



The Cayman Turtle Farm

A continued
case for change



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(World Society for the
Protection of Animals)

We move the world to protect animals

We are local

We are active in more than 50 countries. From our offices around the world, we work with local partners, animal welfare organisations, businesses and governments. We help people to find practical ways to prevent animal suffering worldwide.

We are global

We collaborate with national governments and the United Nations. We have formal relationships with international bodies including the Food and Agriculture Organization, UNEP, the Council of Europe and the World Organisation for Animal Health. We seek national and international policy change to improve the lives of millions of animals, because animal protection is a fundamental part of a sustainable future.

Cover image: A green sea turtle in a tank in the public area of the CTF
World Animal Protection, 2013

Contents

| | | | |
|--|-----------|---|-----------|
| Executive Summary | 4 | 3 Risks to human health | 25 |
| Foreword | 6 | 3.1 Transmission of disease | 26 |
| 1 Background | 7 | In summary: risks to human health | 28 |
| 1.1 The green sea turtle | 8 | 4 Failure of the conservation mandate | 29 |
| 1.2 The Cayman Turtle Farm | 9 | A wild life | 30 |
| 1.3 Campaign background | 10 | 4.1 The consumption of turtle meat | 30 |
| Sustainability in UK Overseas Territories | 10 | The Kemp's Ridley - A conservation crisis | 33 |
| 2 Threats to animal welfare | 11 | 4.2 Releasing turtles into the wild: The 'Headstarting' Programme | 34 |
| 2.1 Neglect | 12 | Compassion of methods: 'headstarting' versus beach protection | 37 |
| 2.2 Holding environment | 12 | Campaign success: World Animal Protection and Cayman Islands Government Joint Statement | 38 |
| 2.3 Overcrowding | 14 | 4.3 Failure to meet biodiversity standards | 39 |
| 2.4 Cannibalism | 15 | Widespread concern | 39 |
| 2.5 Captivity stress | 15 | In summary: failure of conservation mandate | 40 |
| 2.6 Disease | 16 | 4.4 The CTF as a research facility | 40 |
| 2.7 Water quality | 17 | 5 A failing business model | 41 |
| 2.8 Diet | 18 | In summary: CTF economics | 44 |
| 2.9 Handling | 18 | 5.1 Future tourist trade | 44 |
| Campaign victory: Myrtle the turtle | 19 | 6 The humane solution: replacing a defunct initiative | 45 |
| 2.10 Birth defects | 20 | 6.1 A model for change | 46 |
| 2.11 Slaughter | 20 | 6.2 The future of the CTF | 46 |
| In summary: threats to welfare | 21 | Moving forward: Time to Stop Sea Turtle Farming | 47 |
| 2.12 Status as a non-domestic species | 21 | References | 48 |
| Animal welfare concerns: other animals in the care of the CTF | 22 | | |
| The UK Government and the Cayman Turtle Farm | 24 | | |

Executive Summary

Ending the suffering of over 9,500 endangered green sea turtles

There is no humane way to farm sea turtles. As a solitary, migratory, non-domesticated species these animals cannot adapt to life in a farmed environment. Sadly, being bred in captivity for their meat and housed within a tourist attraction is the reality for over 9,500 endangered green sea turtles on the British Overseas Territory of the Cayman Islands.

A failing breeding facility

World Animal Protection firmly believes that the Cayman Turtle Farm (CTF) poses a threat to the welfare of the turtles housed there - these animals often live in overcrowded, unhygienic conditions which foster abnormal behaviours, including aggression and even cannibalism. Typically swimming in turbid water, and fed on an unnatural diet, these conditions are a far cry from the natural environment in which these wild animals should be living.

There is no way to meet a sea turtle's welfare needs in a farmed environment - the CTF should seek to gradually end the production of turtle meat and transition into a facility which truly considers the welfare of any turtles in its care.

A failing tourist attraction

Handling of turtles can transmit illnesses to people, especially the elderly and the young. Water sample tests have shown that bacteria, including *Salmonella* and *E. coli*, are present in the tanks in which tourists can enter. Whilst the Farm provides hand sanitiser and cold water washing facilities for those who choose to handle the turtles, it is not clear if this is sufficient to prevent disease transmission especially to the elderly, the infirm and the young.

Whilst the Farm might claim that visitors do not get ill - it is unclear how this view can be substantiated when no follow up checks with visitors are conducted. Given the clear risks to human health, the only certain way to ensure no one becomes ill would be for the CTF to end the handling of turtles by tourists.

Image: Juvenile sea turtle in the public touch tank area of the CTF World Animal Protection, 2013



A failing conservation model

The CTF maintains that by providing a legal source of turtle meat for Caymanians they are relieving pressure on the wild turtle populations – and so helping to conserve the species. But no one knows what the true Caymanian demand for turtle meat is, and whether or not the Farm is currently meeting this demand. The Farm does not keep detailed records of who buys the meat, nor has it looked at levels of poaching in comparison to the price charged for this product.

Turtle meat from the Farm even ends up on the menu of restaurants which are cooking dishes aimed at tourists. As a result any tourist who eats a ‘turtle steak’ is artificially inflating the perceived Caymanian demand for this meat.

The Farm has released over 31,000 turtles into the wild since 1968 – an impressive sounding number, although only 13 have been recorded as returning to nest on Caymanian beaches. A lack of appropriate quarantine procedures for releasing turtles also raises doubts about the levels of disease transmission which may have occurred from CTF turtles to wild populations.

There are significant question marks regarding the cost-effectiveness of this release project considering the many millions of Caymanian dollars spent breeding and releasing turtles with only 13 recorded as migrating back. The cost necessary to achieve this number of nesting turtles perhaps could have been better spent on other, more successful, conservation methods – including beach protection and education initiatives.

The CTF must play a more effective role in conserving sea turtles, whilst at the same time encouraging the sale of meat to tourists to end. Over time the CTF should also work towards ending the demand for meat altogether. The Farm must also immediately end the costly and controversial turtle release programme.

A failing business model

The CTF is an unsustainable business model that drains the Caymanian economy – and it only remains operational due to large Cayman Island Government subsidies. Between 2013 and 2014 this subsidy was the equivalent to \$175 for each of the 56,000 Caymanian residents (Cayman Compass, 2013b).

Farming sea turtles is never likely to be a profitable enterprise because they are wild animals, biologically unsuited to commercial farming. The CTF must move away from operating as a meat production facility in order to reduce its reliance on Government funding.

World Animal Protection’s pragmatic solution

World Animal Protection is calling for the CTF to begin the shift away from commercial farming, and to transition into a rehabilitation and release facility for injured sea turtles – whilst at the same time working to effectively reduce Caymanian consumer demand for turtle meat.

World Animal Protection advocates a model for change as demonstrated by ‘Kélonia: the Observatory for Marine Turtles’ which has successfully transitioned from a commercial sea turtle farm into a release and education facility.

This model clearly shows that change is possible. Such a change is desperately needed in the Cayman Islands; for the wild green turtles found in local waters, for visitors to the CTF, for Caymanians who take pride in the turtle as their national emblem – but have to subsidise a failing business model – and most importantly for the 9,500 turtles housed at the Farm.

This is the second version of this document, which builds on the research previously conducted and published in the 2011 report entitled ‘The Cayman Turtle Farm; A Case for Change’.

Foreword



Image: Tanya Streeter aged eight years old. Sandra Dailey, 198.

As you can see there are snapshots of me as a freckle-faced, blond pig-tailed kid, gleefully clutching a turtle at the Cayman Turtle Farm in the early 1980s. I also know there is one of my mother, visibly pregnant with my brother, proudly lifting – no doubt against doctors orders – a large breeding female turtle. This was the primary photo used in an early promotional leaflet for the Cayman Turtle Farm, then called Mariculture Ltd.

Such was our family connection to the place. My parents were instrumental in its establishment and, over the 40 plus years since then, they have remained close to some of the founders. The Farm has been a part of my life for as long as I can remember.

Once an avid promoter of the Farm, like many other Caymanians, I am now an activist for its change. Our increasing understanding of what animal welfare is, means that many locals are less comfortable with the existence of a place that farms wild animals, especially in such unsuitable conditions. This is partly demonstrated by the declining local market for turtle meat.

I'm proud of World Animal Protection and the Cayman Turtle Farm, both for the meetings they have held and for the positive changes that have been made in the last year in response to World Animal Protection's campaign. This initiative has gathered almost 200,000 supporters globally and the attention of 99 UK MPs.

It is encouraging to hear that the Farm has appointed a full-time vet for the first time in its history, and that it has stopped training a large female turtle named Myrtle to give rides to tourists. Good news too that turtle meat is no longer served at the onsite restaurant and that the Caymanian Department of Environment has committed to a three-year study to ascertain the true market demand for turtle meat in the Cayman Islands, the only place where it can be legally sold. Government officials openly admit to subsidising the Farm to the tune of around CI\$9m per year – so it is hoped that proof of dwindling demand will help locals support the gradual end of turtle farming altogether.

It is my honour to write this foreword, as it was to sign in 2012, an open letter calling on the Farm to change its business model.

We have a way to go yet before we have solved the welfare issues being suffered by over 9,500 turtles being kept on the Farm. But we move forward with determination and optimism.

Tanya Streeter

Tanya Streeter is a Caymanian world record holding freediver and environmentalist.



Image: Tanya Streeter freediving with a hawksbill turtle in Grand Cayman. Patrick Weir, 2013.



Image: A giant turtle being hauled onto a schooner. Ronald Mitchell/The National Archives UK, 1950.

1 Background



Image: Unloading green turtles at Grand Cayman. Ronald Mitchell / The National Archives UK, approximately 1957-1960.

1.1 The green sea turtle

The endangered green sea turtle (*Chelonia mydas*) is an icon of the Cayman Islands. Graceful in the water, these animals migrate vast distances between feeding and breeding areas. Their stunning shells range from green to grey to brown, although they were named not for the colour of their carapace, but for the hue of their body fat which becomes tinted through the adult diet of seagrass.

Turtles are valuable ecosystem engineers, boosting the health of coastal and marine environments. They have been on earth for 150 million years, and the health of their populations today offers a glimpse into the wellbeing of our oceans.

Green sea turtles are an integral part of the Cayman Islands' history and culture. When the islands were first discovered, by Christopher Columbus in 1503, he named them 'Las Tortugas' after the turtles he found there. Today, the green sea turtle is displayed on the Caymanian flag, coat of arms and on the watermark of banknotes.

However, across the globe the number of wild green sea turtle populations has drastically declined, and some of the largest breeding populations the world has ever known including those in the Cayman Islands, have all but vanished (Harold et al., 2005). In 1984, the Convention on International Trade in Endangered Species (CITES) made it illegal to import, export, kill, capture or harass wild green turtles in order to begin to readdress this situation. Yet numbers are still declining globally, an assessment conducted by the International Union for Conservation of Nature (IUCN) Red List of Threatened Species observed the changes in green turtle population size at 32 nesting sites, and concluded that the annual number of nesting females had declined by 48% over the last three generations (IUCN, 2004).

1.2 The Cayman Turtle Farm

In the Cayman Islands, turtle meat is legally farmed and sold via the Cayman Turtle Farm (CTF), a Government-owned facility that also functions as a major tourist attraction.

The CTF, originally known as 'Mariculture Ltd', was created in 1968 with founding stock taken from Ascension Island, Costa Rica, Guyana and Suriname (Bell et al., 2005), this included 60 adults and more than 477,000 eggs (Bell et al., 2005). By 1975 the Farm had demonstrated that its captive animals could breed and produce eggs, and that hatchlings could survive to maturity (Bell et al., 2005). The Farm is currently home to approximately 9,860 green sea turtles.

After the Farm was damaged by Hurricane Michelle in 2001, it was redeveloped at a cost US\$150 million and renamed 'Boatswain's Beach'. It has since once again been rebranded as the 'Cayman Turtle Farm' (CTF, 2011a). The site now boasts a breeding pool, beach and hatchery, public touch tanks and wading pools,

and a lagoon where visitors can snorkel with the turtles. It is also home to other animals, including Kemp's Ridley and loggerhead turtles, a caiman crocodile, sharks and various species of fish and birds.

The CTF's mission statement states that its tourism agenda is matched by a desire to promote conservation (CTF, 2012). The Farm claims that it is able to protect the remaining local wild turtle populations by:

- providing an alternative and sustainable source of turtle meat for local Caymanians (Brammer, 2011; Schabbing, 2012); and
- boosting the wild population through the release of captive-bred animals into the wild (Fosdick and Fosdick, 1994; Brammer, 2011; Schabbing, 2012).

Image: Entrance to the CTF. World Animal Protection/Michelle de Villiers, 2011.



1.3 Campaign background

In 2012, World Animal Protection conducted an investigation into the failings of the CTF. This included:

- detailed information from Farm visits;
- expert advice on animal health and welfare from independent veterinary experts;
- interviews with key stakeholders;
- commissioning independent research on North American and Caymanian attitudes to welfare and conservation concerns;
- focus groups with local Caymanians to learn more about cultural attitudes to turtle meat consumption;
- a detailed review of the peer-reviewed scientific literature published in research journals.

World Animal Protection's concerns were highlighted in its report, of the same year, entitled 'The Cayman Turtle Farm: A Case for Change' (the first edition of this report). The report exposed shocking instances of turtle mistreatment and a lack of understanding of animal welfare needs. Specifically the report cautioned that the Farm;

- represents a serious source of concern from an animal welfare perspective;
- is at best, failing, and at worst, harming efforts to promote turtle conservation;
- is a potential threat to human health;
- is failing on economic grounds;

Since 2012 World Animal Protection has continued to amass evidence about the CTF. Notably, World Animal Protection accumulated under the Freedom of Information Act, a large amount of information directly from the CTF and other involved parties. It also collected evidence from an 'immediate veterinary assessment' and an 'independent inspection', both conducted during 2012 following requests by the CTF. What follows is an update on the practices and conditions at the CTF.

Sustainability in UK Overseas Territories

As a UK Overseas Territory, the Cayman Islands fall under the jurisdiction and sovereignty of the United Kingdom. In January 2014, the Environmental Audit Select Committee, of the House of Commons, released its report 'Sustainability in the UK Overseas Territories' (Environmental Audit Committee, 2014).

The report highlighted the fact that 90% of the UK's biodiversity is contained in UK Overseas Territories (UKOTs), and claimed that the UK Government is failing to meet its legal and governmental responsibilities when it comes to protecting biodiversity and sustainability in all its 14 Overseas Territories.

World Animal Protection submitted information to the Committee, highlighting evidence and outlining concerns about ongoing practices at the CTF, including its negative impact on sustainability, biodiversity, conservation and animal welfare. In June 2013, during the inquiry phase of the report, two MPs visited the Farm as part of the Committee delegation, where they were given behind-the-scenes access to the meat production side of the facility (Environmental Audit Committee, 2013). This information was then used by the Committee in its report, and was the only case study of its kind to be included - highlighting the level of concern of the members.

The report highlighted the issues raised by World Animal Protection and echoed calls for further dialogue between the Cayman Islands Government (CIG) and World Animal Protection.



Image: 299 turtles die at the CTF after a water pipe bursts after suffering from heat exhaustion. Picture obtained under FOI, 2012.

2 Threats to animal welfare

The World Organisation for Animal Health states, "Animal welfare means how an animal is coping with the conditions in which it lives. An animal is in a good state of welfare if it is healthy, comfortable, well-nourished, safe, able to express innate behaviour, and if it is not suffering from unpleasant states such as pain, fear, and distress" (World Organisation for Animal Health, 2010).

Determining whether an animal's welfare needs are being met requires an assessment which looks beyond the health of the animal. Researchers can use scientific methods to objectively measure animal welfare. Protecting the welfare of animals involves the prevention of unnecessary suffering and ensuring a good quality of life and a humane death (Brakes et al., 2004). Evidence suggests that the CTF is currently failing to meet these baseline welfare criteria (Arena, et al., 2013).

2.1 Neglect

Many turtles housed at the CTF suffer ill health and extremely poor levels of animal welfare. In July 2012 an 'immediate veterinary assessment' was conducted at the CTF as a result of the public launch of World Animal Protection's Stop Sea Turtle Farming campaign. At the time it was found that 'a significant proportion (possibly even a majority), of turtles exhibited skin lesions'. The Inspector also noted incidences of shell rot, floating syndrome, and flipper damage consistent with cannibalism (Freedom of Information Request, 2012d).

Mortality rates are of additional concern, especially amongst young juveniles. In 2011, 714 green sea turtles died at the CTF, twice as many as the year before (Freedom of Information Request, 2012a). Then, in July 2012, 299 green sea turtles died from heat exhaustion after a water pipe supplying one of the tanks ruptured and the water drained away (Fuller, 2012, Freedom of Information Request, 2012c). Turtles can survive out of the water for quite some time, so it is reasonable to assume the animals could have been moved elsewhere, but they were not. The turtles died slowly and needlessly. Despite happening in the Cayman Islands, news of the disaster took two weeks to reach the residents (Wildlife Extra, 2012) fuelling allegations of a cover-up. It was later revealed, again via evidence obtained under the Freedom of Information Request (2012c), that the turtles' bodies were disposed of at the local rubbish dump.

2.2 Holding environment

The Farm is split into publicly accessible and private areas. The public area includes a breeding pond and beach, touch tanks, and a lagoon where visitors can snorkel with turtles. Behind the scenes there are an unknown number of extra tanks, plus quarantine and meat processing facilities.

In the public area, all of the tanks are outdoors under the full glare of the Caribbean sun. As far as World Animal Protection can ascertain, the tanks have no screens, covers, spray bars, chillers or heaters. Whilst water continually flows into the tanks it is possible that the shallow depth combined with the heat of the sun would raise the temperature to an undesirable level. When World Animal Protection officials visited the Farm in January 2014, they noted that many of the overcrowded shallow pools are just half-full with water, making it hard for the larger turtles to fully submerge and impossible for them to dive. Aside from the turtle lagoon, which contains man-made coral and some hiding places for the turtles, the tanks are bare, with no sources of behavioural enrichment. The turtles' captive environment is a far cry from their home in the wild.



Image: Turtles in the public area of the CTF. World Animal Protection, 2013.



Image: Tanks in the public area of the CTF. World Animal Protection, 2014.

These findings are of concern for several reasons:

- Sea turtles which spend prolonged periods out of water can suffer from carapace drying and peeling, creating a canvas for bacteria and fungi (Bluvias and Eckert, 2010);
- Sea turtles become sunburnt without adequate shade (Bluvias and Eckert, 2010);
- Sea turtles rely primarily on the surrounding temperature to moderate their own. If the water temperature is too high, it can promote lethargy and stress, the growth of algae and pathogens, and facilitate outbreaks of disease (Bluvias and Eckert, 2010, Goreau, 2008, Haines and Kleese, 1977). If the water temperature is too low, it can also make turtles more susceptible to illnesses (Bluvias and Eckert, 2010);
- Captive sea turtles restricted to small, sterile, monotonous environments are unable to behave naturally. They are prone to swim in stereotypical repetitive patterns that can result in injury, such as calluses from rubbing the side of the tank. Environmental enrichment, including the addition of hiding places, back scratchers and ice blocks filled with food, can help to reduce these problems (Bluvias and Eckert, 2010).

Away from the public eye, however, it was the production side of the operation that caused the greatest concern to the independent inspectors when they visited the Farm in December 2012. Whilst conducting a report commissioned by the Farm entitled 'independent assessment' the inspectors concluded that, within this private area, "there is clearly room for improvement in the standards of care which will require immediate changes in infrastructure, processes, staffing and resources to rectify" (Balasz et al., 2012).

2.3 Overcrowding

The CTF is currently home to an estimated 9,860 green sea turtles, including hatchlings, juveniles and adults (Freedom of Information Request, 2013). There are a variety of different turtle tanks at the Farm, all shallow, overcrowded and without shade. A single tank may house hundreds of sea turtles (Freedom of Information Request, 2013), which can be seen clambering on top of one another and bunching up around the edges of their enclosures. This is not normal behaviour as seen in the wild.

Unless breeding, wild sea turtles tend to be solitary creatures. They swim thousands of miles and dive to depths of over 100 metres (Sea Turtle Restoration Project, 2003). The confined and overcrowded

conditions at the CTF curtail these natural behaviours, placing the animals under unnecessary stress, which can result in an increased risk of injury, disease and cannibalism (George, 1997, Bluvias and Eckert, 2010), all of which have been observed at the CTF.

It has been argued by some that stocking densities are not really an issue for the CTF. It is claimed that densities may appear inflated as a result of feeding regimes which encourage turtles to congregate around the food (Balasz et al., 2012). However, when some tanks house 999 animals in an area which measures 865 square feet – this equates to approximately 0.87 square feet per turtle. This space is inadequate to house a solitary, wild, migratory and diving turtle – and when kept in such conditions overcrowding will always be an issue.

Image: Overcrowding can be observed at the CTF both in the public and private areas. In the meat production side of the facility some tanks contain over 900 turtles. World Animal Protection, 2011.



2.4 Cannibalism

As part of World Animal Protection's thorough research into the CTF an undercover investigation was conducted. The investigators noted that green sea turtles with severe wounds and injuries were present throughout the Farm. Some had whole flippers missing, whilst others had massive trauma to their digits. It is believed that these injuries were caused by cannibalism, a direct result of their overcrowded, stressful living conditions (Frye, 2011).

The 'immediate veterinary assessment' commissioned by the Farm in July 2012 found evidence that cannibalism had decreased, but not disappeared. Around ten turtles with signs of cannibalism were spotted at this time. Injuries of this nature are rarely seen in the wild, as the vastness of the ocean affords aggressive turtles the opportunity to avoid one another (Frye, 2011). World Animal Protection maintains that until animal welfare issues are resolved, cannibalism is likely to continue at the CTF.

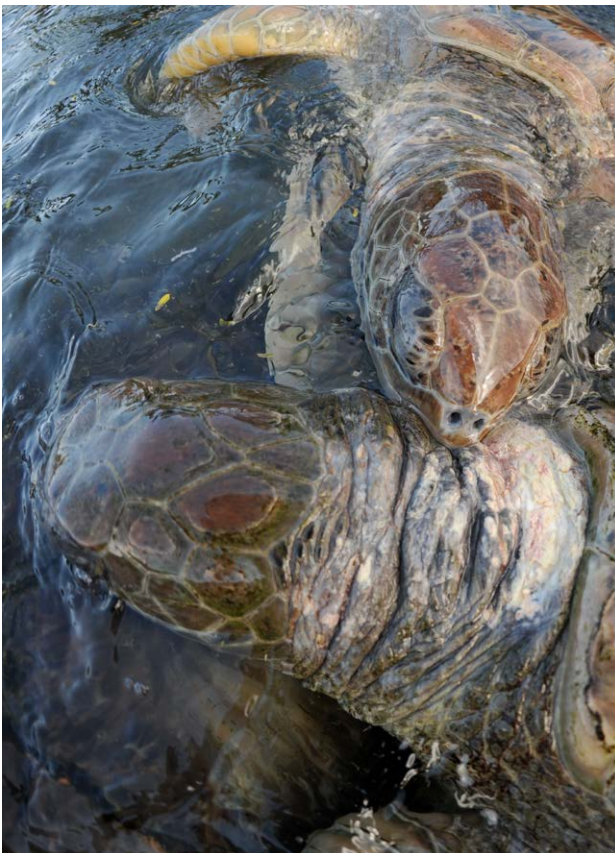


Image: Turtles, in the public area of the CTF, observed biting each other. Michelle de Villers, 2011.

2.5 Captivity stress

Turtles at the CTF show signs of stress by adopting unusual behaviours rarely observed in their wild counterparts. Observed symptoms of stress include frenzied feeding, hyperactivity, boundary exploration and congregation in large numbers at the water's surface. These abnormal behaviour patterns are likely to be caused by the turtles' overly restrictive, deficient and inappropriate environment (Warwick, 1995; Warwick et al., 2011a). Their presence confirms that the behavioural needs of these animals are not being met.



Image: Cannibalism caused by intensive farming conditions can result in gross flipper loss. Image obtained as part of World Animal Protection's initial investigation into the CTF. World Animal Protection, 2011.

2.6 Disease

Various diseases have been observed at the Farm since its formation (see Table 1).

Disease outbreaks have caused the deaths of many animals over the years (Homer et al., 1994); and both shell rot and floating syndrome were identified during the 2012 'immediate veterinary assessment' (Freedom of Information Request, 2012d). In 2011, grey patch disease was noted to be prevalent throughout the Farm (Frye, 2011). High stress loads, overcrowding, sub-optimal welfare conditions, poor water hygiene, and inappropriately designed tanks are thought responsible for these levels of disease seen at the CTF (Bluvas and Eckert 2010, Haines et al., 1974).



Image: A green sea turtle with an untreated wound on its neck. This turtle was in one of the touch tanks, and was being handled by visitors. World Animal Protection, 2012.

Table 1: Diseases identified amongst sea green turtles at the Cayman Turtle Farm

| Disease | Potential Outcome |
|----------------------------|--|
| Grey Patch Disease | A potentially fatal, viral disease causing bumpy lesions and grey patches of dead skin |
| <i>Chlamydiosis</i> | A potentially fatal, bacterial disease that can cause weakness, lethargy and the inability to dive |
| <i>Fibropapillomatosis</i> | A potentially fatal, infectious, tumour-causing disease |
| Lung-eye-trachea disease | A potentially fatal, viral disease causing symptoms including conjunctivitis and pneumonia |
| Shell Rot | A generic condition usually caused by bacterial infection that, if left untreated, can spread to the blood stream and become fatal |
| Floating Syndrome | A generic condition that causes gas to build up under a turtle's shell, interfering with the ability to dive and feed |
| <i>Enteritis</i> | A generic condition involving intestinal inflammation and caused by a variety of potential factors including poor diet and bacterial infection |
| <i>Coccidiosis</i> | A contagious parasitic disease of the intestinal tract, that causes diarrhoea and can be fatal for weak individuals |

[Sources: World Animal Protection 2013, Haines et al., 1974; Homer et al., 1994; Godley, 2002, 2012, Freedom of Information Request, 2012d, Pourdonya et al., 2010].



Image: Tank cleaning at the CTF, the man in the background is wearing a mask and protective clothing presumably to protect himself from the cleaning solution. The turtle in the back of the image also appears to have a tumor like lump on its back flippers. Image supplied to World Animal Protection, 2013.

2.7 Water quality

Captive green sea turtles require substantial amounts of good quality water (Higgins, 2003). Fundamental to their welfare, the water should always be clear and clean, with its temperature carefully regulated (Bluvias and Eckert, 2010); as this replicates the water found in their natural environment.

Back in 2008 researchers noted that algae coating the sides and bottom of the breeding pond was indicative of high nutrient levels, inadequate flushing and poor water quality (Goreau, 2008). It appears this has not been rectified because according to the December 2012 ‘independent assessment’, “the visual appearance of the water varies from very clear for post-hatchling turtles to quite turbid in some of the tanks for the larger juveniles”.

It is obvious that many of the turtle pools are not cleaned regularly, leaving uneaten food and voided faeces to contaminate the living environment. The result is a foul mix of water, debris and pathogenic micro-organisms including bacteria and viruses that pose a significant threat to turtle welfare (Frye, 2011).

Dirty water can compromise health, slow wound healing, cause eye irritations, and exacerbate bacterial and other infections (Bluvias and Eckert, 2010). This is of particular concern at the CTF where some of the turtles have open lesions, rendering them more susceptible to infection from contaminated water.

The CTF states that its tanks are “cleaned using chlorine, brushes and pressure washers, as needed” (Freedom of Information Request, 2013f). World Animal Protection believes that the water is cleaned by draining the tanks and sprinkling in some form of powdered chlorine. It is believed that the turtles are not removed from the tanks before this occurs, so they are also covered with this cleaning solution. Staff are required to wear protective clothing including masks when administering the cleaning formula yet no protection appears to be afforded to the turtles. This, if found to be the case, raises significant animal welfare concerns as chlorine should never be applied to an animal in this way.



Image: Buckets such as this can be seen throughout the public areas of the CTF. It is believed this is the solution used to clean the tanks. World Animal Protection/ Catherine Mason, 2014.

2.8 Diet

In the wild, adult green sea turtles are strictly herbivorous, eating a diet mainly consisting of seagrass, seaweed and algae (See Turtles, 2012). At the CTF, green turtles are fed an artificial diet composed entirely of pellets that contain a mix of plant, animal and fish products, as well as various vitamins and supplements. Although the CTF claim their turtle diet is “nutritionally complete” (Freedom of Information Request, 2013a), the complete nutritional value and appropriateness of this artificial diet remains unknown.

Ensuring turtles receive the right balance of nutrients is very important. For example, diets with the incorrect levels of calcium and phosphorous, and certain single food diets, can cause bone disease and iron deficiency respectively (Bluvas and Eckert, 2010).

It is strongly recommended that sea turtles are offered an assortment of foods, similar to which they would eat in the wild (Bluvas and Eckert, 2010). Mature sea turtles spend most of their time in shallow, coastal waters grazing on lush seagrass beds. Feeding captive turtles with pellets robs them of this natural grazing behaviour, and is likely to impact negatively on their physiology and welfare.



Image: Turtles are fed on a diet of pelleted food. World Animal Protection/Catherine Mason, 2014.

2.9 Handling

The arbitrary and sometimes unsupervised handling of turtles occurs at the CTF by members of the public. Visitors of all ages can remove turtles (of all manageable sizes) from the ‘touch tank’ area of the Farm. Tour guides have been observed handling larger turtles from other tanks.

Sea turtles are naturally timid creatures, so this unnatural interaction causes them great stress, which can weaken their immune system and render them more susceptible to disease (Warwick et al., 2011a). From the beginning of 2013 far fewer turtles have been available for handling at the CTF, perhaps as a result of World Animal Protection’s Stop Sea Turtle Farming campaign which has continued to raise the animal welfare issues which surround the handling of these wild animals. However, this results in the same animals being held more often and for longer periods of time, greatly increasing their levels of stress in these individual animals.

Handling also causes the frightened animal to panic. “Turtles are deceptively slow when inactive, but are capable of intense flipper and body movements that can both self-injure and cause injury to others,” says Nancy Mettee, Director of Sea Turtle Medicine at the Wider Caribbean Sea Turtle Network (WIDECAST) (Mettee, 2013a).



Image: Handling of turtles can cause injuries to these wild animals. World Animal Protection, 2012.

Even experienced handlers can find it hard to handle sea turtles. The fractious flapping of a turtle's flippers can cause the animal to suffer detached claws, fractures, bleeding and bruising (Mettee, 2013b). Dropping an animal can cause fractures and other significant harm (Arena et al., 2013). Novice handlers often underestimate the weight and strength of a turtle and will pull it out of the water body first and head down. It is a natural response of startled turtles to breathe in rapidly, so removal in this manner puts the animal at risk of pneumonia (Mettee, 2013a).

Sun cream and insect repellent can be toxic to turtles, so handled animals are at risk from traces of these products left on tourists' hands. Sadly these are both products which are likely to appear on the hands of tourists wishing to protect themselves from the Caribbean sun and mosquito population (Pierre-Nathoniell, 2006). Visitors at the CTF are now required to use an alcohol-based hand sanitiser before handling the turtles, the effects of this on the turtles themselves is unknown.

For all these reasons the US Fish and Wildlife Service regulations prohibit the handling of any sea turtle for gratuitous reasons (Mettee, 2013a). ABTA, the UK Travel Association, also deem attractions which allow animals to be used as photographic props, and involve bad practice, to be unacceptable (ABTA, 2013).

Once learning that handling is stressful to turtles people are actually far less willing to participate in this activity. A World Animal Protection-funded independent poll of 400 cruise ship visitors to the Farm found that 85% of people would not want to pick up a turtle once learning that handling was stressful for them (Greenberg Quinlan Rosner Research, 2012).

In line with expert opinion, World Animal Protection recommends that CTF visitors should not be allowed to handle the turtles. Handling of turtles should only occur when it is for the benefit of the individual animal and World Animal Protection calls on the CTF to immediately end the handling of turtles by visitors to the facility.



Image: Sign at the CTF (now removed) advertising the 'Turtle Encounter' with Myrtle. World Animal Protection, 2012.

Campaign victory Myrtle the turtle

World Animal Protection learnt that in early 2011 the CTF had begun the training of Myrtle the turtle, a green sea turtle who was bred at the CTF. Visitors were informed that for an additional payment they could get into the lagoon with Myrtle to be pulled along if they held on to her shell, she would also retrieve a thrown ring, and would respond to commands.

World Animal Protection was informed that before Myrtle's training could begin she was moved to the Lagoon area, in order to separate her from the other turtles. She also had to be cleaned of algae and trained not to bite. A dolphin trainer was recruited to instigate a training regime for Myrtle, which they did via a dog style whistle with food for reinforcement.

World Animal Protection raised serious concerns over the treatment of Myrtle, as World Animal Protection maintains that it is completely unacceptable to train a wild animal in this way. As a result of World Animal Protection's campaigning work, this programme has been suspended - whilst Myrtle is no longer required to give people rides, there is no plan for her future, and she has simply been returned to a barren concrete tank.

2.10 Birth defects

When World Animal Protection prepared its last report, green turtles with congenital defects were present at the Farm. Some had skeletal deformities, whilst others lacked one or both eyes (Arena et al., 2013). In the wild, animals born with these deformities would probably have died before reaching adulthood (Arena et al., 2013). Their presence at the Farm shows they can survive in captivity – but, because they find it harder to move, see and eat, they are more likely to succumb to injury and disease.

The CTF claimed that instances of congenital deformities were extremely rare at the Farm (Cayman News Service, 2012), and the ‘immediate veterinary assessment’ in 2012 (Freedom of Information Request, 2012d) found no evidence of congenital deformities. However, Freedom of Information reports reveal that 17 green turtles were euthanised in the six months before the vet’s visit, and a further 146 animals were euthanised after the visit. The CTF stated that “an unknown number of these would have been euthanized irrespective of an assessment” (Freedom of Information Request, 2012d), but did not state why these particular animals were destroyed. It is possible, perhaps probable, that they were euthanised because of birth deformities, but in the absence of detailed record keeping, the exact reasons remain unknown.

As a result of the ‘independent assessment’ published in 2013, an action plan was put in place to address the problems and areas of concern raised by the inspectors. This action plan clearly states that the workers need to look for congenital deformities, and in the event of discovering any, they should humanely euthanise the turtle if prognosis is poor (Freedom of Information Request, 2013e).

2.11 Slaughter

Turtles are regularly slaughtered at the CTF as part of its meat production process. It is believed that after a single shot from a captive-bolt pistol, the spinal cord and major blood vessels are severed and the animal is left to exsanguinate or bleed out (Godley, 2002). The ‘independent assessment’ carried out in December 2012 concluded that the slaughter is humane and hygienic (Balasz et al., 2012). However no data or explanation was presented to back-up this finding. Based on the available descriptions, in World Animal Protection’s view the evidence is not conclusive, and more detailed observations are urgently needed, in particular to assess the length of consciousness after slaughter.

Image: Congenital defects observed at the CTF can include turtles with one or both eyes missing. Image obtained as part of World Animal Protection’s initial investigation. World Animal Protection, 201.



2.12 Status as a non-domestic species

Advocates of turtle farming argue it is no different from farming any other animal (Godley, 2002). However, unlike mammalian and avian livestock, sea turtles have never been domesticated.

Domestication takes many generations to occur and involves multiple factors that result in genetic and behavioural change, most notably a tolerance of humans and adaptation to captive conditions (Driscoll et al., 2009).

The CTF turtles are not domesticated because:

- They are currently not adapted to their confines – something needed to demonstrate that domestication has occurred. In fact turtles at the Farm show signs of captivity stress, including aggression and cannibalism.

- It appears that an insufficient time period has passed to allow for domestication to occur, and if the CTF were to commit to housing turtles for the required time period, many more generations of turtles would need to be kept in an environment in which their welfare needs could not be met.

Simply breeding an animal over a number of decades in captivity does not make it domesticated. The CTF's green sea turtles are not domestic animals. They are wild animals forced to live in captivity. Their commercial production is ethically and practically very different to that of domestic, agricultural livestock and as such standards used to evaluate animal welfare conditions in these farms should not be applied to the CTF.

Image: Turtles housed in the meat production side of the CTF. World Animal Protection, 2011.



In summary: threats to welfare

- At the CTF, a proportion of green sea turtles live in overcrowded and unhygienic conditions fostering unnatural levels of aggression and cannibalism, stress and disease.
- Indiscriminate handling by visitors can potentially cause the turtles further, unacceptable levels of stress and injury.
- Despite repeated calls to improve animal welfare, the CTF fails to meet the basic welfare requirements of the animals in its care.

Animal welfare concerns: other animals in the care of the Cayman Turtle Farm

Whilst World Animal Protection has predominantly focused on the welfare of the turtles in the care of the CTF, there are other animals at the facility whose welfare is also compromised.

The blue iguana

The blue iguana is only found on the island of Grand Cayman in the Cayman Islands. Classed as endangered by IUCN, and previously listed as critically endangered, its numbers have increased as a result of a concerted effort by the 'Blue Iguana Recovery Program' (BIRP).

It is understood that one blue iguana was donated to the CTF by the BIRP (BIRP, 2011). World Animal Protection has seen no evidence to suggest that this animal has been at the facility since about mid 2012. Whilst the Farm has not publically stated what happened to this animal, it is believed that it died. If this is found to be the case then questions must be raised about the conditions in which this occurred, and whether the Farm reported this to the BIRP.

Nurse and sandbar sharks

The sandbar shark is classed as vulnerable by the IUCN, as it is often fished for the commercial production of products such as shark fin soup; as a result numbers are declining worldwide (The Shark Trust, 2009a). Predominantly a bottom dwelling, shallow water coastal species, the sandbar shark is seldom seen at the surface.

It generally eats relatively small bottom dwelling fish, including sardines, shad, anchovies and mackerel, as well as molluscs and crustaceans (The Shark Trust, 2009a).

In the wild the nurse shark is found in the temperate and tropical conditions of the Pacific and Atlantic Oceans in waters varying from 1 to 75 metres. They are predominantly nocturnal bottom dwellers and feed on invertebrates, although they do sometimes feed on fish including catfish and mullets (Shark Trust, 2009b).

The CTF is currently home to two sandbar sharks and three nurse sharks; however, there are only two nurse sharks on display to the public in the 'Predator Reef' section of the facility. The CTF have disclosed that whilst in their care four sandbar sharks died, the reason for these deaths is unknown - although the CTF suggests that they could have resulted from old age (Freedom of Information Request, 2013c). This suggests that proper tests were not conducted on the sharks that died. So the causes of death cannot be determined, or lessons from these deaths used to ensure that the other sharks in the care of the CTF do not suffer a similar fate.

It is also known that one of the nurse sharks became the victim of aggression from the others in their tank, and that they suffered bites to their pectoral fin. The CTF states that this shark's recovery is complete (Freedom of Information Request, 2013c), but this shark is no longer in the main exhibit tank.



Image: A blue iguana at the BIRP. World Animal Protection, 2014.



Image: Nurse shark at the CTF with bites on its pectoral fin. Image supplied to World Animal Protection, 2012.

Only two of the five sharks in the possession of the CTF are on display, nothing is known about the conditions in which the other three sharks are held. The 'Predator Reef' display tank measures approximately 10 metres in depth and contains one large section of 'coral' believed to have been moulded from concrete or a similar material. There appears to be no enrichment for these animals, and as such they are not able to exhibit their natural behaviours. For example it is difficult to see how these animals can retreat from the surface or exhibit their nocturnal behaviours - as they are fed during the day.

For the two sharks on display, the CTF state that they are there for 'display and education' (Freedom of Information Request, 2013c), no sharks have been released into the wild and the ones in captivity do not form part of a breeding community. The purpose of the sharks not held in the public area of the facility is unclear, and questions must be asked as to whether the CTF is a suitable facility for any of these animals.

The caiman crocodile

In the wild caiman crocodiles live in lowland wetland and riverine habitats. They eat a variety of crustaceans, fish and even larger mammals. Caiman crocodiles capture their prey via trapping (with the body perpendicular to the shore), active search (with the head under the water), and jumping (leaping partially out of the water and capturing prey) (Marioni et al., 2008).

Caiman crocodiles require enough water to efficiently thermoregulate and wash food down their gullets; they also need to submerge themselves fully in water. These animals experience stress if they are constantly maintained at a temperature above approximately 29 degrees Celsius (Kaplan, 2014).

The CTF is home to a single caiman crocodile named Smiley. She was captured from the wild, in the Cayman Islands with the use of a harpoon - something which is likely to have caused her a significant level of pain. Even though she originated from the wild it is claimed that she cannot be released because she is a hybrid of two species (Cayman News Service, 2011a).

In her pen at the CTF Smiley is only able to fully submerge in a small area and has very little shade in her enclosure. One notice by the side of her enclosure is all that is available to educate visitors about her and her species. Smiley serves no other purpose other than to perform for visitors at feeding time when she is required to 'jump' for food, which results in her hitting the concrete floor of her enclosure - the repetitiveness of this act, together with the insufficient captive conditions means Smiley's welfare is significantly compromised.



Image: The sharks on display to the public at the CTF. World Animal Protection/Catherine Mason, 2014.

The UK Government and the Cayman Turtle Farm

As a British Overseas Territory, the Cayman Islands is represented by the UK Government at the Conferences of Parties meetings, held by CITES. At these meetings, various issues relating to international trade in endangered species are discussed as CITES regulates the trade in wild animals and plants, to ensure that this does not threaten their survival.

Whilst the trade in many endangered animals is prohibited under CITES, some trade in certain species can be allowed if specific criteria are met. For example trade can sometimes be permitted if the animal in question was bred in a farmed environment as opposed to being captured in the wild. In order to meet the criteria for what CITES calls a 'captive breeding facility', it needs to be determined that the operation is being carried out at all stages in a 'humane (i.e. non-cruel) manner' (CITES, 2010).

In 2002, representatives from the UK Government's Department for the Environment, Food and Rural Affairs (Defra) proposed that the CTF should be registered as a captive breeding facility under CITES, which would have allowed it to export live turtles and their carapaces (Donnelly, 2011). In order to demonstrate that the Farm met all of the relevant criteria for this sort of facility, Defra commissioned a report into the workings of the CTF which was undertaken by Professor Brendon Godley of Exeter University. Professor Godley stated that 'in my professional opinion, the operation is carried out in a "humane (i.e. non-cruel) manner" as required by CITES Resolution Conf 11.14' (Godley, 2002).

However, the proposal to list the CTF as a captive breeding facility was rejected at CITES, and therefore their ability to trade internationally was prohibited. However, the rejection was not made on the grounds that the facility was operating in a cruel way, but instead concerns were raised about the insufficient data provided to show that true captive breeding was occurring (Sea Turtle Conservancy, 2002).

Despite pushing for the Farm to be registered as a captive breeding facility, the UK Government, has not signed up to the section of CITES which requires these facilities to be registered. The UK CITES Management Authority has stated that "the EC (and so the UK) does

not implement the CITES Resolution for the registration of Appendix I captive breeding operations" (UK CITES Management Authority & Scientific Authority et al., 2006).

In 2006, 20 green sea turtles were shipped from the Cayman Turtle Farm to the UK in order to be housed at public aquariums throughout Europe (MEDASSET et al., 2006). This decision was heavily criticised by turtle conservation bodies worldwide (Sea Turtle Conservancy, 2006).

The UK CITES Management Authority, on behalf of the UK Government, not only allowed this shipment of green turtles to take place; but stated that "we remain confident that the Cayman Turtle Farm (CTF) meets the CITES criteria for captive breeding as defined in Res. Conf. 10.16." (UK CITES Management Authority & Scientific Authority et al., 2006) thus confirming that they believed the Farm to be operating in a non-cruel manner.

Today one of these turtles, named Ernie, is on display at the Manchester Sea Life aquarium, and visitors are informed that the aquarium "saved" him from becoming turtle soup (Collin, 2013).



Image: Ernie the turtle, originally from the CTF and now on display at Manchester Sea Life aquarium. World Animal Protection, 2013.



Image: Visitors handling turtles at the CTF. Not only does this pose a risk to the turtles, but World Animal Protection has concerns about the possibility of disease transmission to humans. World Animal Protection/Catherine Mason, 2014.

3 Risks to human health

Wild turtles in their natural environment present very little health risk to humans, but the same cannot be said for captive-housed turtles (Warwick et al., 2013).

World Animal Protection maintains that the CTF's turtles pose a potential threat to human health via the transmission of infectious biological agents (bacteria, viruses, parasites and fungi) when visitors interact with the animals.

3.1 Transmission of disease

Sea turtles can harbour a variety of bacteria, viruses and parasites (Bluvias and Eckert, 2010). In 2013, a peer-reviewed study of water samples taken from the CTF's turtle tanks found that four different types of disease-causing bacteria were identified, all of which can infect and cause disease in humans (Warwick et al., 2013). Further water samples obtained as part of World Animal Protection's investigation between 2011 and 2013, have revealed further bacteria. The CTF now also conducts its own water tests and has found both *E.coli* and *Salmonella* to be present on occasions in the swimming lagoon and turtle tanks (Freedom of Information Request, 2014b).



Image: Hand washing information signs at the CTF which highlight the potential for the spread of bacteria. World Animal Protection/Catherine Mason, 2014.

Table 2: Analysis of water samples obtained on behalf of World Animal Protection from the CTF turtle tanks

| Date | Source | Bacteria isolated | Symptoms in humans |
|----------|--------------------|--|---|
| Jan 2012 | Touch tank | • <i>Aeromonas</i> spp | • Stomach pain, cellulitis, nausea, vomiting, pain, fever, septicaemia, colitis, meningitis |
| Jan 2012 | Touch tank | • <i>Pseudomonas aeruginosa</i> | • Fever, dermatitis, diarrhoea, urinary and respiratory problems, meningitis, corneal ulceration |
| Jan 2012 | Turtle tank | • <i>Aeromonas</i> spp | • Stomach pain, cellulitis, nausea, vomiting, pain, fever, septicaemia, colitis, meningitis |
| Jan 2012 | Juvenile tank | • <i>Vibrio</i> spp • <i>Salmonella</i> spp | • Stomach pain, vomiting, fever, septicaemia • Stomach pain, nausea, vomiting, fever, septicaemia, meningitis |
| Jan 2012 | Snorkelling lagoon | • <i>Vibrio</i> spp | • Stomach pain, vomiting, fever, septicaemia |
| Feb 2012 | Turtle tank | • <i>E.coli</i> • <i>Enterococcus</i> spp | • Acute gastrointestinal, nausea, vomiting, pain, fever, acute renal failure. • Urinary tract infections, bacterial endocarditis and meningitis. |
| Feb 2012 | Turtle tank | • <i>Enterococcus</i> spp | • Urinary tract infections, bacterial endocarditis and meningitis. |
| Feb 2012 | Snorkelling lagoon | • <i>Vibrio alginolyticus</i> • <i>Aeromonas hydrophila</i> | • Gastrointestinal, pain, vomiting, fever, septicaemia, otitis • Gastrointestinal, cellulitis, nausea, vomiting, pain, fever, septicaemia, colitis, meningitis |
| Feb 2012 | Snorkelling lagoon | • <i>Aeromonas hydrophila</i> | • Gastrointestinal, cellulitis, nausea, vomiting, pain, fever, septicaemia, colitis, meningitis |
| Sep 2012 | Touch tank | • <i>Vibrio vulnificus</i> | • Gastrointestinal, pain, vomiting, fever, septicaemia, otitis |
| Sep 2012 | Turtle tank | • <i>Vibrio alginolyticus</i> • <i>Vibrio vulnificus</i> | • Gastrointestinal, pain, vomiting, fever, septicaemia, otitis |
| Sep 2012 | Touch tank | • <i>E.coli</i> • <i>Enterococcus</i> spp | • Acute gastrointestinal, nausea, vomiting, pain, fever, acute renal failure • Urinary tract infections, bacterial endocarditis and meningitis. |
| Sep 2012 | Turtle Tank | • <i>Vibrio alginolyticus</i> • <i>Shewanella putrefaciens</i> | • Gastrointestinal, pain, vomiting, fever, septicaemia, otitis. • Soft tissue infections usually only when in combination with other bacterial infections |
| Sep 2012 | Snorkelling lagoon | • <i>Vibrio alginolyticus</i> • <i>Vibrio vulnificus</i> | • Gastrointestinal, pain, vomiting, fever, septicaemia, otitis |
| Sep 2012 | Turtle Tank | • <i>E.coli</i> • <i>Streptococcus</i> spp | • Acute gastrointestinal, nausea, vomiting, pain, fever, acute renal failure • Pink eye, meningitis, bacterial pneumonia |
| Jan 2013 | Touch Tanks | • <i>Moraxella</i> spp | • Lower respiratory tract infections |
| Jan 2013 | Turtle Tanks | • <i>Vibrio vulnificus</i> | • Gastrointestinal, pain, vomiting, fever, septicaemia, otitis |
| Jan 2013 | Turtle Tanks | • <i>Salmonella</i> spp • <i>E. coli</i> • <i>Enterococcus</i> spp | • Stomach pain, nausea, vomiting, fever, septicaemia, meningitis • Acute gastrointestinal, nausea, vomiting, pain, fever, acute renal failure. • Urinary tract infections, bacterial endocarditis and meningitis. |
| Jan 2014 | Touch tank | • <i>E. coli</i> | • Acute gastrointestinal, nausea, vomiting, pain, fever, acute renal failure |
| Jan 2014 | Turtle tank | • <i>E. coli</i> | • Acute gastrointestinal, nausea, vomiting, pain, fever, acute renal failure |

Documented cases at other facilities clearly show that disease transmission from turtles to humans does occur. As of October 2013, America's Centres for Disease Control (CDC) reported eight multistate outbreaks of human *Salmonella* infections linked to small freshwater turtles (CDC, 2013), one of which was traced back to two Louisiana fresh water turtle farms. ABTA, the UK Travel Association, also classes the handling of reptiles as an unacceptable practice because of the risk of *Salmonella* transmission (ABTA, 2013).

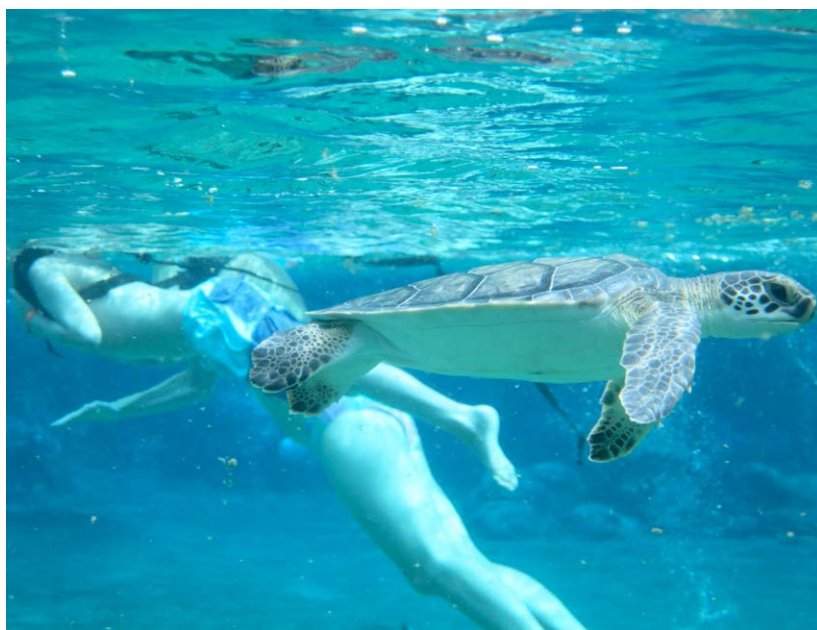
Until recently, there were no signs alerting CTF visitors to potential health risks, and no sanitising products available (Warwick et al., 2013). However, after World Animal Protection launched its public Stop Sea Turtle Farming campaign, hand-sanitising facilities were introduced, as were public signs citing possible health concerns and CDC Guidelines.

Experts are uncertain, however, as to whether cold water, soap and hand sanitiser are sufficient to kill the bacteria that pose a risk to people (Warwick, 2012). Other conservation programmes insist that handlers wear latex or nitrile gloves and that surface wounds be covered with protective dressings to reduce the risk of disease transmission (Bluvias and Eckert,

2010). World Animal Protection argues that the CTF's precautionary measures do not go far enough. The best way to ensure that disease transfer does not occur is to end the unnecessary handling of turtles by members of the public.

The CTF states that they do not have confirmed cases of people becoming ill after visiting their facility (Connolly, 2013a), but this claim is impossible to verify. Given the identification of disease-causing microbes in its tanks and swimming lagoon, it is reasonable to assume these bacteria are widespread throughout the Farm (Warwick et al., 2013). Visitors who pick up an infection from the captive turtles may not feel unwell until hours or days after they have left the facility, and until signs were in place advising them of the possibility of contracting an illness they may not have thought that their symptoms were the result of handling a turtle. The symptoms these illnesses produce – commonly nausea, vomiting and diarrhoea – mimic those of other common tourist illnesses, so may be misattributed to some other cause (Warwick et al., 2013). Research is needed to assess the potential for disease transmission, focussing on the post-visit health of CTF tourists; without such data, the CTF's words should be treated with caution.

Image: Juvenile green sea turtle and swimmers in the CTF lagoon. World Animal Protection, 2014.



In summary: risks to human health

- At least five different types of disease-causing bacteria have been identified in publicly-accessible turtle pools.
- Procedures, such as hand washing, to minimise the risk of disease transmission may be inadequate.
- The CTF has no procedures in place to monitor the health of its visitors.



Image: Turtle in the wild. Patrick Weir.

4 Failure of the conservation mandate



Image: A green sea turtle in its natural environment. Patrick Weir.

A wild life

In the wild, green sea turtles take 25-50 years to reach sexual maturity. Female turtles often swim thousands of kilometres from their feeding grounds to lay their eggs on the beach where they hatched. Females nest every two to four years, and lay up to nine nests per season each containing around 100 eggs. Around 60 days later, the eggs hatch and the tiny, vulnerable hatchlings scabble their way to the water. Easy pickings for gulls, crabs and other scavengers, it is the most dangerous time of their lives. It is estimated that just 1% of hatchlings survive their first year. Those that do may live up to 80 years (Sea Turtle Restoration Project, 2013).

4.1 The consumption of turtle meat

Turtle meat has been part of the Caribbean diet for centuries. In the Cayman Islands, turtle stew is the national dish and its consumption is deeply embedded within Caymanian culture. Local Caymanians and tourists continue to eat turtle meat in the Cayman Islands, despite the endangered status of green sea turtles, and a dramatic fall in the wild local population (Bell et al., 2005; 2007). Commercially farmed turtle meat can be legally sold within the Cayman Islands, but its export is forbidden under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

Averaging the slaughter numbers over the last five years it appears that around 1,095 turtles a year are killed for meat (Freedom of Information Request, 2012a), however, this number is declining, during 2012 around 900 turtles were slaughtered (Cayman News Service, 2013b).

4.1.1 Consumption by Caymanians

The CTF maintains that farmed turtle meat fulfils a local demand which would otherwise be met by the illegal poaching of wild turtles, in fact they say; "the goal of this... company (CTF) is to produce enough turtles to supply the needs of the local market and continue releasing turtles" (CTF, 2011a). Plus the Farm adds that "the sale of turtle meat has a positive conservation impact because it greatly reduces poaching in the wild" (CTF, 2011b) and that "[a] factor that has enabled the increase in the wild turtle population is that Cayman Turtle Farm provides a legally and readily available source of farmed turtle meat. There is much less incentive to take turtles from the wild than would be likely if local demand for turtle meat were not met from farmed stocks" (Cayman Compass, 2013a).

In an open letter to Tanya Streeter, a celebrity supporter of the Stop Sea Turtle Farming campaign the Managing Director of the Farm, Tim Adam says; "A review of our turtle meat sales data shows local demand for turtle meat increasing significantly each year in 2011 and 2012. For example for 2012 it took over 900 turtles to satisfy local demand. If the Cayman Turtle Farm does not supply the local demand for turtle meat, which has increased to over 900 turtles in 2012, where does Ms Streeter or the World Animal Protection suggest that amount of turtles will come from to allow Caymanians to continue eating turtles?" (Cayman Compass, 2013a).

Yet the true actual demand for turtle meat among Caymanians is unknown – the CTF sells its meat on a ‘cash and carry’ basis and keeps no records of its buyers (Freedom of Information Request, 2012f). From 2010 to 2011 the CTF aimed to maintain the production levels of turtle meat at 400lbs per day for four days a week, or 1600lbs per week. This is despite the fact that the Farm is unsure of the true Caymanian demand. By setting a meat production quota the CTF are anticipating a demand which has yet to be quantified (Swarbick, 2013).

World Animal Protection maintains that contrary to the argument put forward by the CTF, the provision of farmed turtle meat may stimulate local demand, which in turn, drives illegal poaching (Pioro McGuire, 2010; Cayman News Service, 2010a). Anecdotally it has been claimed that some Caymanians even prefer the taste of wild to farmed turtle meat, and although the CTF reduced prices in 2013, farmed meat remains expensive. This means the incentive to poach still exists, because meat obtained from the wild will always be cheaper than that purchased from the Farm. Despite facing fines and the possibility of a custodial sentence it is known that poaching of wild sea turtles continues in the Cayman Islands (Cayman News Service, 2011b).

Research is needed to understand the factors that drive and deter poaching as the true scope of the practice remains unknown. Most notably perhaps is the fact that the Farm claims that meat sales reduce poaching, but does not itself monitor or study these levels in the Cayman Islands and there are no known studies which investigate the levels of poaching in relation to the cost of turtle meat produced and sold at the Farm. Without this type of information it is impossible to assess the impact of the Farm on poaching and conservation to any degree of certainty.

4.1.2 Consumption by tourists

Meat from the Farm is sold in several Caymanian tourist restaurants. A 2012 World Animal Protection-commissioned independent poll of 400 cruise ship tourists who visited the CTF, found that 21% had eaten turtle meat whilst on holiday (Greenberg Quinlan Rosner Research, 2012). Whilst turtle stew has cultural significance for the people of the Cayman Islands, turtle steak and turtle burgers are more recent additions to the menu – created in part for the tourist market.

Eating turtle meat is part of Caymanian culture, but the same argument cannot be used to defend the tourist appetite. World Animal Protection argues that there is no real ‘demand’ from tourists to eat turtle meat whilst holidaying in the Cayman Islands, and they may only choose to do so because it is advertised to them on the menu on a restaurant. By selling turtle meat to tourists, the CTF has created an artificial market that effectively



Image: Caymanian restaurant advertising turtle burgers. World Animal Protection/Catherine Mason, 2014.

subsidises its own existence, by allowing the Farm to continue to state that there is a significant demand for turtle meat. This artificially inflates the numbers of turtles slaughtered, erroneously reinforcing the Farm's claims of demand. This strategy also seems at odds with the Farm's conservation remit, because it is unclear how the Farm can maintain that a tourist eating turtle meat benefits the conservation of the green turtle species as a whole.

If the Farm genuinely only wanted to meet the local Caymanian demand for turtle meat in order to protect local turtle populations, they could begin by addressing the issues which surround the recording of turtle meat purchases. The Farm could also work to encourage restaurants on the Island to end the sale of meat to tourists - this would not only reflect the original aims of the facility, but would help to establish true Caymanian demand for the meat. This is something it appears the Farm has already recognised, because as a result of World Animal Protection's Stop Sea Turtle Farming campaign they have ended the sale of turtle meat to tourists in 'Schooner's Bar and Grill', their own on-site restaurant.

4.1.3 A taste for change

Despite claims made to the contrary by the CTF it appears that demand for turtle meat could in fact be waning. Over the last five years, per capita consumption of farmed turtle meat has decreased (Cayman News Service, 2010b), and the CTF is slaughtering fewer animals now than five years ago - around 900 in 2012 compared with 1632 in 2007 (Cayman News Service, 2013b and Freedom of Information Request, 2012a).

World Animal Protection welcomes the announcement that the Cayman Islands Department of Environment recently committed to conduct a three-year study to ascertain the true scale of local demand for farmed meat. World Animal Protection hopes that once the market demand is known, the CTF will introduce initiatives to reduce that demand over time. The first step would be to stop selling meat to tourists via tourist facing restaurants, and instead supply meat to Caymanians (World Animal Protection, 2013).

At a glance:

- By selling farmed meats to locals and tourists, the CTF could be driving demand for its own product and stimulating the black market for wild turtle meat;
- The commercial production of sea turtles could therefore be said to work against, not for, the species conservation;
- Research to identify the true local demand for turtle meat is welcome and should lead to initiatives to reduce demand over time;
- The consumption of turtle meat holds deep cultural significance for locals, but satisfies little more than curiosity for tourists. The CTF should cease supplying turtle meat to tourist outlets.

The Kemp's Ridley

– A conservation crisis

The Kemp's Ridley is the world's most endangered sea turtle. It is estimated there are around 8,000 nesting females alive in the world today (Sea Turtle Conservancy, 2013). In 1968, the CTF established a captive breeding programme to boost their numbers, starting with 163 animals. By the mid 90's when the initiative was closed, 3,049 Kemp's Ridley turtles had hatched. Today only 18 remain at the Farm, and 19 have died within the last five years (Freedom of Information Request, 2014a). The fate of the other Kemp's Ridley turtles remains unclear. An undocumented number were shipped to the US, and 110 were transferred to Mexico. Although the CTF can disclose that none of the animals were ever released, it has no records of

how long the hatchlings survived, of how many died or of how many were euthanised (Freedom of Information Request, 2013b). It is disappointing to think this golden conservation opportunity had so little impact (World Animal Protection, 2013).

It appears that there is also no plan in place for the Kemp's Ridley turtles which remain at the CTF, other than for a small number of them to be on display to the public in completely unsuitable conditions.

These critically endangered animals deserve better. World Animal Protection wants these animals to be immediately assessed by an independent expert and for their welfare needs to be met as a matter of urgency.

Image: One of the Kemp's Ridley turtles housed at the CTF. This turtle has a large extensive wound which appears untreated. Image obtained as part of World Animal Protection's initial investigation. World Animal Protection, 2011.



4.2 Releasing turtles into the wild: The 'Headstarting' Programme

The CTF uses a release process that it has championed, known as 'headstarting', where juvenile turtles are raised in captivity, then released into the wild when big enough. It is believed that 'headstarting' turtles ensures that those released are less likely to fall victim to predation. Since inception the CTF has released 31,000 captive-bred turtles into the wild (Cayman Turtle Farm, 2013). The CTF claims that 80% of these were tagged so they could be tracked and identified post-release.

Over the last three decades, however, the CTF's release programme has slowed (Freedom of Information Request, 2013a). In the 1980s, thousands of turtles were released per year. In the 1990s, it was hundreds. In the last decade, it is down to tens per year (Freedom of Information Request, 2013a).

It is unclear what has happened to the majority of animals released. Monitoring has shown that only 13 of the 31,000 turtles released have returned to Caymanian beaches (Freedom of Information Request, 2012a). That is just 0.04% of the original tagged population, leaving the fate of the remaining 99.96% unknown.

In recent years, the numbers of wild turtle nests on Caymanian beaches has increased (Freedom of Information Request, 2012a). Yet despite tagging by the CTF of so many released turtles, researchers are currently unclear as to how many of the turtles nesting on Caymanian beaches are wild and how many are 'headstarted'. As a result, Janice Blumenthal, research scientist from the CIG's Department of Environment said "we are currently unable to determine the role of the Cayman Turtle Farm in contributing to the green turtle nesting increase" (Connolly, 2013b).

World Animal Protection concludes that 'headstarting' is an ineffective practice. However, there are also other detrimental factors to consider namely that 'headstarting':

- may introduce disease into wild populations;
- may impair the migratory ability of released turtles;
- could be polluting the genetic diversity of Caymanian turtles.

The CTF's captive breeding and release programme from 2007 to 2011

127,000 eggs were laid at the Farm

6.2% of all hatchlings survived to one year, this equates to 7,905 turtles

2299 adult turtles died in the care of the Farm

263 turtles were released into the wild

13 Farm bred and released turtles were recorded as returning to Caymanian beaches to nest

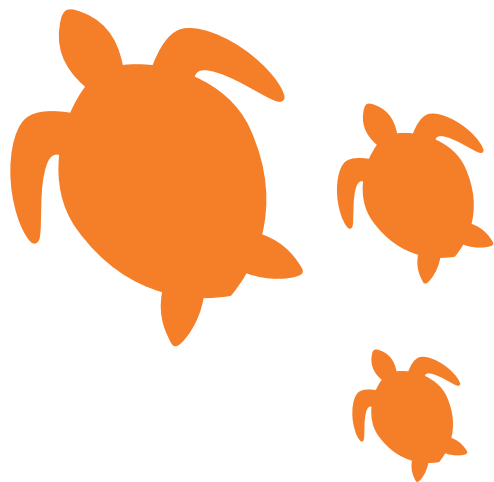




Image: A CTF organised turtle release. Member of the public are allowed to release 'headstarted' turtles into the wild. Michelle de Villers, 2012.

4.2.1 Disease risk for wild turtles

Many different diseases have been identified in the overcrowded, stressful conditions of the CTF. Some diseases such as grey patch are known to spread between turtles (Haines et al., 1977). Turtles released from the CTF have the potential to introduce and spread disease to the wild population (Mortimer 1995, Wood & Wood, 1993).

Elliott Jacobson, a specialist in reptile infectious disease at the University of Florida has stated;

"Releasing infected, asymptomatic turtles into unexposed wild populations can result... in major episodes of mortality... It has the potential of doing more harm than good. Unless a farming operation can clearly demonstrate that it has the resources and commitment to establish a sound preventative medicine program and can demonstrate that only healthy turtles are being released, then it should not

be supported by either conservationists or anyone else who has common sense." (Jacobson, 1996)

Quarantine is an important part of this procedure. The CTF claims to follow internationally recognised protocols for the release of turtles into the wild (Freedom of Information Request, 2012a), but their exact protocol is unclear and currently under review. The Farm recently updated its quarantine facilities and says that no animals exhibiting clinical signs of disease have ever been released. But infected, asymptomatic animals can appear healthy in quarantine yet still pose a disease risk after release.

The 2012 'independent assessment' of the CTF reported: "At present there are concerns over the potential release of CTF animals into the wild. Although no evidence of deleterious effects have been documented in wild turtles, we recommend that, in future, all animals released into the wild receive a veterinary certificate of health" (Balazs et al., 2012).

Scientists looking into the success of the release programme have also stated that “precautions are taken at the Cayman Turtle Farm to ensure this risk [of disease transmission] is kept to an absolute minimum” (Bell et al., 2005).

But recent events have caused doubt as to the effectiveness of these quarantine procedures. The planned turtle release for 2013 was called off with the Farm citing concerns over their quarantine procedure (Fuller, 2013c). The Farm’s release programme has now been suspended until at least 2016 and when the results of appropriate tests have been reviewed. As the conditions for release are only now being revised and updated it remains unclear how the Farm can demonstrate that all animals released up until this point were free from disease.

4.2.2 Impaired migration

World Animal Protection believes that prolonged periods of captivity – prior to release, combined with the hatching of eggs in a farmed environment could interfere with the green sea turtles’ complex migratory habits (Eckert et al., 1999). Turtles bred at the CTF were originally sourced from the Ascension Islands, Suriname and Costa Rica but are released from the Cayman Islands. One study which looked at where turtles from the Farm go once released found that they were moving around the Caribbean and South-eastern USA. However, only two individual turtles in this study were shown to have returned to the Cayman Islands to successfully lay eggs (Bell et al., 2005).

Evidence suggests that turtles imprint onto the beach on which they hatched, and so experience a critical period of time in the first few hours of their lives – something which then guides them back to this beach to lay their own eggs once they have reached sexual maturity. This critical period cannot be replicated in farmed conditions (Mrosovsky, 1983) because turtles do not hatch out onto a beach which they are able to return to.

Perhaps an ineffective migratory system in CTF released turtles could be one explanation as to why seemingly so few have returned to Caymanian beaches.

4.2.3 Genetic concerns

Nesting turtles return to their beach of origin to lay eggs and in turn contribute to the gene pool of their population (Allard, 1994). The CTF is releasing turtles of mixed genetic ancestry into its local waters, raising concerns that it is polluting the genetic heritage of the native Caribbean sea turtles (World Animal Protection, 2013), and potentially interfering with their ‘internal migratory compass’ (see above).

Inbreeding is an additional concern. This occurs when genetically related individuals are allowed to mate, potentially causing serious deformity and ill-health in their offspring. Through a Freedom of Information Request, World Animal Protection has learned that the number of turtles which are breeding and producing viable eggs is very limited. In 2012, 12 wild caught and 31 captive bred turtles produced eggs (Freedom of Information Request, 2013b). These figures suggest that inbreeding may be occurring at the CTF, because the gene pool from which turtles are breeding is small. The discovery by World Animal Protection of CTF turtles with missing eyes and deformed skeletons also suggests genetic deformity and inbreeding (Arena et al., 2012).

Other countries are so concerned about genetic pollution that they demand that checks are carried out before a release of turtles takes place. For example the Costa Rican law states that genetic evaluations of turtles planned for release must occur in order to ensure that these animals will not damage the ecosystem (Ley de Conservación de la Vida Silvestre, 2012). Such checks have not been a legal requirement in the Cayman Islands.

4.2.4 Easing the symptoms is not enough

Marine turtle populations face a range of threats to their survival including human consumption, habitat destruction, marine and light pollution, beach dredging, oil spills and climate change (Lutcavage et al., 1997, Sea Turtle Conservancy, 2012). Many conservationists have criticised ‘headstarting’ because it fails to address the reasons for the initial decline, so can have little long-lasting effect (Mortimer, 1995).

Moreover the cost of rearing a turtle in captivity for several years before releasing it is extremely high, especially when the cost of housing, feeding and medicating each individual for at least a year and are factored in. It is unclear how much it costs the CTF to release a single turtle because their financial records

do not appear to detail this information. However, what is clear is that however much it costs to rear one 'headstarted' turtle – it would cost less to protect beach nesting sites, and turtle's eggs, in situ.

Consequently, it can be argued that 'headstarting' treats the symptoms of the problem rather than the cause, siphoning funds from tried and tested programmes, such as anti-poaching initiatives and improved protection for nesting turtles.

Release at a glance:

- The success of the CTF's 'headstarting' release programme is highly uncertain;
- 'Headstarting' releases may hinder migration and conservation efforts;
- Concerns exist over the genetic heritage and make up of released CTF turtles;
- Turtles released under the 'headstarting' programme may introduce disease(s) into wild turtle populations;
- The CTF currently has no systematic protocol in place to guarantee the health of its released turtles.

Compassion of methods: 'headstarting' versus beach protection

At the Archie Carr National Wildlife Refuge in Florida a scheme is in place to protect both turtles and their eggs. They do this by protecting the beaches on which turtles lay their eggs and by enhancing levels of habitat protection. In 2001 the Refuge recorded 198 green sea turtle nests. By 2013 this had increased to 12,846 (US Fish and Wildlife Services, 2013).

In the Cayman Islands, the Department of Environment works to protect turtles' nests. However, the Farm claims that their 'headstarting' release programme bolsters wild population numbers. In 2001 there were approximately 10 nests on Cayman beaches; by 2011 this had increased to approximately 100 nests (Freedom of Information Request, 2012a). Although only around 13 CTF-released turtles can be shown to be nesting on these beaches (Freedom of Information Request, 2012a).

Image: A CTF turtle release. Juvenile turtles are unable to naturally imprint on this beach as they are raised in captivity. Michelle de Villers, 2012.



Campaign success: World Animal Protection and Cayman Islands Government Joint Statement

In January 2014 World Animal Protection staff met with representatives from the Cayman Islands Government (CIG) including the Deputy Premier and Minister for District Administration, Tourism and Transport and the Minister of Financial Services, Commerce and Environment. World Animal Protection called for progress to be made in the following areas:

- Ending the controversial and costly release of sea turtles bred at the Farm
- Ending the promotion and sale of turtle meat to international tourists
- Understanding the true scale of Caymanian demand for turtle meat

The CIG was receptive to taking these steps, and as a result agreed to produce a first-ever joint statement with World Animal Protection which highlighted some of World Animal Protection's concerns as well as outlining ways to address these. This statement says;

The Cayman Islands Government and World Animal Protection have held positive discussions on several key issues carried forward from meetings last year. It was agreed that turtle meat has huge cultural significance in the Cayman Islands. World Animal Protection is concerned that there is a need to consider ways to reduce the promotion of turtle meat to international tourists. These concerns will be investigated further through research conducted by the Department of Environment and their project partners via Darwin Plus funding made available by the UK Government. This long-term study will also look into the effectiveness of the turtle-release programme and potential contribution of releases to wild populations of turtles. World Animal Protection was pleased to learn that the future release of farm-raised turtles has been suspended until the findings of the research are available. The Cayman Islands Government has undertaken to address all appropriate concerns.

Image: World Animal Protection, 2013.



4.3 Failure to meet biodiversity standards

Waste water from the CTF is pumped directly into the sea. The discharge contains sewage, food waste and bacteria, and has potentially been degrading the local water quality for 40 years. This has resulted in a visible plume of suspended white organic matter and bacteria, and intensive growth that has smothered the shoreline, ocean bed and coral reef (Goreau, 2008).

The Cayman Islands' Department of Environment (DoE) has reported a stunting of coral growth in the immediate local area. A 2008 report from the then Complaints Commissioner John Epp revealed that effluent "may have interfered with the attractiveness to the water tourism industry of Cayman's well-known surrounding reefs and contributed to the reduction in the production of beach sand" (Fuller, 2011). The 2012 'independent assessment' also highlighted concerns that pathogens in the CTF effluent have the potential to infect wild turtles.

World Animal Protection concludes that waste water from the CTF continues to have a negative impact on the delicate biodiversity of the local marine environment (World Animal Protection, 2013). According to the CTF's 2011 Annual Report the Farm remains at risk from possible litigation and fines after its failure to acquire the correct environmental permits between 2007 and 2008. In 2009, the CTF was granted a two-year permit for its effluent discharge but was obligated to reduce its effluent emissions by half, which the auditors say the Farm has not done. Despite regular effluent monitoring, the Farm still fails to meet the required reduction in the waste and pollution it discharges into the ocean (Cayman News Service, 2013a and Freedom of Information Request, 2013d).

Biodiversity at a glance:

- Waste water from the CTF is pumped directly into the sea, failing to comply with the demands of the Cayman Water Authority;
- This effluent is polluting the neighbouring waters, representing a serious threat to biodiversity.

Widespread concern

Many different organisations have expressed concern about the CTF. In 2013 the YWF-KIDO Foundation, an NGO based in Grenada in the West Indies that promotes wild sea turtle conservation, stated that the CTF poses "serious risks to the conservation of wild sea turtle populations" in the Caribbean.

Specific concerns include:

- Released Farm turtles may carry disease, which can then contaminate the wild population.
- Released turtles are unable to find nesting grounds and reproduce.
- Handling and eating turtles poses a threat to human health.
- The CTF's marketing of farmed turtle meat as food sends the wrong message. "Eating turtle meat of any kind, wild or farmed, is not acceptable."

Rather than boosting conservation efforts, the CTF is likely to be harming them, the YWF-KIDO Foundation concludes. It therefore urges "an immediate halt to the Cayman Turtle Farm release program," and "the total ceasing of any commercial turtle farming activities." Instead, they say that the Farm could be converted "to a truly genuine sea turtle conservation research institution and visitors' attraction, as the Caribbean's foremost Sea Turtle Hospital and Rehabilitation Center."



Image: YWK - KIDO rescue operation. YWK - KIDO.



A Life for Nature

Image: YWK - KIDO.

4.4 The CTF as a research facility

With its captive breeding and release programme, the CTF has been uniquely placed to contribute to the scientific study of green sea turtles. Through its practices and experience it has had the potential to shed light on issues including turtle behaviour, migration, biology and conservation. However, its research pedigree is lacking.

Scientific research becomes authenticated when independent experts have had the chance to review the study (a process known as peer review), and its methods and findings are then published in a scientific journal. The CTF claims to have published or contributed towards 153 scientific research papers since it began in 1968 (Freedom of Information Request, 2013a), but their list includes many non-peer reviewed publications, including opinion pieces and bibliographies. This dilutes the authority of the research record.

In addition, the CTF's list of research papers includes 17 duplications and several references that have proved untraceable, leading World Animal Protection to question the validity of some of the CTF's research

claims. The majority of peer-reviewed research was also performed prior to 1985. Some papers portray the Farm in a positive light, whilst others document animal welfare concerns and serious disease outbreaks.

Given its resident population of turtles, and its captive breeding and release programme, the CTF could have done more to contribute to the scientific understanding of green sea turtles. However poor record keeping and missed research opportunities mean this has not occurred. The paucity of data and current, peer-reviewed scientific studies make it hard to substantiate the CTF's claims that it is making a significant contribution to scientific research.

Research record: at a glance

- The CTF is missing out on a golden opportunity to be at the forefront of turtle conservation research;
- Although the CTF boasts 153 relevant research publications, their quality is mixed and some of the studies are outdated or have not been through the peer review process.

In summary: failure of conservation mandate

World Animal Protection maintains that:

- Commercial production of turtles at the CTF may have a detrimental effect on conservation by fuelling demand and illegal poaching;
- The CTF's 'headstarting' release programme is of unproven effectiveness, and maybe harming the health of released and wild turtles;
- Practices at the CTF, including the discharge of effluent directly into the sea, maybe harming local biodiversity;
- The CTF's scientific research is outdated.

World Animal Protection does not doubt the Farm genuinely believes its actions are positively contributing to green sea turtle conservation efforts in the Cayman Islands. But World Animal Protection concludes that these actions are at best failing, and at worst harming conservation efforts.



Image: Turtle on the menu in the Cayman Islands. Michelle de Villers, 2012.



Image: A green sea turtle housed in the public area of the CTF. The water quality is so poor that it is hard to see the second turtle in the background. World Animal Protection, 2013.

5 A failing business model

Every known attempt to farm sea turtles commercially has failed. The CTF is no exception: its meat production is unprofitable, and its tourist trade fails to compensate for this and as a result it has amassed debts in the region of US\$56.6 million (balances quoted as of June 2010 (Harrison, 2010)).

The Farm has always maintained that it could operate a business model with a philosophy of 'conservation through commercialisation' (CTF, 2011b) and historically there may have been one or two years when the facility did turn a profit. However, as the following timeline shows, the Farm has struggled financially for decades:

The CTF's 2011 annual report, audited by KPMG, reveal falling gross profits - CI\$.3.6 million in 2011, compared with CI\$4.6 million in 2010. And because of its substantial debt, and the added costs associated with servicing this debt, it continues to lose around CI\$10 million a year (Cayman News Service, 2013a, Fuller, 2013b).

The CTF struggles on as a result of regular CIG subsidies.

- In the 2013/14 tax year, the CIG subsidised the CTF to the tune of CI\$10.29 million (Cayman Compass, 2013b) - equivalent to CI\$175 per year for each of the 56,000 Caymanian residents (Turks and Caicos Sun, 2013);
- Between 2006 and 2011, the CIG ploughed a total of CI\$53.5 million into the facility (Freedom of Information Request, 2012b).
- Between 2001 and 2005, the CIG spent around CI\$50 million redeveloping the Farm (Cayman Compass, 2013b).

In short, the CTF is an unsustainable business model that drains the Caymanian economy. In the last few years, the Farm has attempted to address its financial problems by various means, including laying-off workers, reducing staff salaries and exploring new revenue

Cayman Turtle Farm Timeline:

1968

Mariculture Ltd. was established.

1975

Mariculture Ltd. went bankrupt and was put into receivership.

Mariculture Ltd. (receivership) was purchased by German investors who renamed it the Cayman Turtle Farm. Conditions were placed on this sale which meant that the CIG held a 2.5% stake in the company.

streams (Cayman News Service, 2013a). But although it has halved its debt (Fuller, 2013a) higher than expected development costs, coupled with lower than projected visitor numbers and operating costs in excess of the initial budget, continue to create a significant business risk that casts a long shadow over the Farm's viability (Cayman News Service, 2013a).

The Farm's expenditure has averaged CI\$18 million per year over the last five years. Consequently, it could be argued that each turtle released during this time has cost CI\$600,000 (Freedom of Information Request, 2012a). A better use of funds, World Animal Protection argues, would be to address the causes of wild turtle decline, rather than patching up the symptoms.

Farming sea turtles is never likely to be a profitable enterprise. Sea turtles are wild animals, biologically unsuited to commercial farming. In their natural environment, they eat a rich and varied diet, and prefer to live in solitary conditions unless mating. In captivity, they are overcrowded, stressed, and prone to ill health. They are fed synthetic food that fails to meet their nutritional needs, and take years to grow to a size where they are suitable for slaughter. Keeping mortality rates down is technically challenging and extremely

expensive. This combined with international legislation in place which bans the commercial sale of these animals or their parts internationally means that generating a profit is at best unlikely. CITES concurs with this view, and states that sea turtle farms are "very expensive, require advanced technical knowledge, and are, to date, of unproved economic viability" (CITES, 1999).

In a recent media interview, the CTF's Managing Director, Tim Adam was unable to offer reassurances that the Farm would break even in the next few years, estimating that it would need to double its annual visitor intake to do so. Visitor numbers, however, are currently falling. For 2010 - 2011, the Farm aimed to increase customer arrivals from 2% to 5%. However, this was not achieved and the Farm states that the numbers were affected by the drop in cruise arrivals to the island, with a reduction of 4% (Swarbrick, 2013).

Were the CTF to attract the requisite number of tourists, problems would still exist, not least is the need to construct a new cruise dock to manage the extra liners which would be required to bring the extra cruise passengers to the Cayman Islands (Turks and Caicos Sun, 2013). Development plans for such a dock, however, are not confirmed so should not be relied upon for business projections.

1979

CITES changed the interpretation of its exemption of "bred in captivity" animals. This excluded the first generation of turtles born in captivity and occurred just as the Farm announced that its captive breeding programme had been successful.

1982

The new Farm owners gave up trying to farm turtles and brought numbers to a minimum with the intention of closing the facility.

1983

The CIG purchased the Farm for US\$1.5 million; the previous owners had invested over ten times this amount.

(World Animal Protection, 2013)

5.1 Future tourist trade

In previous years, the CTF has boasted around 230,000 international visitors per year (Freedom of Information Request, 2012b), but recently the figure fell by some 22% (Freedom of Information Request, 2012a).

Surprisingly a high proportion of tourists who visit the facility do not even realise that it actually operates as a farm. A World Animal Protection-funded independent survey of cruise ship passengers who had visited the Farm found that 71% of them had not realised that some of the turtles were slaughtered for meat. After learning this, respondents were asked to rate on a scale of 1 to 10 how serious their concerns were about the meat production, with 1 reflecting the views of those who were 'not concerned' and 10 reflecting the views of respondents who were very 'extremely concerned'. The average respondent rating was 7.1 (Greenberg Quinlan Rosner Research, 2012).

When asked if they would still have visited the Farm knowing it was a meat production facility, 74% of respondents said they would be less willing to have gone if they had known this in advance (Greenberg Quinlan Rosner Research, 2012).

A further World Animal Protection-funded independent survey of the attitudes of 1,436 US and Canadian residents who planned to visit the Caribbean over the next five years also found:

- That travellers are interested in visiting facilities that provide a 'marine animal encounter' and this is strongly linked to their interest in animals and supporting institutions that protect their welfare (Professional Survey Group, 2012);
- Over three-quarters of travellers would be unlikely to attend an activity or facility if they discovered the animals there were being mistreated (Professional Survey Group, 2012).

Should the Farm change from a meat production facility into a release and rehabilitation facility it seems that it would continue to attract tourists, and moreover provide the sort of experience that most are both looking for, and expect to be visiting.

Image: Turtle housed in the public area of the CTF. World Animal Protection, 2014.



In summary: CTF economics

- The CTF's business plan - to generate profit through tourism and the sale of turtle meat - is failing;
- The Farm continues to generate significant losses and represents a financial drain on the island's economy;
- The Farm relies heavily on regular government subsidy, a model that is not sustainable in the long term;
- Visitors are looking to go to attractions which protect the welfare of the animals in their care.



Image: Green sea turtle in its natural environment
Patrick Weir

6 The humane solution: replacing a defunct initiative

The CTF is not financially viable, and continues to generate widespread condemnation over the mistreatment of its resident sea turtles and questionable conservation policies. World Animal Protection asks, not just that the CTF address these concerns, but that it shift its focus from sea turtle farming to one of research and education. Such a facility could serve to rescue and rehabilitate injured wild sea turtles, and as a result could become a viable eco-tourism attraction.

Historically, sea turtle farms have met with failure. In 1980, a project to raise green and hawksbill turtle hatchlings on the Torres Strait Islands was aborted after disease, parasites and a poor food supply caused the death of many juveniles. Sometime later, the Ferme Corail turtle farm on Réunion Island closed after continued issues with poor growth and disease, and failed attempts to apply for international trading privileges (Ciccione, 2011). In its place, the Kélonia Observatory of Marine Turtles (known as 'Kélonia') was established, operating with an entirely different humane and sustainable approach to sea turtle conservation.

6.1 A model for change

Set in the heart of the Indian Ocean, Kélonia now operates as a sea turtle research and education centre with a major focus on the provision of care for injured and ill sea turtles. It managed to overcome the challenges of local demand and shift away from commercial production, and now generates income from tourism whilst contributing towards wild populations simultaneously (Alcock, 2013).

The shift was financed by both the European Union and Regional Council, with research and development support from external organisations (Kélonia, 2008). The conversion cost less than €20 million and the facility is now run as a not for profit venture generating revenue that covers 67% of its running costs. The majority of the remainder is met by Government and local authority subsidies for awareness-raising or research programmes, with money being granted for discrete projects which have tangible outcomes (Ciccione, 2011).

Today Kélonia is a key contributor to the research and conservation of sea turtles and receives over 100,000 visitors annually, proving it to be a successful tourist attraction (Kélonia, 2008). Visitor numbers and turnover have increased since the site's time as the Ferme Corail, with 110,000 people visiting in 2010 compared to 80,000 in 1997 (Ciccione, 2011).

Following the transition away from commercial production it is evident that turtles remain an important element of Réunion Island's cultural inheritance. Those involved in running Kélonia believe the importance of turtles is stronger today than in the days of farming, and that the status of turtles on the island is progressively improving, with the turtles remaining a driver for job creation and economic success (Ciccione, 2011).

With regards to research, the Kélonia Institute is making a positive contribution to marine turtle conservation. In collaboration with a host of national and international partners (notably the European Union), it aims to broaden the existing knowledge of turtle biology, life cycles and migratory patterns both around and beyond Réunion Island (Kélonia, 2008). Much of this research has already been published in peer reviewed literature.

6.2 The future of the CTF

World Animal Protection hopes that the CTF will follow the example set by Kélonia and move from a turtle farm to leading turtle rescue and rehabilitation centre. This would allow for the current levels of debt to be properly managed as the main focus of the facility would no longer be the costly production of turtle meat. By gradually downscaling meat production at the CTF, an end would be in sight to the annual bailout required to ensure that turtle meat can be consumed by perhaps only a small proportion of Caymanians.

World Animal Protection suggests the transition process be phased over several years, during which time the current staff employed at the CTF could be retrained to ensure they retain their jobs.

A transition of this sort could also significantly benefit local biodiversity – waste water would no longer be pumped into the sea in such large amounts, and 'headstarted' turtle releases would cease, preventing the potential spread of disease from farmed turtles to wild populations.

A properly conducted transition, which could be funded by sources including the Defra's Darwin Plus initiative, could result in a positive change for the Caymanian taxpayer, the Cayman Islands Government and the 9860 turtles currently resident at the CTF. With guidance and a will to change, the CTF could become a centre of excellence for sea turtle conservation and eco-tourism.

Moving forward: Time to Stop Sea Turtle Farming



Image: Kélonia, a facility that has successfully made the shift away from turtle meat production, and has become a rehabilitation and release facility. World Animal Protection, 2012.

World Animal Protection firmly believes there is no humane way to commercially farm green turtles. Furthermore, following a detailed assessment, World Animal Protection also has severe concerns regarding the potential impact of the CTF on wild sea turtle conservation efforts and human health. Consequently, World Animal Protection is committed to ending the inhumane practice of sea turtle farming at the CTF.

We are not alone in this view. Members of the Convention on the International Trade in Endangered Species (CITES) have said that "Sea turtle farms, whether for captive breeding or ranching, cannot be shown to be directly beneficial or proven to be fatally detrimental to the conservation of wild populations. What can be demonstrated is that they are very expensive, require

advanced technical knowledge, and are, to date, of unproved economic viability. The linkage of farms to direct conservation activities and strict trade control, through international cooperation, provides the potential that farms could contribute to the conservation of sea turtles, but this potential remains unrealized." (CITES, 1999).

Réunion Island's Kélonia observatory provides a working example of how a facility can shift from commercial production to a more humane, sustainable and economically profitable alternative.

World Animal Protection urges the CTF to make a similar transition to become a sea turtle research and education centre.

References

- ABTA, The Travel Association (ABTA) (2013) *ABTA Animal Welfare Guidelines: Unacceptable and Discourage Practises*, ABTA Ltd: London.
- Alcock, R. (2013) Does the Cayman Islands really need 'cramped dirty and overcrowded' turtle farm? *The Ecologist*, [Online] 10 January 2013. Available at: http://www.theecologist.org/News/news_analysis/1759173/comment_does_the_cayman_islands_really_need_cramped_dirty_and_overcrowded_turtle_farm.html [Accessed: 11 January 2013].
- Allard, M., Miyamoto, M., Bjørndal, K., Bolten, A., & Bowen, B. (1994) Support for Natal Homing in Green Turtles from Mitochondrial DNA Sequences. *Copeia*. 1. pp. 34-41.
- Arena, P.C., Warwick, C., Steedman, C. (2013) Welfare and Environmental Implications of Farmed Sea Turtles. *Journal of Agricultural and Environmental Ethic*. Available at: <http://link.springer.com/article/10.1007/s10806-013-9465-8#> [Accessed: September 2013].
- Balazs, G., Broderick, A., Godley, J., & Work, T. (2012) Inspection of the Cayman Turtle Farm (10th-12th December 2012): Report to the Cayman Turtle Farm (Ltd.). [Online]. Available at: <http://caymanturtlefarm.ky/wordpress/wp-content/uploads/2013/01/CTF-Inspection-Report-Final-2012-12-17.pdf>. [Accessed: 30 January 2013].
- Bell C. D. L., Parsons J., Austin T. J., Broderick A. C., Ebanks-Petrie G. & Godley B. J. (2005) Some of them came home: the Cayman Turtle Farm headstarting project for the green turtle *Chelonia mydas*. *Oryx*. 39. pp. 137-148.
- Bell, C.D., Solomon, J.L., Blumenthal, J.M., Austin, T.J., Ebanks-Petrie, G., Broderick, A.C. & Godley, B.J. (2007) Monitoring and conservation of critically reduced marine turtle nesting populations: lessons from the Cayman Islands. *Animal Conservation*. 10. pp. 39- 47.
- Blue Iguana Recovery Program (BIRP) (2011) *Conversations with staff about the blue iguana recovery programme and the facility* [Meeting – Personal Communication] July 2011.
- Bluvias, J., & Eckert, K. (2010) Marine Turtle Trauma Response Procedures: A Husbandry Manual. *Wider Caribbean Sea Turtle Conservation Network (WIDECAST) Technical Report No. 10*. Ballwin, Missouri. pp. 100.
- Brakes, P. et al. (2004) (Eds). *Troubled Waters: A review of the welfare implications of modern whaling activities*. London: World Society for the Protection of Animals . ISBN 0-9547065-0-1.
- Brammer, J. (2011) *What if the turtle Farm went belly up?* Cayman Compass. [Online] 16 October 2011. Available at: www.compasscayman.com/caycompass/blogs/whatifcolumn/What-if-the-turtle-Farm-went-belly-up/ [Accessed: 21 February 2012].
- Cayman Compass (2013a) *Cayman Turtle Farm refutes Tanya Streeter's claims*. [Online] 18 February 2013. Available at: <http://www.compasscayman.com/caycompass/2013/02/18/Cayman-Turtle-Farm-refutes-Tanya-Streeter-s-claims/> [Accessed: 20 March 2013].
- Cayman Compass (2013b) *The most important number in the budget*. [Online] 23 October 2013. Available at: <http://www.compasscayman.com/caycompass/2013/10/23/The-most-important-number-in-the-budget/> [Accessed: 24 October 2013].
- Cayman News Service, (2010a) *Turtle meat prices soar*. [Online] 2 May 2010. Available at: www.caymannewsservice.com/headline-news/2010/02/05/turtle-meat-price-soars [Accessed: 21 February 2012].
- Cayman News Service (2010b) *Turtle meat discount over, say Farm officials*. [Online] 3 May 2010. Available at: <http://www.caymannewsservice.com/local-news/2010/03/05/turtle-meat-discount-over-say-farm-officials> [Accessed: 21 February 2012].
- Cayman News Service (2011a) *Captured croc becomes turtle farm performer*. [Online] 30 May 2011 Available at: <http://www.caymannewsservice.com/science-and-nature/2011/05/30/captured-croc-becomes-turtle-farm-performer> [Accessed: 1 March 2014].
- Cayman News Service (2011b) *Endangered green turtle slaughtered with speargun*. [Online] 12 May 2011. Available at: <http://caymannewsservice.com/science-and-nature/2011/05/12/endangered-green-turtle-slaughtered-speargun> [Accessed: 29 October 2011].
- Cayman News Service (2012) *Turtle Farm denies cruelty, disease or genetic defects*. [Online] 19 October 2012. Available at: <http://www.caymannewsservice.com/science-and-nature/2012/10/19/turtle-farm-denies-cruelty-disease-or-genetic-defects> [Accessed: 21 November 2012].
- Cayman News Service, (2013a) *Turtle farm still polluting sea*. [Online] 15 January 2013. Available at: <http://www.caymannewsservice.com/science-and-nature/2013/01/15/turtle-farm-still-polluting-sea> [Accessed: 2 January 2013].
- Cayman News Service, (2013b) *900 turtles killed for meat in 2012, CTF reveals*. [Online] 12 February 2013. Available at: <http://www.caymannewsservice.com/science-and-nature/2013/02/12/900-turtles-killed-meat-2012-ctf-reveals> [Accessed: 15 February 2013].
- Cayman Turtle Farm (CTF) (2011a) *About Us, Cayman Turtle Farm Island Wildlife Encounter*. [Online]. Available at: www.turtle.ky/about-us [Accessed: 21 February 2012].
- Cayman Turtle Farm (CTF) (2011b) *Cayman Turtle Farm speaks*. [Online]. Available at: <http://www.turtle.ky/cayman-turtle-farm-speaks> [Accessed: 27 November 2013].
- Cayman Turtle Farm (CTF) (2012) *Mission Statement, Cayman Turtle Farm Island Wildlife Encounter*. [Online] Available at: www.turtle.ky/missionstatement [Accessed 21: February 2012].

- Cayman Turtle Farm (CTF) (2013) *Research and Conservation: Release Programs, Cayman Turtle Farm Wildlife Encounter* [Online]. Available at: <http://www.turtle.ky/research-conservation> [Accessed: 13 February 2012].
- Centres for Disease Control and Prevention (CDC) (2013) *Eight multistate outbreaks of human salmonella infections linked to small turtles*. [Online] 18 October 2013. Available at: <http://www.cdc.gov/Salmonella/small-turtles-03-12/index.html> [Accessed: 13 February 2014].
- Ciccione, S. (2011) *Questions to the Director: The History of Kélonia*. Interviewed by Lamy, C. [E-mail] December 2011.
- Collin, A. (2013) *Meet Ernie, the Mancunian turtle addicted to sprouts- The Northerner Blog*. [Online] 30 May 2013. Available at: <http://www.theguardian.com/uk/the-northerner/2013/may/30/ernie-the-sprout-eating-turtle-manchester-sealife> [Accessed: 1 June 2013].
- Connolly, N. (2013a) *Study addresses visitor health concerns at Turtle Farm*. Cayman Compass [Online] 11 February 2013. Available at: <http://www.compasscayman.com/caycompass/2013/02/11/Study-addresses-visitor-health-concerns-at-Turtle-Farm/>. [Accessed: 11 February 2013].
- Connolly, N. (2013) *History of turtle releases*. Cayman Compass. [Online] 9 April 2013. Available at: <http://www.compasscayman.com/caycompass/2013/04/09/History-of-turtle-releases> [Accessed: 15 April 2013].
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (1999) *Ranching and Captive Breeding of sea turtles* [Online] Available at: http://www.cites.org/eng/prog/hbt/bg/ranch_breed.shtml [Accessed: 10 July 2013].
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (2010) *Registration of operations that breed Appendix-1 animal species in captivity for commercial purposes*. [Online] Available at: <http://www.cites.org/eng/res/12/12-10R15.php> [Accessed: 12 November 2013].
- Donnelly, M. (2011) *Sea Turtles and CITES*. [Online] Available at: http://seaturtlestatus.org/sites/swot/files/report/033111_SWOT6_p42-43_CITES.pdf [Accessed: 5 January 2014].
- Driscoll, C.A., McDonald, D.W., O'Brien, S.J. (2009) From wild animals to domestic pets, an evolutionary view of domestication. *PNAS*. 106 (1). pp 9971-9978.
- Environmental Audit Committee (2014) *Annex 1 Visit to Cayman Islands*. [Online] 16 January 2014. Available at: <http://www.publications.parliament.uk/pa/cm201314/cmselect/cmenvaud/332/33207.htm> [Accessed: 18 January 2014].
- Environmental Audit Committee (2014) *Sustainability in the UK Overseas Territories*. [Online] 16 January 2014. Available at: <http://www.publications.parliament.uk/pa/cm201314/cmselect/cmenvaud/332/33202.htm>. [Accessed: 18 January 2014].
- Fosdick, P. & Fosdick, S. (1994). *Last Chance Lost?* York PA: Irvin S. Naylor.
- Freedom of Information request (2012a) to The Cayman Turtle Farm. Response received September 2012.
- Freedom of Information request (2012b) to The Cayman Turtle Farm. Response received October 2012.
- Freedom of Information request (2012c) to The Cayman Turtle Farm. Response received December 2012.
- Freedom of Information request (2012d) to The Cayman Turtle Farm. Response received December 2012.
- Freedom of Information request (2012e) to The Cayman Turtle Farm. Response received December 2012.
- Freedom of Information request (2012f) to The Cayman Turtle Farm. Response received December 2012.
- Freedom of Information request (2013a) to The Cayman Turtle Farm. Response received February 2013.
- Freedom of Information request (2013b) to The Cayman Turtle Farm. Response received May 2013.
- Freedom of Information request (2013c) to The Cayman Turtle Farm. Response received June 2013.
- Freedom of Information request (2013c) to The Cayman Water Authority. Response received July 2013.
- Freedom of Information request (2013e) to The Cayman Turtle Farm. Response received July 2013.
- Freedom of Information request (2013f) to The Cayman Turtle Farm. Response received September 2013.
- Frye, F.L. (2011) Clinical Professor of Comparative Medicine & Pathobiology. *Conversations about the condition of turtles at the Cayman Turtle Farm* [Email - Personal Communication].
- Fuller, B. (2011). Waste water reduction goals not met. Cayman Compass. [Online] Available at: <http://www.compasscayman.com/story.aspx?id=85069> [Accessed: 10 March 2014].
- Fuller, B. (2012) *299 turtles die after water line break*. Cayman Compass [Online] 2 August 2012. Available at: <http://www.compasscayman.com/caycompass/2012/08/02/299-turtles-die-after-water-line-break/> [Accessed: 3 August 2012].
- Fuller, B. (2013a) *The Farm: we are improving*. Cayman Compass [Online] 3 April 2013. Available at: <http://compasscayman.com/story.aspx?id=120091> [Accessed: 4 April 2013].

- Fuller, B. (2013b) *The Future of the Cayman Turtle Farm*. Cayman Compass [Online] 9 April 2013. Available at: <http://www.compasscayman.com/caycompass/2013/04/09/The-future-of-the-Cayman-Turtle-Farm/> [Accessed: 14 April 2013].
- Fuller, B. (2013c.) *Cayman Turtle Farm says turtle release 'postponed'*. Cayman Compass, [Online] 6 November 2013. Available at: <http://www.compasscayman.com/caycompass/2013/11/06/Cayman-Turtle-Farm-says-turtle-release--postponed-/> [Accessed: 6 November 2013].
- Godley, B.J. (2002) CTF: Consultancy report to DEFRA 15 September 2002, pp. 23.
- Goreau, T.J. (2008) *Algae in the fish lagoon and Cayman Turtle Farm effluent receiving area: recommendations for monitoring*. Report to Joseph Ebanks [Online] July 11 2008. Available at: http://www.globalcoral.org/wp-content/uploads/2014/01/turtle_farm_grand_cayman.pdf [Accessed: 12 June 2013].
- Greenberg Quinlan Rosner Research (2012) *Frequency Questionnaire: 400 Cayman Turtle Farm visitors*. Unpublished Report.
- Haines H.G., Rywlin, A., & Rebell, G. (1974) A herpesvirus disease of farmed green turtles (*Chelonia mydas*). *Proceedings of World Mariculture*. 5 pp. 183-195.
- Haines, H. and Kleese, W.C. (1977) Effect of water temperature on a herpesvirus infection of sea turtles. *Infection and Immunity*. 15 (3) pp. 756-759.
- Harold, S. & Eckert, K. (2005) *Endangered Caribbean Sea Turtles: An Educator's Handbook*. [Online] Available at: <http://dukespace.lib.duke.edu/dspace/handle/10161/229> [Accessed: January 2014].
- Harrison, G. (2010). CTF (1983) LTD - *Invitation to Tender for Provision of Audit Services*. Central Tenders Committee [Online]. Available at: http://www.centraltenders.gov.ky/pls/portal/docs/PAGE/CTCHOME/TENDERS/2010/PROVISIONOFAUDITSERVICESTOCAYMANTURTLEFARM1983LTD/CTC_09-10_AO_058%20TENDER%20DOC.PDF [Accessed: 21 February 2012].
- Higgins, B.M (2003) Sea turtle husbandry (pp 412-440). In Lutz, P.L., Musick, J.A. & Wyneken, J. (Eds.), *The Biology of Sea Turtles*, Volume II. Boca Raton, Florida: CRC Press. ISBN: 0-8493-1123-3.
- Homer, B.L., Jacobson, E.R., Schumacher, J. & Scherba, G. (1994) Chlamydiosis in Mariculture-reared Green Sea Turtles (*Chelonia mydas*). *Veterinary Pathology*. 31, pp. 1-7.
- IUCN Red List of Threatened Species (IUCN) (2004) *Chelonia mydas*. [Online]. Available at: <http://www.iucnredlist.org/details/4615/0> [Accessed: 30 January 2014].
- Jacobson, E.R. (1996) Guest Editorial: *Marine Turtle Farming and Health Issues*. *Marine Turtle Newsletter*. 72, pp. 13-15. Available at: <http://www.seaturtle.org/mtn/archives/mtn72/mtn72p13.shtml> [Accessed: January 2014].
- Kaplin, M. (2007) *Frequently Asked Questions About Alligators and Their Kin*. [Online]. Available at: <http://www.anapsid.org/aligato.html> [Accessed: 10 March 2014].
- Kelonia: The Observatory of Marine Turtles (2008). *Get Astonished and Understand* [Online] Available at: www.kelonia.org/00-GB/Kelonia/About-Kelonia.html [Accessed: 21 February 2012].
- Ley de Conservación de la Vida Silvestre (2012) *La Asamblea Legislativa de la República de Costa Rica*. [Online] Available at: <http://www.sinac.go.cr/normativa/Leyes/Ley%20de%20Conservaci%C3%B3n%20de%20la%20Vida%20Silvestre%20N%C2%BA207317.pdf> [Accessed: 9 November 2013].
- Lutcavage, M.E et al. (1997) Human Impacts on Sea Turtle Survival. *The Biology of Sea Turtles*. 15, pp. 387-409.
- Magnino, S. et al. (2009) Biological risks associated with consumption of reptile products. *International Journal of Food Microbiology*. 134, pp. 163-175.
- Mediterranean Association to Save the Sea Turtles (MEDASSET) & Caribbean Conservation Corporation (2006) *Marine Turtle Newsletter*. [Online] Available at: <http://www.seaturtle.org/mtn/archives/mtn113/mtn113p9b.shtml> [Accessed: 13 October 2013].
- Mettee, N. (2013a) *Discussion on handling of turtles* [Email- Personal Communication] 10 July 2013.
- Mettee, N., (2013b) *Capture and Restraint* [Online] Available at: http://www.widecast.org/What/AnnualMeeting/2013/2013_Mettee_Sea_Turtle_Restraint.pdf [Accessed: 10 December 2013].
- Mortimer, J.A. (1995) Headstarting as a management tool. *Biology and Conservation of Sea Turtles*. pp. 613-615.
- Mrosovsky, N. (1983) *Conserving Sea Turtles*. London: The British Herpetological Society c/o The Zoological Society of London. ISBN 0-9507371-1-9.
- National Health Service (NHS) (2011) *Symptoms of food poisoning*. [Online] 12 July 2011. Available at: www.nhs.uk/Conditions/Food-poisoning/Pages/Symptoms.aspx [Accessed: 7 March 2012].
- Pierre-Nathaniel, D. (2006) *How to behave around sea turtles*. Available at: <http://www.widecast.org/What/Country/Lucia/Docs/How%20to%20behave%20around%20sea%20turtles.pdf>. [Accessed: February 2013].
- Pourdonya, M. et. al (2010) Prevalence of Gastritis and Enteritis in Red-Eared Turtles Diagnosed by Radiology. *Veterinary Surgery*, 8 (5), pp. 71-76.

- Piolo McGuire, B. (2010) *Turtle meat price tripling*. Cayman Compass [Online] 8 February 2010. Available at: www.compasscayman.com/story.aspx?id=15056 [Accessed: 21 February 2012].
- Professional Survey Group (2012) *Research Report for World Animal Protection Caribbean Vacation Activities Survey*.
- Schabbing, D. (2012) *Turtle Talk: Cayman Islands stop teaches visitors about green sea turtles and more*. Journal Gazette and Times-Courier [Online] 14 January 2012. Available at: http://ig-tc.com/lifestyles/turtle-talk-cayman-islands-stop-teaches-visitors-about-green-sea/article_cfb7dd16-3e3b-11e1-9edd-0019bb2963f4.html [Accessed: 21 February 2012].
- Sea Turtle Conservancy (2002) *Cayman Islands Turtle Farm Proposal Fails*. [Online]. Available at: <http://www.conserveturtles.org/cites.php?page=2002-cayman-proposal>. [Accessed: 24 May 2013].
- Sea Turtle Conservancy (2006) *Global Conservation Groups Join Costa Rican Government in Condemning an Illegal Shipment of Caribbean Green Sea Turtles to Europe*. [Online]. Available at: <http://www.conserveturtles.org/caymanislandturtles.php> [Accessed: 24 May 2013].
- Sea Turtle Conservancy (2012) *Information about sea turtles: threats to sea turtles* [Online] Available at: <http://www.conserveturtles.org/seaturtleinformation.php?page=threats> [Accessed: August 2012].
- Sea Turtle Conservancy (2013) *Information about sea turtles: Kemp's Ridley sea turtle*. [Online]. Available at: <http://www.conserveturtles.org/seaturtleinformation.php?page=kemps-ridley> [Accessed: 10 February 2014].
- Sea Turtle Restoration Project (2003) *Sea Turtle Fact Sheet, Green Sea Turtle*. [Online] Available at: http://www.seaturtles.org/pdf/Green_Sea_Turtle.pdf [Accessed: 21 February 2013].
- Sea Turtles (2012) *What Sea Turtles Eat* [Online] Available at: <http://www.seaturtles.org/1894/what-sea-turtles-eat.html> [Accessed: 13 February 2013].
- The Shark Trust (2009a) *Sandbar Shark* [Online] Available at http://www.sharktrust.org/shared/factsheets/sandbar_shark_st_factsheet.pdf [Accessed: 10 January 2014].
- The Shark Trust (2009b) *Nurse Shark* [Online] Available at: http://www.sharktrust.org/shared/factsheets/nurse_shark_st_factsheet.pdf [Accessed: 10 January 2014].
- Swarbrick, A. (2013) *The Accountability of Statutory Authorities and Government Companies*. [Online] Available at: <http://www.auditorgeneral.gov.ky/powerpanel/modules/reports/html/uploads/pdfs/Performance-Audit-Reports-SAGC-Accountability-----final-updated-January-2014.pdf> [Accessed: 9 February 2013].
- Turks and Caicos Sun (2013) *Cayman Islands Turtle Farm gets \$30M over three years*. [Online] Available at: <http://suntci.com/cayman-islands-turtle-farm-gets-m-over-three-years-p844-106.htm> [Accessed: 13 February 2014].
- UK CITES Management Authority and Scientific Authority & Cayman Islands Department of the Environment & CITES Scientific Authority (2006) *Cayman Turtle Farm: A Response to NGO Comments*. Marine Turtle Newsletter [Online] Available at: <http://www.seaturtle.org/mtn/archives/mtn113/mtn113p10a.shtml> [Accessed: 7 June 2013].
- US Fish and Wildlife Services (2013) *Archie Carr National Wildlife Refuge, sea turtle nesting* [Online] Available at: <http://www.fws.gov/archiecarr/updates/> [Accessed: 1 January 2014].
- Warwick, C. (1995) Psychological and behavioural principles and problems. *Health and Welfare of Captive Reptiles*. London and New York: Chapman & Hall/Kluwer.
- Warwick, C. (2012) *Discussions around provision of hand washing facilities at the Cayman Turtle Farm* [Email- Personal Communication] 28 September 2012.
- Warwick, C., Lindley, S. & Steedman, C. (2011) Signs of stress. *Environmental Health News*. 10 (21).
- Warwick, C., Arena, P. C., & Steedman, C. (2013) Health implications associated with exposure to farmed and wild sea turtles. *JRSM short reports* 4(1), 8.
- Wood, F. & Wood, J. (1993) Release and recapture of captive reared green sea turtles, (*Chelonia mydas*) in the waters surrounding the Cayman Islands. *Herpetological Journal*. 3 pp. 84-89.
- Wildlife Extra (2012) *300 Green turtles die at Cayman Turtle Farm* [Online] Available at: <http://www.wildlifeextra.com/go/news/cayman-turtle-farm.html#cr> [Accessed: August 2012].
- World Organisation for Animal Health (2010). Chapter 7.1.- Introduction to the Recommendations for Animal Welfare. [Online] Available at: http://web.oie.int/eng/normes/mcode/en_chapitre_1.7.1.htm. [Accessed: 12 March 2014].
- World Society for the Protection of Animals (2013) *Environmental Audit Committee: Sustainability in the Overseas Territories*. [Online] Available at: <http://www.publications.parliament.uk/pa/cm201314/cmselect/cmenvaud/writev/332/ots36.htm> [Accessed: 11 July 2013].

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