Breeding adults are known to fly long distances from their nest sites in search of seasonal berries to feed their young. In Grand Cayman, it is not unusual to see pigeons flying across the North Sound between West Bay and North Side.

White-Crowned Pigeons are known to be a migratory species. They are strong flyers that can easily cross the distances between islands. Consequently, although they may be indigenous to the Cayman Islands, it would be difficult to say if this species can be considered permanent residents of Grand Cayman. One may even hypothesise that our (Cayman) birds are part of a regional flock that may range as far as Cuba, Jamaica or the Bahamas.

Some of the reasons why White-Crowned Pigeons are important to Cayman's history and future are:

- White-crowned Pigeons are fruit berry eaters, foraging in trees or on the ground after storms. They move around singly and in flocks in search of whatever berries are in season. They digest the soft skin and pulp and defecate the seeds out as they fly around during the day and perch in their roosts at night. Their digestive juices actually soften the hard seed shells and prepare seeds for quick germination.
- They are strong, long distance flyers and will go from island to island in search of whatever berries are in season, always transporting and spreading seeds. White-crowned Pigeons can travel 30 - 40 miles a day to forage for food for their young.
- If in the next thousands of years' time the Earth does really warm, all the sea ice melts, sea levels rise again and Cayman goes back under water and then re-emerges from the sea with the onset of another ice age, then very likely it will be White-crowned Pigeons that will see Cayman from the mountains of Cuba and Hispaniola and will fly across to forage and deposit berry seeds and life will begin again.
- Think about how ancient Amerindian peoples navigated without a compass or GPS. They navigated from the flight lines of birds, and the iconic bird that draws navigation lines in the sky all over our region is the White-crowned Pigeon in the breeding season. These flight lines were of immense value as prehistoric navigation aids.
- White-crowned Pigeons are consumed in as game meat in Cayman and many other Caribbean islands. It appears they were always an important food source to native people in our region.
- White-crowned Pigeons are the consummate game bird to Caribbean sports hunters – beautiful and fast with an erratic, defensive flight.

- White crowned Pigeons are a valuable eco-tourism asset - they are a "life bird" for birdwatchers from other countries and regions that love nature and value and collect memories and photographs of our native birds.
- Another eco-system function: White-crowned Pigeons are part of the food chain themselves, becoming prey for predators such as raptors (hawks). However, there is a return, the predators pick out and cull the weak, the slow, the sick and the heavily parasitized birds and so keep White crowned Pigeon populations strong and healthy.

    - ***Cayman Parrot breeding and release program***

CTC's Aviary also has also successfully captive-bred the Grand Cayman Parrot, one of our country's two national birds. The parrots breed once a year and produce typically one or two chicks each breeding season. In May 2015, the Aviary's original parrot breeding pair, Sweetpea and Leo, hatched and raised three chicks. This is a rare event in nature and a first for the Cayman Parrot captive breeding programme. The "Triplets", as they are called, will be raised in the semi-natural Aviary environment until they are 9 – 12 months old, at which time they will undergo isolation for desensitisation from humans and transition to wild feed for eventual wild release. The Triplets' release will bring the total up to 9 captive-bred Cayman Parrots introduced into the wild since the programme began in 2009.

Apart from captive-bred birds, the CTC Aviary has also assisted the Department of Environment with the rehabilitation and repatriation of Grand Cayman parrots that had been injured, poached, or rescued from deplorable captive conditions. In 2015 four of these birds were rehabilitated and returned to the wild, and the initiative has recently been extended to include rescued Cayman Brac parrots, Cayman's other national bird.

Details of other Collaborative Conservation & Research Projects

- ***Rock Iguana rehabilitation in conjunction with Department of the Environment***

In collaboration with a rehabilitation initiative by the Department of the Environment (DoE), we are temporarily accommodating a female Sister Islands Rock Iguana, *Cyclura nubila caymanensis* (otherwise known as the Cayman Rock Iguana/Sister Islands Iguana) - endemic to Cayman Brac & Little Cayman, a "cousin" of Grand Cayman's better known Blue Iguana. It is an endangered species that is highly threatened on Cayman Brac, but more abundant on Little Cayman. However, both populations are considered vulnerable and are both continuously threatened by development, road kills, and free-roaming cats and dogs. The iguana was found in Grand Cayman and was transferred to the care of the Cayman Turtle Centre due to concerns over its apparently failing health, and the lack of appropriate resources at the DoE to rehabilitate the animal over an extended time period.

While housed at the Cayman Turtle Centre, the iguana has since been rehabilitated and nursed back to prime health. She also underwent DNA analysis to confirm her identity and island origin,

which was part of a DNA analysis study carried out by a student at the Mississippi State University under the supervision of Dr Mark Welch, a specialist in Cyclura species genetics. Although the student's results indicated that the iguana is a Sister Islands Rock Iguana, a larger DNA analysis of the Sister Islands Rock Iguana is currently underway to see if each island has their own unique population. The DoE recommended in accordance with best practices that the iguana remains with the Cayman Turtle Centre pending the imminent results of the larger genetic analysis and then a final health screening, prior to release.

In the meanwhile, this particular iguana offers an educational opportunity for the benefit of visitors and guests for the benefit of visitors and guests by remaining on display at the Cayman Turtle Centre in the iguana enclosure located adjacent to the park's Caribbean Free-flight Aviary. Cayman Turtle Centre's Curator – Terrestrial Animal Programs & Education, Mr. Geddes Hislop, is working closely with the DoE to ensure that the iguana is appropriately cared for, and also in the development of an education programme centred on this sub-species. Over 2000 local schoolchildren visit the Cayman Turtle Centre each year on educational visits as part of their school curriculum.

- ***Recycling***

Our plastic recycling programme was begun at CTC in honour of Earth Month 2014. Specially designated bins have been placed at strategic locations in the park to collect plastic bottles for recycling. On an average day, visitors can consume over 200 bottles of water! Blue recycling bins are also in place for collecting aluminium cans and the park's Schooners restaurant uses biodegradable cups and straws when serving drinks. Many of the offices will reuse office paper that has been printed only on one side for scrap or for informal printing tasks.

- ***World Turtle Day participation***

The goal of World Turtle Day, which is observed every year on May 23, is to bring attention to turtle and tortoises, by encouraging human action to help them survive and thrive. Cayman Turtle Centre joined in the world-wide celebration with exciting activities and special observances throughout the day.

► End of *2016 Annual Report Extracts regarding Conservation, Education & Research* ◄