February 2023

DEPARTMENT OF ENVIRONMENT
CAYMAN ISLANDS GOVERNMENT

Wildlife Impacts and Health of Cats *(Felis catus)* in the Cayman Islands

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There is substantial evidence from around the world reporting high levels of predation on wildlife from both feral and domestic cats (*Felis catus*) (Loyd et al. 2013, Doherty et al. 2015). Globally, cat populations have been estimated to consume hundreds of millions of native animals each year (Loss et al. 2013; Doherty et al. 2015). On islands, where most native species have evolved without the presence of feline species, the impacts of feral cat predation has resulted in direct extinctions of mammals, reptiles and birds (Nogales et al. 2004) including, iguanas and skinks in Fiji (Gibbons 1984) and iguanas in the Caribbean (Mitchell et al. 2002). The Cayman Islands is no exception given the presence of feral cat populations on all three islands with little to no intervention since introduction. Prey items in the Cayman Islands can be varied, dependent on seasonality, and include a mixture of both native and non-native wildlife.

The predation threat to wildlife is also caused by well-fed companion and pet cats. A study which attached small cameras to the collar of well-fed companion cats revealed that 44% of pet cats exhibited hunting behavior (Lloyd et al., 2013). Only 25% of the prey items were brought home by companion cats, leaving 75% of the prey items unseen to their owners and highlighting that cats do not always eat what they hunt. Recently the study has been repeated on a colony of feral cats that are fed daily, finding 88% of these cats still exhibited hunting behavior despite supplemental feeding (Hernandez et al., 2018). These studies indicate that the feeding of cats, whether they are feral or pet cats allowed to roam in the wild, does not prevent them from exhibiting their hunting behavior. To protect native wildlife we need attitudes towards responsible pet ownership (i.e. keeping your pets on your property) to change and an effective feral cat population control program to reduce the threats they pose to our endangered species.

Below we document the gut content and health status analysis from recent feral cat control programs in Little Cayman along with survey-based, opportunistic, and public reports of cat predation observed in the Cayman Islands.

1. Evidence gathered in feral cat control efforts in 2007, 2018, 2022, and 2023 in the Sister Isles

The current domestic cat population on Little Cayman is estimated to be 31 registered pets, 10 of which are not de-sexed. A total of 129 feral cats have been trapped and euthanized on Little Cayman: 2007 (29), 2018 (24), 2022 (35), and 2023 (41). Only seven feral cats (two in 2007 and five in 2023) were spayed/

neutered out of the 129 captured. The euthanized spayed and neutered cats were not registered to any owner, confirmed by the attending veterinarian via scanning for microchips and referencing the DoE database of registered cats in Little Cayman. In Cayman Brac, ten feral cats have been captured on the Bluff Lighthouse Trail and on the south coast around the Brown Booby nesting colony in 2023, so far.

The majority of the cats trapped and euthanized were trapped at known population density "hotspots", namely the landfill, the airport hangar, and the village/resorts area. Additionally, in 2023 a number of concerned citizens in the Little Cayman community asked for traps to be placed on their properties to remove feral cats that have been seen hunting wildlife and/or attacking their registered pet cats. Trapping efforts outside of these hotspot areas was targeted along the less-inhabited south coast, central forest, and the north coast.

The average prevalence of wildlife found in the digestive system of necropsied cats revealed that birds were most prevalent (15.8%), followed by reptiles (7.3%), mammals (4.9%), and lastly invertebrates (2.8%) (Table 1). These numbers represent the presence/absence of broad species groups found and do not reflect the number of animals seen in each digestive system. For example, one cat was found to have at least three birds in its stomach (Figure 1) upon inspection but this was only counted as "one" in Table 1 due to the difficulty of accurately counting processed animal remains in the cats' digestive systems. Given the 10-24 hour average time it takes for food items to pass through a cat's digestive system, this represents only a snapshot of their impact for one day. Finally, cats do not eat every prey item they kill (Lloyd et al., 2013; Hernandez et al., 2018) so the total impact of the cats' hunting behavior is likely larger than represented in these figures.

Table 1. Digestive system macro content analysis from feral cats examined in 2018, 2022, and 2023. The numbers reported are presence/absence of broad species groups remains found in the digestive system of cats and do not represent number of animals seen in the stomach contents.

Year	# of cats examined	Birds	Reptiles/ Amphibians	Mammals	Invertebrates	Household & Commercial waste	Provided food	Other
2018	24	4	1	0	2	19	9	14
2022	35	4	1	0	1	25	5	4
2023	41	8	6	6	0	26	13	13

Our dietary analysis showed that cats associated with human habitations and the landfill appear to scavenge for nourishment, evidenced by the necropsies which found 71% and 63% of trapped cats contained household and commercial waste in 2022 and 2023 respectively (Table 1). However, these human-associated cats were still found to predate on native fauna, as evidenced by birds, reptiles, frogs

and insects remains found in their digestive tracts. The stomach and upper intestinal tract was empty of food in a third (34%) of cats examined.

Rodent remains were only found in the stomach contents of six cats in the 2023 trapping session. Although cats do hunt rodents, the fact that the rodent population is still dense across Little Cayman, indicates that cats are not an effective method for population management of the invasive rodent population. This is supported by international research that shows rodent populations are mostly controlled by resource-availability and intraspecific-density dependence rather than predation due to their high birth rates in tropical environments (Prevetali et al., 2009; Harper & Bunbury, 2015). Rodents are a threat to native wildlife, especially fledgling birds, eggs, and plants (Harper & Bunbury, 2015; Wolf et al., 2018), that need to be managed through a targeted population control program to be successful (Holmes et al., 2015). We understand the concerns of the public regarding the rat population, and we are monitoring the population of rats in Little Cayman to detect any possible increases following our feral cat control program.

Figure 1. Remains of bird species found in the stomach contents of two individual cats. Left photo is of bird feet, likely from a small passerine. Right photo is of at least three Northern Flicker (*Colaptes auratus*) birds confirmed by their feather color pattern, including at least one fledgling bird due to presence of small wings in the content, indicating a likely nest attack.

Figure 2. Remains of reptile and bird species and one rat found in stomach contents of two individual cats. Left photo shows a reptile tail, bird feathers, and a rodent tail. Right photo is of a large reptile with scales clearly seen, likely an endemic Cayman racer snake.

Figure 3. Human trash found in the stomach contents of two individual cats. Left photo is of paper. Right photo shows several pieces of plastic film/wrap.

General health and condition of feral cats captured and euthanized in 2022 and 2023

External examinations:

All adult males showed scarring especially of the head, which tended to be more marked in older individuals and are presumed to reflect injuries caused by fighting.

Regardless of gender, 43% and 46% of trapped cats had severe physical injuries in 2022 and 2023 respectfully. These injuries ranged from deep lacerations likely caused by running over glass or sharp metal on the landfill, through to extensive abrasions possibly caused by vehicular impact, broken teeth, amputated tails, blindness, eye and ear infections and miscellaneous cuts and scars. Some cats had active abscesses on their faces, legs and rear end; severe skin irritations from fleas and mange; and tooth and gum decay from dental disease (Figure 4 and 5).

General exterior body condition tended to be good in younger age classes but deteriorating in cats two years old and older.

Internal examinations:

Little Cayman's feral cat population shows a high internal parasite load, where 71% (2022) and 78% (2023) had mature active parasites (Figure 6). Mature parasites were seen in cats as young as 2 months. Whipworms (*Trichuris spp*) were identified in one cat in 2023, which was not seen in previous years. Mature tapeworms were observed in over half of cats in 2018 (54%), 60% in 2022 and 66% in 2023. The tapeworm species has not been identified but may be a species of the genus *Dipylidium* or *Taenia*, and is likely transmitted back to cats and other hosts via flea ingestion or more likely via predation of birds, depending on the tapeworm species. Tapeworms were severely occluding the lower gut in some older individuals.

Roundworms (presumed to be *Toxocara* species) were visible in 11% (2022) and 12% (2023) of cats examined. The actual incidence of these and the tapeworms is likely to be higher because these parasites can only be seen without magnification when adult. Fecal flotations, normally used to assess the presence of immature and microscopic parasites were not conducted, which suggest that the parasite loads could be higher than these estimates.

Table 2. Parasite prevalence in cats examined in 2022 and 2023.

Year	# of cats examined	Tapeworms	Roundworms	Whipworms
2022	35	21	4	0
2023	41	27	5	1

Five females were found to be pregnant. Four of the pregnant females were estimated to be one year old, the fifth was younger at six months. Two of the one-year-old females were also lactating, i.e. rearing kittens while pregnant. Highlighting the ongoing reproduction of cats in the wild.

During these exams, blood and fecal testing for common diseases such as Feline Immunodeficiency Virus (FIV), Feline Leukemia Virus (FelV), Heartworm, Diabetes, Cancer, Kidney disease, Flea-born typhus, Ringworm, Toxoplasmosis, etc., were not conducted due to laboratory availability. However, these ailments are commonly seen in cats and present a health risk to both pet cats and humans. With regular veterinary care and annual vaccinations many of these diseases are preventable. However, feral cats do not receive veterinary care and are a source of disease prevalence in the population, which could have public health risks, especially for zoonotic diseases such as toxoplasmosis (de Wit et al. 2019).

This necropsy analysis highlights that native species are a consistent part of the feral cat diet. Finally, the health status (i.e. parasite prevalence, signs of disease, and body condition) of these feral cats makes them poor candidates for rehoming initiatives. The poor health status also points out that releasing cats into the wild without any primary care-giver responsible for their overall health (e.g. in the case of trap-neuter-release programs) does not allow these cats to live healthy lives in accordance with the internationally accepted standards for animal welfare (ASPCA, 2015).

Figure 4. Evidence of gum disease and tooth decay and loss in two individual cats.

Figure 5. Evidence of eye disease (left) and partial blindness (right) in two individual cats.

Figure 6. Evidence of internal parasite in two individual cats.

2. Evidence of cat predation and impacts on the Sister Islands Rock iguana (*Cyclura nubila caymanensis*)

On Little Cayman, the Critically Endangered Sister Islands Rock Iguana has been documented being preyed upon by cats during the hatchling to juvenile stages, when they are most vulnerable to predation. A study in 2017 tracked hatchling iguanas in Little Cayman that had just emerged from their nest; 28 transmitters were deployed, and after following for an average of 19 days, the fate of 18 was known. Of these 18, two died of confirmed cat predation during the short tracking period which gives a predation rate of 11% in this small sample (Moss et al., 2020).

Surveys of the rock iguana population in Little Cayman have documented a decline in the younger age classes since surveys began in 2014, highlighting the lack of recruitment in the population (Figure 7). Hatchlings accounted for 5% of the observations in 2022; down from the 2014 and 2015 surveys where hatchlings accounted for 19.6% of the observations. Sub-adults accounted for 8.1% of observations in 2022; down from the sub-adults observed in 2019: 11.5%, 2015: 16.3%, and 2014: 43.5%. Research conducted on the species in 1995 observed many more hatchling iguanas relative to the older age classes, which the author notes is a "healthy demographic structure" for this long-lived reptile species (Figure 8; Gerber, 1995). Note that the historical report used a different survey method, so it is not directly comparable with most recent surveys and is presented here for reference.

This decline in the younger age classes first observed in hatchlings and then following in sub-adults corroborates an ongoing lack of recruitment in this population. Removing the unnatural predation pressure posed by cats, along with habitat protection and the cessation of other causes of mortality such as road kills, is urgently needed to preserve this species in its natural habitat. The continued lack of recruitment in this critically endangered sub-species will lead to population decline and possible extinction over time.

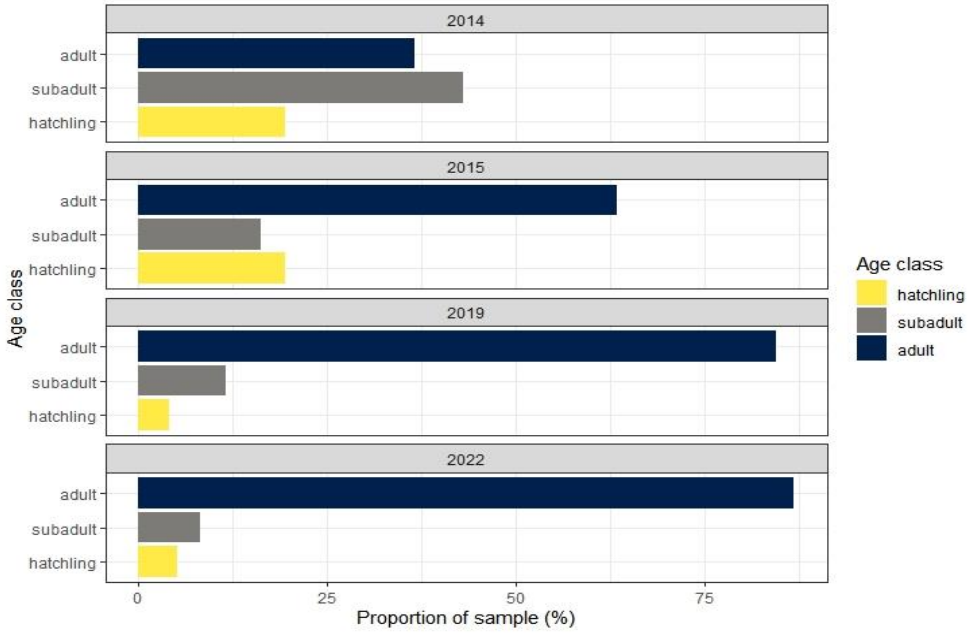

Figure 7. Age class distribution of Sister Islands Rock Iguanas observed during surveys conducted on Little Cayman.

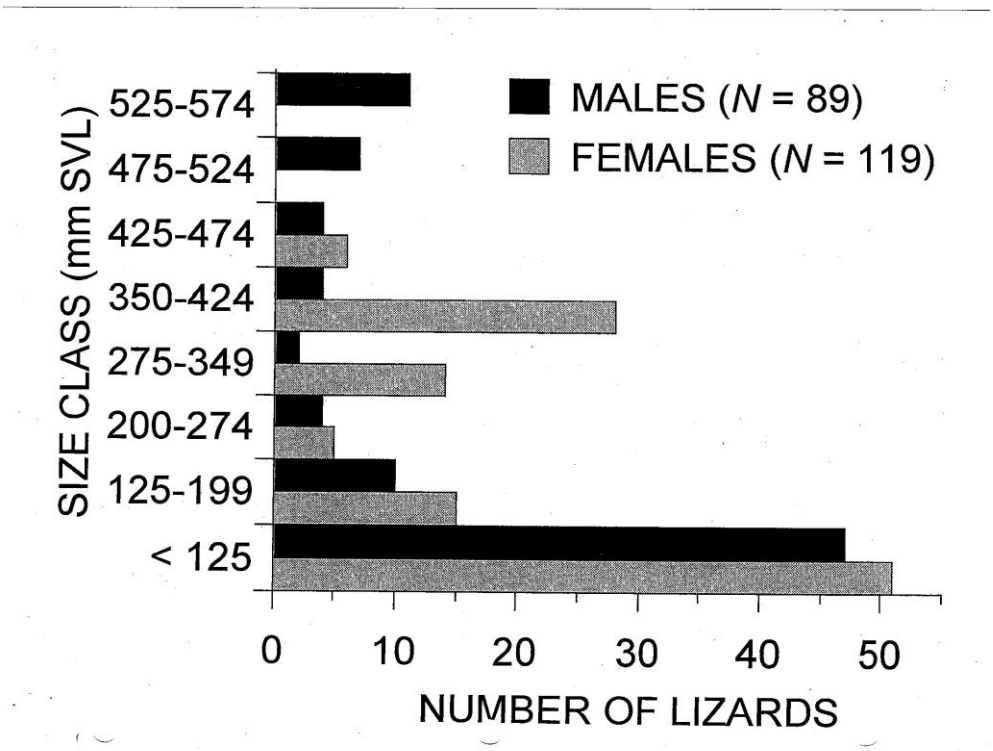

Figure 8. Size class distribution of the Sister Islands Rock Iguana observed during a survey conducted in 1995 (Gerber, 1995). To reference this against the age classes in figure 7: hatchlings = <125 SVL; sub-adults = 125 – 274 SVL; adults = 275 – 574 SVL.

Opportunistic reports, along with observed predation rates of Moss et al. (2019), of cat predation on hatchling rock iguanas during nest hatching time corroborates that cat predation is a likely contributor to the decline seen in the younger age classes. Numerous reports of hatchling predation have been made by members of the public in the Sister Islands and a number of them have been photographed:

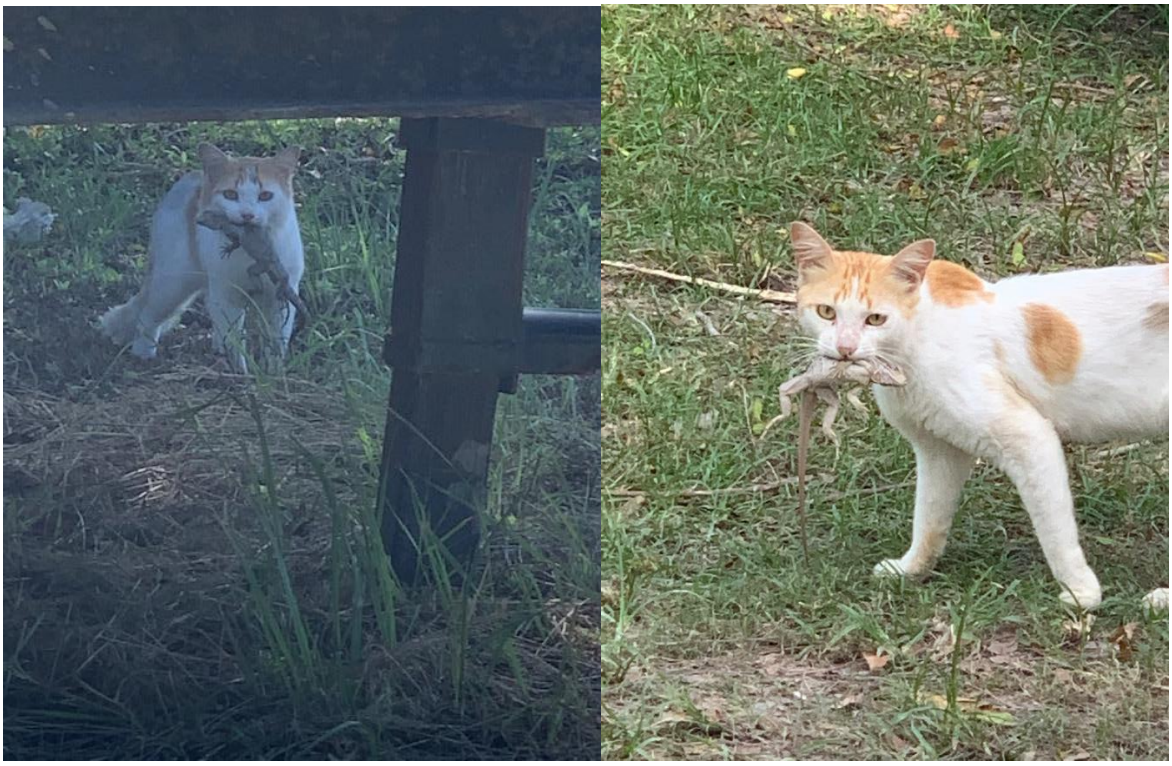

Figure 9. Images of a cat predating on a rock iguana hatchling in Little Cayman on September 3rd 2021.

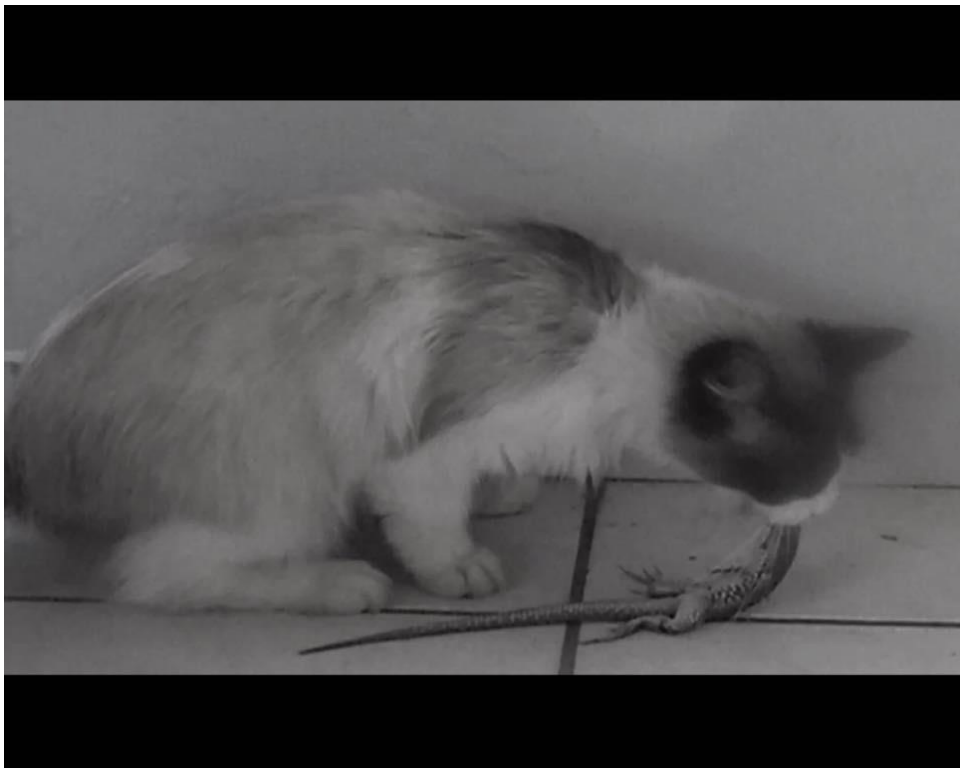

Figure 10.

House cat eating a rock iguana hatchling in Cayman Brac in 2019.

Figure 11. Evidence of cat predation from Moss et al. 2019; radio tracking study showing a transmitter which was attached to a hatchling rock iguana being found in cat faeces. The transmitter wire is outlined in red.

3. Evidence of cat predation and impacts on the Red-footed and Brown Booby (*Sula sula* & *Sula leucogaster*) and the Magnificent Frigatebird (*Fregata magnificens*) populations

The Little Cayman Booby Pond is the nesting area of approximately one-third of the Caribbean population of Red-footed Boobies. Magnificent Frigatebirds also nest abundantly there. The Little Cayman Booby Pond is the only nesting grounds for both species in the Cayman Islands. During this critical life-stage the chicks are especially vulnerable to a variety of pressures, including predation. The Red-footed Booby and Magnificent Frigatebird populations at the Booby Pond were studied in 2016 and 2017 during a Darwin Initiative funded project, which aimed to gain urgently needed data on the population status, at-sea distribution, and ecology of important breeding populations of seabirds in the Cayman Islands. As part of this study, seabird ecologists from the Universities of Exeter and Liverpool (UK), in collaboration with the DoE and Little Cayman National Trust, used five camera traps to capture evidence of predation events at nests, as well as recording sightings of predators during other project activities at the site. From April to October 2017, the cameras captured two separate events of cats feeding upon seabirds. Figure 12 is a photograph captured during one of these events.

Figure 12. Feral cat captured feeding upon a seabird in the Little Cayman Booby Pond in 2017.

The same predation pressure attributed to cats is evident upon the Brown Booby in Cayman Brac. During the nesting season of 2018, it was concluded that cats had attacked and killed at least 16 Brown Boobies who were in the process of nesting on the around Cayman Brac, see Table 3. The nature of the injuries and the evidence of fresh cat prints in the surrounding sand are pictured in Figure 13 and 14 below.

Figure 13.

One of the 16 dead Brown Boobies found on Cayman Brac during the nesting season of 2018. Most dead adults were found in defense positions by their nests, indicating that they died protecting their nests.

Table 3: At least 16 Brown Boobies were killed during the 2018 nesting season.

ID	Date discovered	Sex	Found	Injury
1	February 17 2018	Female	Alive	Wound to back, given fluids, died in hand
2	February 17 2018	Male	Alive	Broken wing barely attached to body, put down
3	February 18 2018	Male	Dead	Broken wing and wound to back
4	February 18 2018	Female	Dead	Broken wing and wound on back
5	February 18 2018	Female	Dead	Tear on skin from back and potential broken wing
6	April 28 2018	Female	Dead	N/A
7	April 28 2018	Chick / Juvenile	Dead	N/A
8	May 17 2018	Unk	Dead	N/A
9	May 29 2018	Chick	Unk	Last seen 28th of April and estimated at 6 wks. Cat prints everywhere
10	July 16 2018	Juvenile	Dead	Dried and splayed out on beach, next to no 11 by 2nd nest on SS
11	July 16 2018	Juvenile	Dead	Dried and splayed out on beach, next to no 10 by 2nd nest on SS
12	July 17 2018	Juvenile	Dead	Dried and splayed out on beach
13	July 17 2018	Unk	Dead	Skeleton
14	July 17 2018	Unk / Adult	Dead	Half skeleton
15	July 17 2018	Male	Dead	Dried and splayed out on beach
16	July 17 2018	Male	Dead	Found by end of nesting stretch SS

Figure 14. Continuation of photographic evidence of Brown Booby mortality events.

A natural predator for the Brown Booby is the Peregrine Falcon (*Falco peregrinus*) and it has been speculated whether these deaths could have been caused by such natural predator. However, prey left by peregrines are distinctly ripped open and, at least, partly eaten. Almost all injured boobies consistently have broken wings indicating a fight with a large bodied animal, are not eaten (nor partly eaten) and most have sharp short puncture wounds corresponding with those of cat incisors, see below in Figure 15.

Figure 15. Brown Booby chick found dead on a nest in 2023. Puncture wounds spacing match the spacing of cat incisors.

Globally, seabirds are noted to be particularly vulnerable to cat predation. There are instances of cat populations, with no control, pushing seabird colonies to the verge of extinction (Ratcliffe et al. 2009) or fully eradicating the species, such as the case of the Jamaica petrel (*Pterodroma caribbaea*) (Birdlife International 2000). In the early 20th century and into the 1930's and 40's, the Brown Booby nesting colony spanned most of the coast of Cayman Brac and numbers were in their thousands according to Brac residents Tennson Scott and Temple Tatum who, in 2001, relayed information from their late grandfather Mr. Ballinger Christian. When the Brown Booby population was first monitored in 1983, only 170 pairs were recorded in five subgroups of the coastline. In 2001, 61 pairs were recorded at four active sites, and in 2019, 46 pairs were recorded across three active sites.

4. **Photographic evidence of cat predation on other species in the Cayman Islands.**

Figure 16. Young cat seen carry a large reptile in its mouth in the Blue Iguana Salina Reserve, Grand Cayman in 2017.

Figure 17. Report from the public of a house cat bringing home a dead fruit bat in Grand Cayman 2022.

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