Little Cayman Cat Trapping Summary: June 2022 – February 2024

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Background

The population of free-roaming cats (*Felis catus*) in Little Cayman is a major conservation concern for that small, environmentally sensitive island. A companion cat registration drive during May and June, 2022, found that only 31 cats, belonging to 14 owners, could meet the registration criteria of being presented to the attending veterinarian. Density estimates derived from camera trap surveys indicate the population of free-roaming cats was 139 feral cats (95% CI = 95 – 202) between July 2022 and April 2023. Following the companion cat registration, six removal trapping sessions (2022: June; 2023: January – February, April, July – August, November; 2024: January - February) were conducted in an effort to reduce the negative impacts on the wildlife in Little Cayman. In this report, we summarize the trapping data focusing on the distribution of trapping efforts and removals, the changes in trapping rates over time, and the variables influencing capture probability to inform future management of the feral cat population.

Methods

The primary aim of the feral cat population management program is to reduce the number of free-roaming cats in Little Cayman for the conservation benefit of the native species. Trapping procedures and locations varied over time based on experience and lessons learned in the field. Generally, all changes to the trapping procedures were made in an effort to increase the efficacy of the traps and our efforts and to reduce interference from non-target species. The trapping data is not standardized for research purposes, rather we are relying on the large number of observations for the explanatory power in this study. The data represents 4,773 trap deployments across Little Cayman between June 2022 and February 2024 over six removal trapping sessions. In this analysis we summarize the trapping success over time by comparing capture rates and we use a statistical model to examine what variables influence capture probability.

Field Methods:

Six removal trapping sessions were completed between June 2022 and February 2024. We targeted the known hotspots for feral cats (i.e. village and resort area, landfill, north-east hotspot) along with other less dense areas each session (Figure 1). After the first two sessions, we also began implementing an adaptive approach to trap placement, responding to cat sightings, reports, signs (e.g. footprints in sandy areas) and began deploying camera traps to spot cat activity during the trapping session (Figure 1). The majority of trapping locations were in accessible areas along main (i.e. paved) and secondary roads (i.e. unpaved) roads while the rest were placed along footpaths, in private gardens (with permission), and in coastal areas.

Figure 1. Unique trap locations for each trap session. Many locations overlap in each session and are not separately visible.

We trapped exclusively at night with traps generally being set around sunset and closed around sunrise. In the first sessions traps were checked four times each night, approximately every three hours between 18:00 – 6:00, in the second session we moved to checking three times throughout the night, twice before midnight and a final check around 6:00, in all other sessions traps were left overnight and checked in the early morning. A variety of metal cage trap types were used including large double door, large single door, small double door, small single door traps. Additionally, we used High-interaction rate traps (2040 ©, New Zealand) were used first used in the July 2023 session. After the first two sessions all double door traps were used as single door traps as there was some evidence of animals approaching the bait from behind the raised plate and exited the cage without triggering the trap.

A range of bait types were used on their own or in combination, including fried chicken from KFC, canned sardines in oil, churu © branded cat food paste, and cat urine and anal gland secretion. Bait was presented either in a bowl or hung from a wire hook for the fried chicken at the back of the cage in single door traps, and in the middle of the cage over the pressure plate for double door traps. Traps were generally placed in hidden positions along likely paths for feral cats with additional consideration of trap placement in terms of wind direction so that bait scent lured cats towards the open end of the trap. During the first session, June 2022, all traps were placed into the environment on the ground as is without much additional camouflage or gear to enhance trap efficacy. In all other sessions, traps were camouflaged using either shade cloth,

burlap, or vegetation and burlap flooring was also placed in some of the traps to cover the pressure plate. In addition, in every session after June 2022, the majority of traps were raised on a platform placed on top of two 5-gallon buckets to prevent by catch of crabs and rats. Bait interference from ants was also an issue in the first session so we began using insecticide around the base of the 5-gallon buckets supporting the raised traps or surrounding any traps placed on the floor which helped reduce the occurrence of bait taken by ants but it had to be reapplied throughout the session to maintain the reduced impact.

Statistical Methods:

Trapping effort was recorded in hours and adjusted by half if a trap was found triggered/ closed to account for the unknown number of hours the trap may have been inactive. A trap night was considered 12 trap hours. The trap rate was calculated as the number of captures per 100 trap nights (C100TN), which is the number of cats trapped multiplied by 100 divided by adjusted trap nights (Nelson & Clark, 1973). For each session the mean C100TN and its 95% confidence intervals were calculated, confidence intervals were calculated as the standard error multiplied by 1.96 either side of the mean, and compared using standard T-test MedCalc, 2024).

We summarized the trapping effort and the number of cats captured on a grid of Little Cayman with 500 m^2 grid cells (i.e. we calculated the total trap nights and number of cats captured in each 500 m^2 grid cell) to visualize the distribution of the two measures, with uninhabitable open water areas excluded. The 500 m^2 grid spacing was used to provide reference for future eradication planning efforts, where 500 m^2 spacing of control efforts may be sufficient to ensure overlap with all feral cat territories.

We analyzed whether a trap successfully captured a cat or not using a binomial regression. We tested the session, trap type, bait type, trap day (i.e. how long that specific trap was deployed in a location), trap cover type, and whether insecticide was used or not as explanatory variables for trapping success. We compared the variables using AIC and Likelihood-ratio test to assess their explanatory power in the model and to decide on the final model. The explanatory variables were visualized as marginal effects displaying the probability of capture.

All analyses were done in the R programming language using the ‘stats’ and ‘sjPlot’ libraries (Lüdecke, 2023; R Core Team, 2024). All maps were created in ArcGIS Pro (ESRI, 2024).

Results

Descriptive statistics:

In total, there were 193 successful captures of cats using cage traps, including one trap that captured two cats and another capture where the cat escaped. We have removed 167 feral cats to date, with the remaining captures being registered pet cats that were returned to their owners after capture. All feral cats captured were humanely euthanized. We trapped between 84 and 138 unique locations each session (June 22 = 84, Jan. 23 = 110, April 23 = 108, July 23 = 138, Nov. 23 = 125, Jan. 24 = 100 unique trapping locations, respectively). Trapping session ranged between six to 15 nights (June 22 = 6, Jan. 23 = 14, April 23 = 11, July 23 = 13, Nov. 23 = 14, Jan. 24 = 15 nights, respectively).

The majority of accessible areas have been targeted with traps frequently, however there are two major stretches of road, one south of Tarpon Lake, another on the North Coast between CCMI and the east cross-island road, that have not been targeted (Figure 2). In addition to the two stretches of road we have not trapped, there are inaccessible parts of the interior that have not been targeted, the primary one being the in the center of the island north-east of Tarpon Lake (Figure 2).

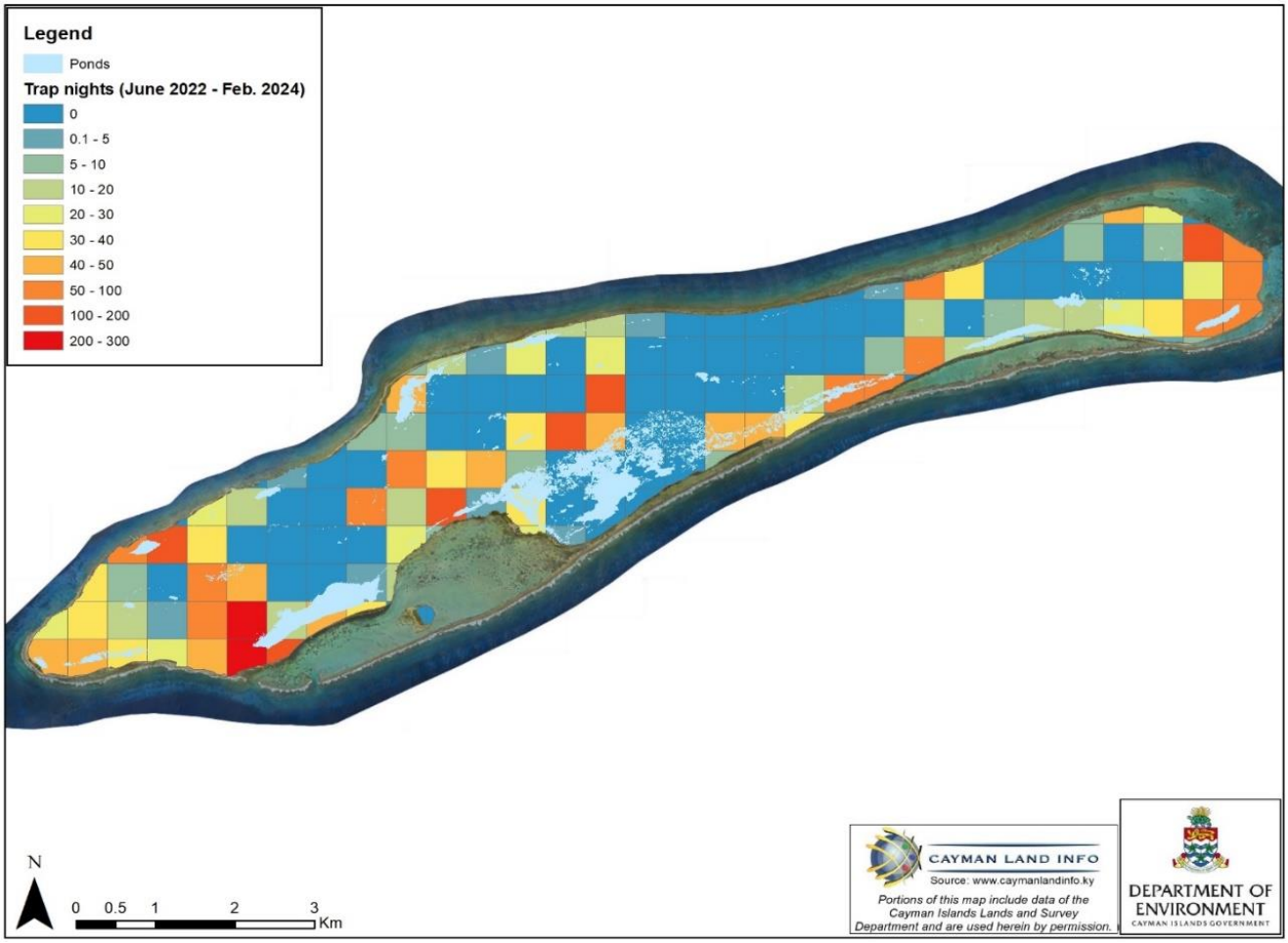

Figure 2. Distribution of trapping effort (trap nights) across Little Cayman; 500 m^2 cell size.

The areas where cats have been removed across Little Cayman is widespread in the Western end of the island but more isolated in the center and eastern areas of the island (Figure 3). Trapping around the landfill and the north-east feral cat colony has yielded a large number of captures. Also, we have removed a relatively large number of cats from the Central Forest area, the south-east coast, and the eastern end of the island. The distribution partly reflects our trapping effort focus with relatively sparse effort spent on the north coast of the island east of spot bay road in the West End and apart from the North-east hotspot (Figure 2).

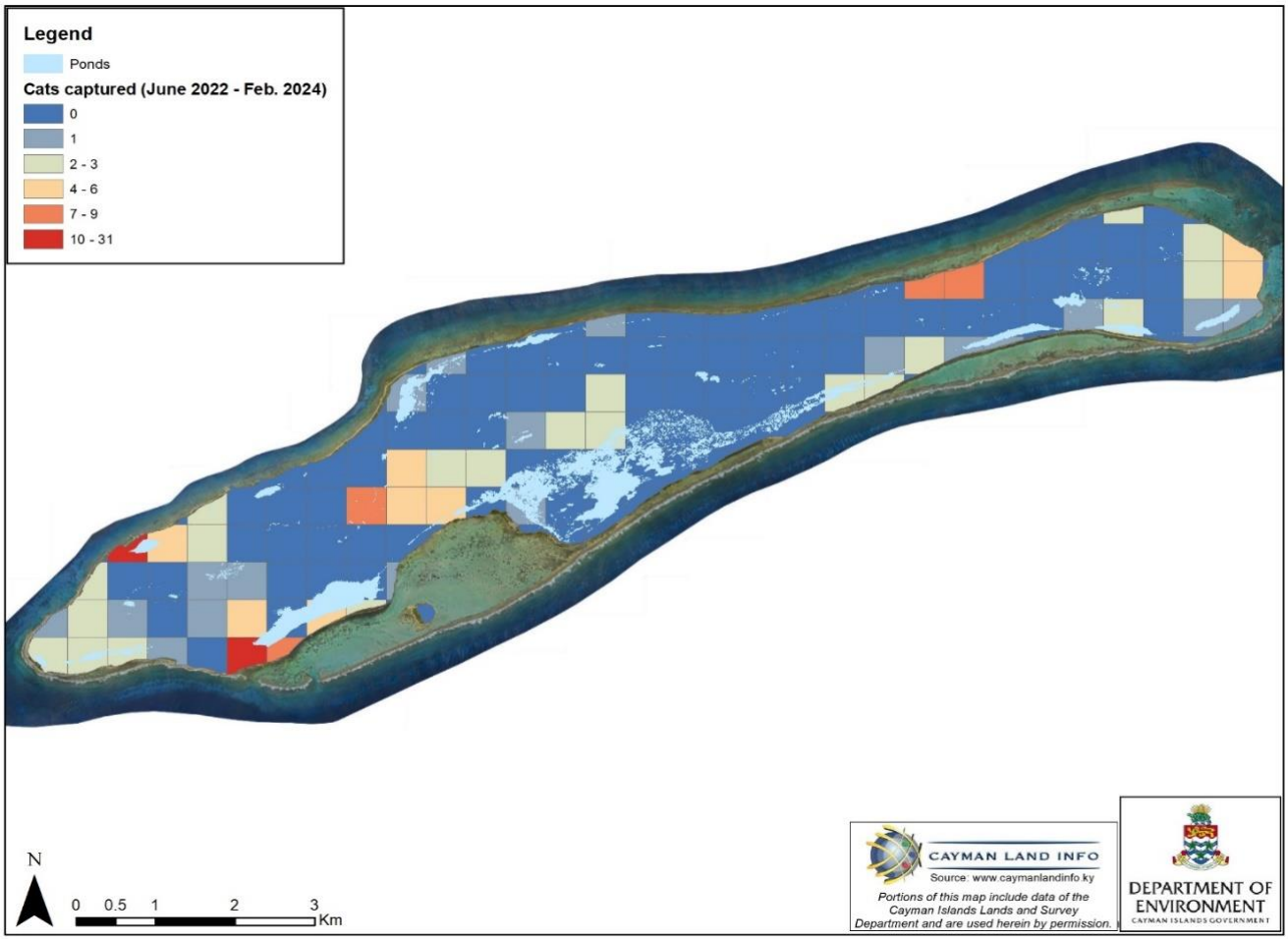

Figure 3. Distribution of cat captures across Little Cayman; 500 m^2 cell size.

Capture rates:

Trapping effort increased steadily from 245 trap nights in June 2022 to a peak of 790 trap nights in November 2023 (Figure 4). This corresponds to an increase in the number of traps deployed and the length of each session. Despite the increase in effort, the mean capture rate (C100TN) declined steadily each session from a peak of 35.23 (95% CI = 23.79 – 46.67) C100TN in June 2022 to 4.25 (95% CI = 2.22 – 6.27) C100TN in January 2024 (Figure 5). This represents an 88% (95% CI = 68 – 98%) reduction in capture rate between the two survey periods (t-test = - 4.14; p-value < 0.001).

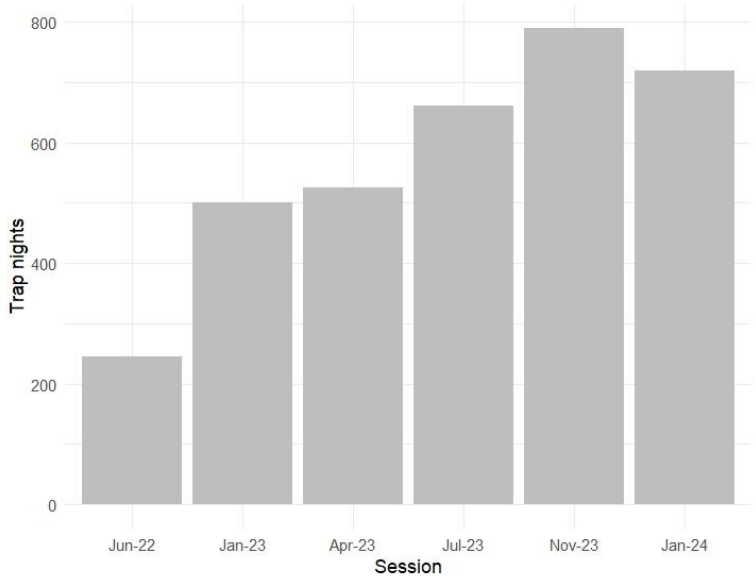

Figure 4. Total adjusted trap nights for each session.

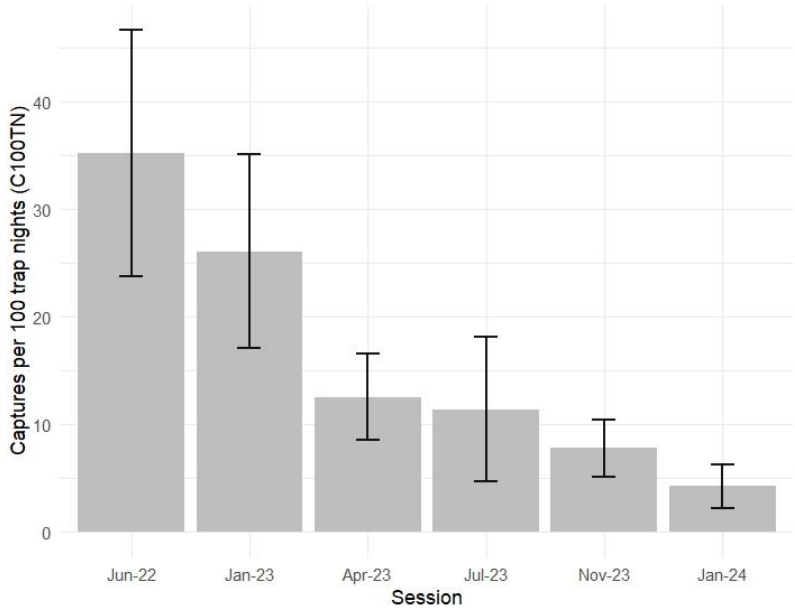

Figure 5. Mean captures per 100 trap nights (C100TN) for each session with 95% confidence intervals.

Capture probability model:

Based on the AIC scores and the likelihood ratio tests the covariates for trap type, trap day, and the session were chosen as important covariates determining trap success (Table 1). Bait type, insecticide, elevated traps, or trap cover type had no meaningful impact on the capture probability. This indicates that all of the improvements to the traps that we implemented to reduce non-target interference did not impact trap effectiveness. The final model fit the observed data sufficiently (Hosmer-Lemeshow goodness-of-fit test = 11.19, P – value = 0.19).

Table 1. Goodness-of-fit test using single term deletions to compare impact of individual covariates on model fit. If AIC is greater when a covariate is deleted compared to the base model than the covariate is important. The larger the likelihood-ratio-test the more important the parameter. Parameters with P-values < 0.05 are considered influential in the model.

Model	Delta – AIC	Likelihood ratio-test (LRT)	P – value (Chi-square test)
Base model (all terms)	1478.1		
Session	**1492.5**	**24.46**	**0.002**
Trap day	**1488.3**	**12.25**	**< 0.001**
Trap type	**1484.4**	**14.31**	**0.006**
Bait type	1477	6.87	0.143
Elevated	1476.2	0.08	0.775
Trap cover	1473.1	0.97	0.809
Insecticide	1476.1	0.01	0.938

The April 23 session appeared to have the highest successful capture rate per deployment (Figures 6) despite the June 22 and Jan. 23 sessions having higher capture rates (Figure 5). This is likely due to a change in strategy that started in the April session where we switched to leaving traps open all night and we implemented the main trap improvements (e.g. raising traps on platforms, covering traps, insecticide use). These changes made each deployment more successful compared to the first two sessions where we had a larger number of deployments for shorter times and with less improvements. In later sessions catch rates led to a reduced capture probability so the April session may represent the juncture between trap effectiveness and catch rates.

Traps were deployed anywhere from one to 15 nights corresponding to an estimated decrease in capture probability from 5% (95% CI = 4 – 6%) to 1% (95% CI = 0.1 – 2%), respectively (Figure 7). This indicates that if a cat is in an area, and is not averse to the entering a trap, then we are likely to capture the cat in the first few nights. However, this does not mean traps left longer in the environment have no chance of capturing a cat; this becomes particularly important as cat density decreases and cat territory size increases so it likely takes more time for a cat to encounter a trap within its territory.

Finally, the four trap types with different cage sizes and number of doors showed relatively small differences, all under 5% capture probability, compared to the very large increase to 16% (95% CI = 11 – 25%) in capture probability estimated with the HIRT or high-interaction rate traps (figure 8). The sample size for each trap varies with SDL (n = 1877) and SDS (n = 1713) having the most observations, followed by DDS (n = 554), HIRT (n = 309) and DDL (n = 84) having the least.

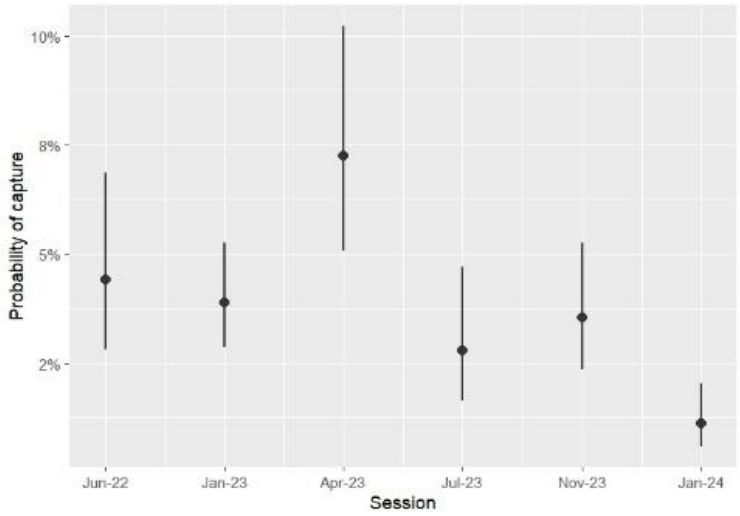

Figure 6. Probability of capture based on trapping session.

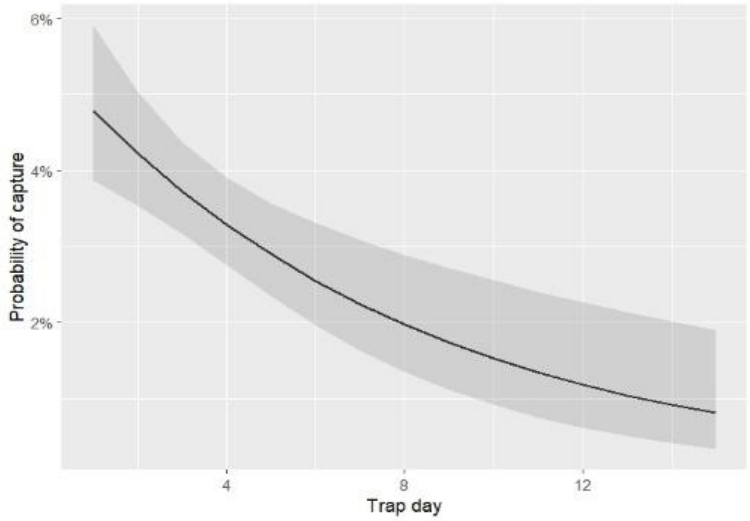

Figure 7. Probability of capture based on the number of days a trap was deployed.

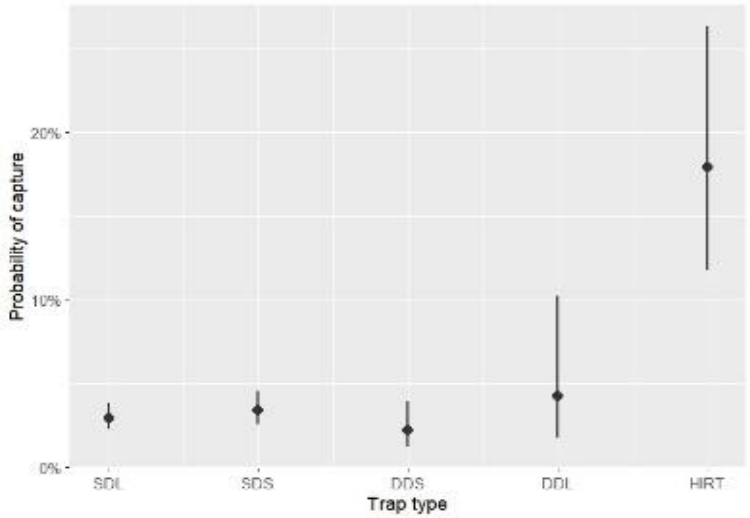

Figure 8. Probability of capture based on trap type. The first two letters SD and DD are single and double door respectively, while the third letter indicates trap size S for small and L for large; HIRT is for the high-interaction rate traps.

Discussion

The trapping rate has steadily declined each session in line with our expectations (Figure 5). The 88% (95% CI = 68 – 98%) reduction in captures per 100 trap nights is corroborated by the 76% (95% CI = 60 – 85%) reduction observed in our spotlight survey of the free-roaming cat population done pre-cull and before the Nov. 2024 trapping session on accessible roadways. These results indicate a large reduction in free-roaming cats across Little Cayman. This decrease in the capture rate each session is matched by a large increase in trap nights over time indicating that we are likely reaching the limits of the effectiveness of cage trapping in this population. However, there is still room to increase the chance of capturing any remaining cats in the environment with the use of the high-interaction rate traps (HIRT) which have a much higher capture probability compared to conventional cage traps (Figure 8).

There are still large interior areas that have not been covered by the trapping efforts to date (Figure 2). The main areas without trapping efforts are largely inaccessible without off-trail trekking. These areas are prime targets for future trapping effort as there are likely feral cats in there that have not been exposed to our trapping efforts. This includes the central forest area where a relatively large number of cats have been removed from the access road indicating that feral cats are abundant there. In addition, there are stretches of road and other accessible areas that have had less trapping effort, including large stretches of the north coast, south coast surrounding Tarpon Lake, and a few secondary roads that lead into the interior. These areas should be targeted in future sessions to ensure effort is being distributed across the feral cat's populations full range and there are no pockets of relatively high survival and/or reproduction.

We have successfully reduced the number of feral cats on Little Cayman over the past 1.5 years through the use of cage trapping. The majority of the island has been covered with some trapping effort and 167 feral cats have been removed to date. The key ways in which we can continue to reduce the number of cats on Little Cayman using only cage trapping is to increase the use of high-interaction rate traps and to deploy trapping effort into untargeted parts of the island. Other improvements to the trapping protocol such as using lures, reducing human scent on traps, and different types of bait can be implemented but are likely only to have marginal increases in effectiveness given the massive reduction in trapping rates to date. The pace of control over the last 1.5 years appears to have outpaced any signs of feral cat population growth on Little Cayman. We are at a phase in the management of the feral cat population on Little Cayman where the effectiveness of periodic culling and the use of physical traps to capture cats has been maximized. Other control options and a high-intensity control effort (i.e. eradication) will likely provide the greatest gains in reducing the feral cat population moving forward.

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