DEPARTMENT OF
ENVIRONMENT
CAYMAN ISLANDS GOVERNMENT

Wildlife and Health of Feral Cat (Felis catus) in Cayman Islands, 2024 update.

Terrestrial Resources Unit – Cayman Islands Department of Environment

Summary

Feral cats are an invasive species and pose a threat to native fauna of the Cayman Islands, due to their inability to effectively evade these predators. In the absence of medical care, feral cats are vector of disease and parasites, which is a risk to public health. In response to diminishing recruitment of the endangered Sister Islands Rock Iguana (SIRI) (*Cyclura nubila caymanensis*) in Little Cayman, evidence of Brown (*Sula leucogaster*) and Red-footed (*Sula sula*) Boobies being predated and community complaints, the Department of Environment (DOE) conducted control efforts, where 167 feral cats were humanely euthanized (2022-2024). Feral cats exhibited poor body conditions from starvation, pregnancies, injures and infections. Necropsies revealed that feral cats have mature parasites (71.3%), plant matter (56.6%), trash (50.7%), cat food (22.4%), foreign matter (44.1%) and animal remains (45.4%) in their gastrointestinal tract. However, these results are biased to digesta that could be deciphered visually as dietary metabarcoding analysis revealed species that were not detected. Hence, the values herein are conservative values of impact on the wildlife in Little Cayman. It is recommended to mitigate the risks of disease and further impact to native biota that feral cats be removed from Little Cayman. Furthermore, education is needed for responsible pet ownership and animal control infrastructure would prevent the continued release or abandonment of cats into the natural environment.

Introduction

Feral cats are an invasive species to the Cayman Islands and threaten the population dynamics of the native wildlife species. It has been well documented that feral cats pose a threat to native wildlife of small island nations causing population declines and local extinctions globally (Bonnaud et al. 2011). Feral cats are skilled hunters and can prey on a wide variety of wildlife, including birds, small mammals, reptiles, amphibians, and insects. Endangered or vulnerable species such as the Cayman Islands' Blue Iguanas, Cayman Parrots, and Sister Islands Rock Iguanas are threatened by their hunting behaviour as they have no natural defences towards them. Surveys in Little Cayman have shown low numbers of Sister Islands Rock Iguana (SIRI) in the hatchling and juvenile population age class. With an aging breeding adult population and low survival of juveniles reaching reproductive age, the Department of Environment introduced invasive species control methods to improve the chances of saving the species from local extinction.

Residents of Little Cayman are in support of the feral cat control and agreed to register their pet cats with the Department of Environment, so that in the event their pet cat is caught, it can be given back to the registered owner. In 2022 owners of pet cats were asked to present their cats to the Department of Agriculture's (DOA) veterinarian for registration and microchipping. Department of Environment staff went door-to-door to ensure pet owners were informed about the registration of pet cats and future feral cat control efforts. Signage, social media posts, and public meetings were conducted to inform the public, where attendees were in favour of planned control efforts for invasive species. At the end of the registration period there were 31 registered pets, 10 of which were not de-sexed. The DOE, DOA, Cayman Islands National Trust, and Cayman Islands Humane Society have coordinated their efforts to educate the public on responsible pet ownership and set up clinics for pets to receive veterinary care, such as vaccinations, deworming, flea-tick control, spays and neutering services. In beginning of 2024, there were 29 registered pet cats on Little Cayman, of which only one female domesticated cat is not de-sexed. The residents of Little Cayman are notified in advance about feral cat control sessions and are given the chance to register any new pets.

Feral cats were live trapped and humanely euthanized by a licenced veterinarian in 2007 (29), 2018 (24), 2022 (35), 2023 (117) and 2024 (15), totalling 220 individuals removed from Little Cayman. All cats were scanned with a universal microchip reader and verified by the attending veterinarian and DOE staff. Euthanasia was only conducted when the attending

veterinarian deemed the cat to be abandoned and feral, meaning it was not registered, or owner upon contact did not want to take responsibility for the cat's care.

From 2022 to 2024 the total number of microchipped cats caught was 45, including 24 microchipped cats that were not registered to an owner and deemed abandoned. Furthermore, upon examination it was found that 16 cats were either trapped-neutered-released (TNR) or trapped-spayed-released (TSR) (11=TNR, 5=TSR). Ear notches were seen on several cats, which is often used to mark cats that have been TNR or TSR, however, there were eleven fertile ear-notched feral cats caught. Similarly, seven of the feral cats found with microchips were also found to be fertile. This indicates that these feral cats had some kind of human interaction in their past but have since been abandoned and released in Little Cayman's environment to fend for themselves.

Each cat was examined and necropsied, whereby the digestive systems were inspected to gain insights regarding what they had consumed to survive, which serves as an indicator of impact on the island's biodiversity. To better understand the scope of species being consumed and the relationship between the habitat quality and dietary options, the department sent 36 faecal samples to be analysed using environmental DNA (eDNA) metabarcoding analysis, by Joahna Ventures LTD. Environmental DNA metabarcoding serves as an effective tool to determine the dietary composition of feral cats, thereby shedding light on their food sources and habitat interactions. By analysing the DNA present in their gut, we gain insights into the specific prey species the cats have eaten.

General health and condition of feral cats captured and euthanized from 2022 to 2024.

External examinations

The following results are from the 167 feral cats euthanized and necropsied in Little Cayman during 2022 to 2024. These cats were scanned for a microchip to determine their registered owner, microchipped and/or ear notched cats that were not registered were deemed abandoned and euthanized by the attending veterinarian. The age ranged from 6 months or less to over 6 years based on the dentition. A physical exam was conducted on each animal, whereby the veterinarian was able to assess their general health looking at their eyes, ears, skin, coat, and mouth. Many cats sustained injuries (38.7%, n=69), such as broken teeth, lacerations, amputations, blindness, mange, and active abscesses (Appendix). The average weight was 3.1± 1.1 kg (±SD), which is within the expected weight range for feral cats, but underweight based on the American Veterinary Medical Association (AVMA) ideal weight range for domesticated cats of 3.7kg to 5.4kg (Denny & Dickman, 2010; Bales, 2023).

Internal examinations

Euthanized feral cats were necropsied for an internal exam, wherein some cats exhibited evidence of thickened intestinal lining, which may have been due to a variety of ailments such as intestinal disease, ulcers, cancer, or high parasite load. Major organs (liver, kidneys, heart, reproductive system, etc.) were inspected and assessed for visual symptoms of illness. There was only one cat that showed signs of heartworm infection. Unfortunately, due to the lack of resources and laboratory facilities, testing for zoonotic and other diseases was not conducted. Thus, the prevalence of diseases such as Feline Immunodeficiency Virus (FIV), Feline Leukaemia (FeIV), Heartworm, Diabetes, Cancer, Kidney Disease, Flea-born typhus, Ringworm, Toxoplasmosis, etc. could not be assessed, but we recognize feral cats do pose a potential threat to public health (de Wit et al. 2019). Necropsies provided some sense of the impact feral cats have on the environment and yielded insights into the specific prey species targeted by these cats.

Little Cayman's feral cat population continues to show a high parasite load. 71.3% (n=119) of the cats that were caught had visible mature loads of tapeworms (*Dipylidium spp. or Taenia spp.)*, Roundworms (*Toxocara spp.*) and Hookworms (*Ancylostoma spp.*) (Figure 1). The intestinal parasites were observed occluding both the upper and/or lower intestine, severely affecting digestive function. The attending veterinarian commented that impaction could occur after conventional deworming treatment, which could cause life-threatening intestinal obstruction for many of these cats due to their extreme parasite load. Mature parasites were seen in cats as young as 2 months old and in older age classes. The aforementioned percentage of feral cats with parasites is a conservative estimate, as equipment necessary to conduct faecal flotation tests to inspect for immature microscopic parasite loads was not available. This suggests that the parasite loads could be higher, as immature parasites can persist in the lumen and epithelial lining of the intestinal wall.

In addition to parasites, feral cats digested a variety of materials (Figure 1). Plant matter, trash, animal remains, other foreign substances (such as sand, gravel, grit, etc), and cat food were observed in the feral cats (Figure 1). The prevalence of plant matter is commonly seen in wild felids (2% to 72%), which is documented with co-occurrence of intestinal parasites (Hart et al., 2021). The ingestion of plant matter, particularly grass, is used by Felids to aid in purging their gut (Hart et al., 2021). Furthermore, refuse such as plastics, paper, Styrofoam, aluminium foil, wrappers, and other household wastes were observed in over half of feral cats' diet (Figure 1). This indicates that many feral cats must scavenge to supplement their diets (Crawford et al, 2020). Nonetheless, the ingested items pose to further damage to

their internal systems, and contribute to poor body condition, malnutrition and life-threatening ailments (Crawford et al, 2020). Similarly, other foreign matter, such as sand, pebbles, grit, and stones were frequently observed in the gut contents of the necropsied feral cats (Figure 1). It is possible for cats to pass some of these items through their digestive tract, but the alarming quantity and frequency of these observations are characteristic of cats deprived of essential nutrients (Crawford et al, 2020; Bradshaw et al., 1997). Such behaviour is indicative of pica (a condition where mammalians ingest unusual items), which occurs in cats when they have experienced prolonged stress (Crawford et al, 2020; Bradshaw et al., 1997). For feral cats, this is commonly from nutritional deficiencies, anaemia, Feline Immunodeficiency Virus (FIV), GI lymphoma, reproduction, early weaning, change in environment, and hormonal changes (Crawford et al, 2020; Bradshaw et al., 1997). Although these are contributing factors to the poor body conditions observed in these feral cats, screening for macro deficiencies and disease was not able to be conducted. Even though some feral cats had access to commercial cat food (22.4%, n=34), 52.9% of these cats also ingested trash (Figure 1). Similarly, 55.9% of feral cats with access to commercial cat food had helminth parasites, showing that intermittent feeding of feral cats alone does not improve the health and welfare of these feral cats and veterinary care is needed.

Animal remains were found in 45.4% (n=69) of the feral cats euthanized during the Little Cayman feral cat control efforts (Figure 1). Most feral cats had the remains of birds (68.1%, n=47) followed by rats (58.0%, n=40), reptiles (39.1%, n=27), fish/crab (11.6%, n=8), insects (2.9%, n=2) and amphibians (1.4%, n=1) (Figure 2). These results are similar to other dietary composition studies for feral cats, where birds, followed by mammals, and reptiles are consumed (Lepczyk, 2023). Considering Little Cayman is rich with avian life and is home to 30% of the breeding population of the Red-footed Booby (*Sula sula*), it is not surprising that birds would be consumed the most by cats (Ramsar, 1994). Nesting birds are vulnerable to feral cat predation as parents are reluctant to leave and young are too young to evade feral cats, this was seen in Cayman Brac especially where a Brown Booby parent and chick had bite marks that matched the dentition of a feral cat (*comm. per Caven, 2023, Appendix).* Rat remains are very conspicuous compared to other animals in the digesta, which may have biased the results over other categories (Figure 2). Other studies have seen reptiles being consumed at a similar frequency to mammals (Lepczyk, 2023). The difference may be due to limitations in study methods and detectability of small reptiles in the digested matter (Lepczyk, 2023). Similarly, detectability would be an issue with the remains of amphibians, fish, and invertebrates, as their skin and/or exoskeleton would be difficult to distinguish in the faecal matter or digesta (Lepczyk, 2023).

To better understand and detect cryptic remains, samples of feral cat gut contents were sent for environmental DNA (eDNA) metabarcoding analysis by Jonah Ventures, where genetic sequences were matched with vertebrate bioinformatics. Due to financial constraints, only 36 samples were sent for analysis. Results revealed that 86.1% of samples only detected cat DNA, which suggests the stomach contents were mostly made up of cat fur, most likely from grooming. Rats were detected in 8.3% of the samples, followed by chicken (5.3%), wild birds (2.8%) and reptiles (2.8%). It is important to note, however, that these results are not representative of the entire feral cat population but serve as an aid to verify species that could not be deciphered through conventional field necropsies. The Cayman Galliwasp *(Comptus maculatus)* an IUCN critically endangered species and White Crowned Pigeon (*Patagioenas leucocephala*) were two species found in the eDNA analysis that had not been detected through field observations. Hence these results indicate that there are likely species that are being consumed that we are not aware of and could not detect with the field methods utilized. Furthermore, the high prevalence of cat DNA in the samples that were sent for metabarcoding analysis indicates the need for a larger sample size and sampling during times of prey availability to avoid skewing data towards representing starved cats instead of revealing the makeup of the feral cats' opportunistic meals. Another limitation during the collection of the faecal samples was the need to have an entire bowl's faeces, as only a subsection of the faeces was collected due to the small size of our containers. Therefore, for more comprehensive and robust understanding of the feral cat diet, further eDNA and metabarcoding methods should be used in conjunction with conventional macro-analysis of digesta and larger samples of the faeces collected.

There is no way for us to verify whether the ingested animals were predated or scavenged on by feral cats. Thus, the values represented here are an indicator of the impacts feral cats have on native wildlife. Similarly, it should be noted that chicken may be overrepresented in the data due to the use of fried chicken as bait in the cat traps (Figure 2). A further caveat to consider is that feral cats do not ingest all the animals they have caught or maimed; only 28% of prey items are consumed (Loyd et al., 2013). Felids are opportunistic predators and will feed on whatever is readily available in the environment, which includes small animals that are more abundant during various times of the year, such as hatchlings of sea turtles, sister islands rock iguanas (SIRI), curly tail lizards, anoles and snakes; and other seasonal movements or migrations, as seen by land crabs and migratory songbirds (Lepczyk, 2023; TRU-DOE, 2023). Rats (*Rattus rattus*) are observed throughout the year in Little Cayman, but this invasive species is most abundant and increases reproductive rates depending on the availability of fresh water sources (Madsen and Shine, 1999; Harper and Bunbury, 2015).

Given the seasonal aridity of Little Cayman, rats able to source suitable and dependable resources can breed throughout the year given the warm climate (Russell and Ruffino, 2012). As feral cats also depend on food and water, like rats, they are likely to frequent similar habitats where water is available (Dutcher et al. 2021). Water and food provided at feral cat feeding stations attract other pests in addition to cats as well (Dutcher et al. 2021). It is a common misconception that well-fed feral cats do not harm wildlife, however our study found that 29.4% of feral cats had both commercial cat food and animal remains in their digesta (Loyd et al. 2013).

During this study, critically endangered and Part 1 protected SIRI remains were found in 9% (n=6) of digesta of feral cats. The feet, skin, and bone length of these SIRI were in the age class of hatchlings to sub-adult (Appendix). Startlingly, SIRI remains were found in a feral cat that was in the young 6 months age class, although the majority were found in both female and male cats that were 1-2 years old. Researchers witnessed registered pets stalking and catching SIRI on multiple occasions during the daytime when the iguanas are active. These observations illustrate that SIRI lack the ability to effectively evade these predators and further attest to the impacts of cats on the dwindling local SIRI population, as well as the need to control feral cats and for owners to control the movements of their pets (TRU-DOE, 2023).

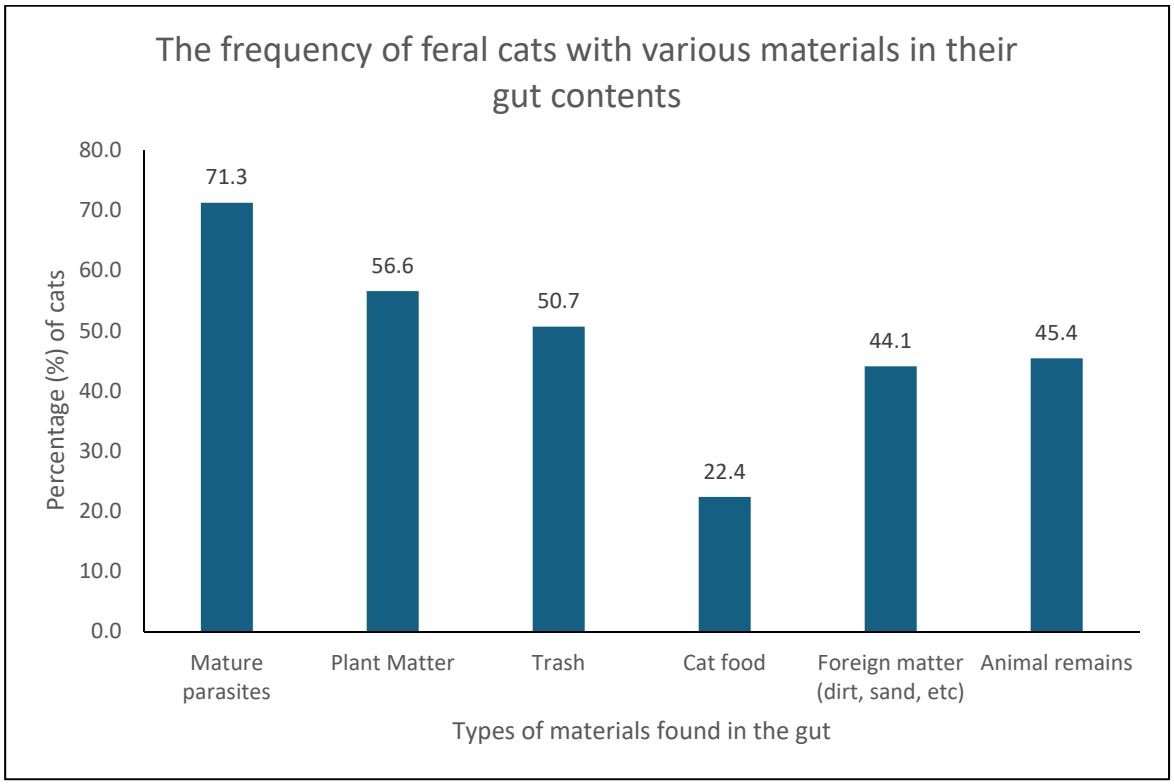

Figure 1: The frequency of materials found in the digestive tract of feral cats necropsied in Little Cayman from 2022 to 2024 (n=191).

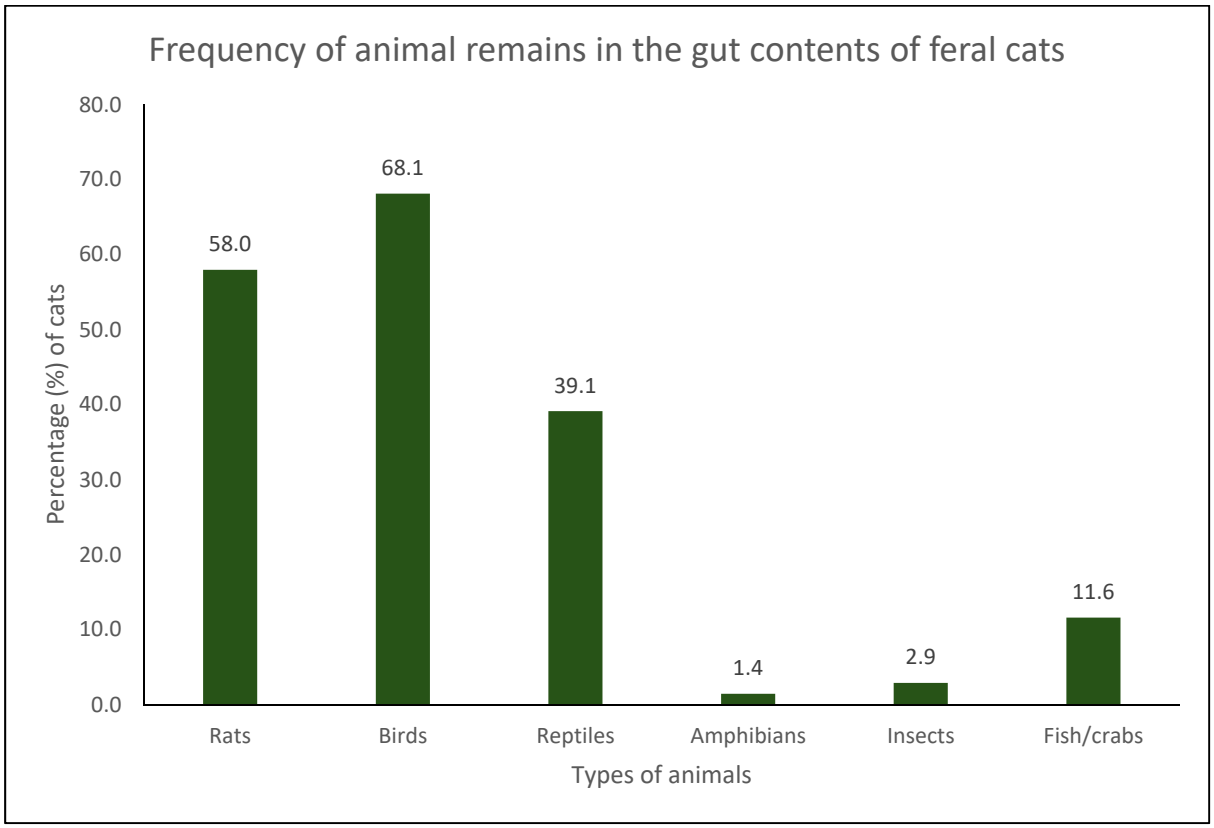

Figure 2: The frequency of types of animals found during the analysis of gut contents of feral cats (n=69) u from 2022 to 2024.

Conclusions

Feral cats in Little Cayman are impacting native wildlife and are existing in poor health, which presents a potential public health concern. Due to limitations in field techniques, assessments for common feline and zoonotic diseases were not able to be assessed. However, based on the observed body conditions, physical injuries, and dietary composition, it is evident these animals are under high stress, resulting in symptoms of pica (an eating disorder where mammalians eat non-food items due to malnutrition and prolonged stress) (Crawford et al, 2020; Bradshaw et al., 1997). The high parasite load and ingestion of foreign materials have ravaged the majority of feral cats, resulting in malnutrition and life-threatening circumstances. Feral cats under stress exhibit generalist predatory behaviour, despite being obligatory carnivores, taking advantage of opportunistic food sources (Hendriks, 2012; Lepczyk et al., 2023). Native wildlife such as the endangered SIRI lack the ability to evade cats and have been observed in the digesta. However, due to digestive

processes their tissues are often unable to be deciphered in the gut contents. Hence, if financial means are available, to enhance species detectability, dietary eDNA metabarcoding analysis can be used in conjunction with visual inspection. Based on the number of abandoned and released cats found in this study there is a need to educate residents of Little Cayman about animal welfare and responsible pet ownership, which includes preventive medical care, permanent identification with a registered microchip, and confining their pets' movements to their property, with cats ideally kept indoors. Additionally, agencies that participate in TNR or TSR need to be held accountable for the release and welfare of these cats and be banned from releasing animals outside on small islands due to deleterious effects on native species. Furthermore, it is recommended that a formalized process and facility, such as a pound, animal control centre or shelter, be created for owners to relinquish unwanted pets rather than abandoning them. Until such time, continual control efforts are needed to mitigate public health risks and save native fauna.

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Appendix

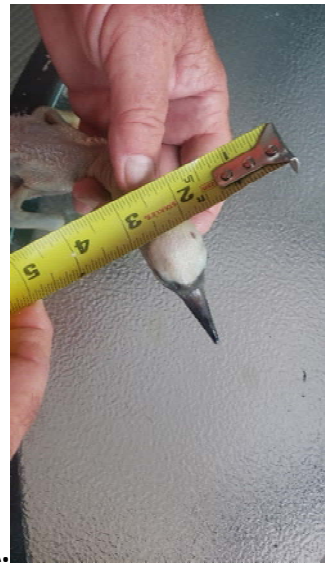
A.  **B.**

Figure 3: Assessment of Brown Booby chick (A) bit wounds match bite size of feral cat (B).

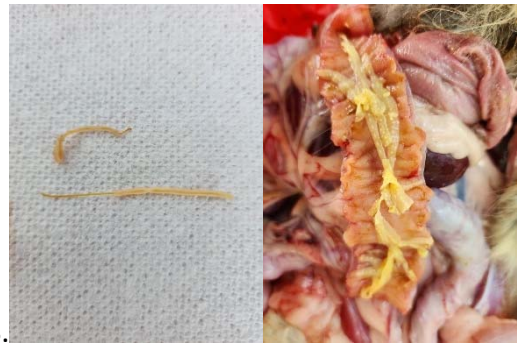
A.

B.

C.

Figure 4: Various physical injuries seen on feral cats in Little Cayman, such as dental disease (A), blindness and eye infections (B), anal abscesses and bite wounds (C).

A.

B. 

C.

Figure 5: Contents found in the stomach of feral cats in Little Cayman, these included plastic wrap and paper (A), internal parasites (B) and wildlife such as SIRI and birds (C).