

**THE ABSENCE OF BIRD PREY ITEMS IN THE DIET OF DOMESTIC CATS LIVING
AROUND HINACTACAN MANGROVE AREA**

A Research Paper Presented to

The Faculty of

Philippine Science High School – Western Visayas

Bito-on, Jaro, Iloilo City

In Partial Fulfillment

of the Requirements for

SCIENCE RESEARCH 2

Shannen D. Abenido

Lucille Marie S. Jusa

Marie Claire P. Mandar

Fourth Year – Tau

March 2013

**THE ABSENCE OF BIRD PREY ITEMS IN THE DIET OF DOMESTIC CATS LIVING
AROUND HINACTACAN MANGROVE AREA**

A Research Paper Presented to

The Faculty of

Philippine Science High School – Western Visayas

Bito-on, Jaro, Iloilo City

In Partial Fulfillment

of the Requirements for

SCIENCE RESEARCH 2

by

Shannen D. Abenido

Lucille Marie S. Jusa

Marie Claire P. Mandar

Fourth Year – Tau


March 2013

APPROVAL SHEET

This research paper herein entitled:

THE ABSENCE OF BIRD PREY ITEMS IN THE DIET OF DOMESTIC CATS LIVING AROUND HINACTACAN MANGROVE AREA

Prepared and submitted by Shannen D. Abenido, Lucille Marie S. Jusa, Marie Claire P. Mandar in partial fulfilment of the requirements in Science Research 2, has been examined and recommended for acceptance and approval.


EDWARD C. ALBARACIN

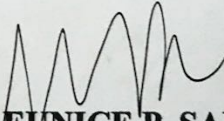
Science Research 2 Adviser

Approved by the members of the Science Research Committee on March 2013.

HAROLD P. MEDIODIA

MIALO L. BAUTISTA

JOSEPH SIMON V. MADRIÑAN


ERIKA EUNICE P. SALVADOR

Accepted in partial fulfillment of the requirements in Science Research 2.

SHENA FAITH M. GANELA

Director IV – PSHSWVC

The Absence of Bird Prey Items in the Diet of Domestic Cats Living Around Hinactacan Mangrove Area

Abenido S.D., Jusa L.M.S., Mandar M.C.P.

Philippine Science High School – Western Visayas Campus, Bito-on, Jaro, Iloilo City

kyushacho@gmail.com, lucille_marie_jusa@yahoo.com, bluewish28@gmail.com

ABSTRACT

Cat predation of birds is unlike that by any native predator, perhaps most importantly because outdoor cats are maintained in numbers far above natural carrying capacity. There are also a number of other important ways in which cats are distinct from native predators that may compound their negative effects on bird and other wildlife populations. Cats have contributed to declines and extinctions of birds and are one of the most important drivers of global bird extinctions. In the city of Iloilo, Philippines, Hinactacan Mangrove Area is known as a bird sanctuary. In this paper, we investigate whether or not domestic cats around this area prey on the birds living there. Studies have shown that cats pose threats to many bird populations, including priority species for conservation, through their predation of birds. But in this study, it was found out that there were no evidence of bird preying by the domestic cats living around Hinactacan Mangrove Area.

Keywords: preying, domestic cats, birds

ACKNOWLEDGEMENT

Thank you for being with us through everything.

First of all, we would like to thank our awesome and very supportive Research Adviser, **Sir Ed**, for all the help you have extended to us. Thank you for the fun consultation periods. Thank you for the patience especially when we had very little to no progress. We probably would not have been able to get this far without all your support, Sir.

Thank you, **Sir Mads** for all the lectures and lessons. And for helping all of us in the SIP class continue our work.

Thank you, **Sir Ja**, **Ma'am Erika**, **Ma'am Mimi**, **Sir Aris** and **Ma'am Flor** for being a part of our rollercoaster-like journey in Research 1 and 2.

Thank you, **Ma'am Muyuela** for the talk. It was a great eye-opener for us. It helped us get through a very dark part of our research life. We might not had much progress if it weren't for you, Ma'am. Thank you!

Our dear classmates and batch mates, thank you for always being with us. Research would have been so boring without you guys. And special thanks to the people who helped us prepare for the community fair. You know who you are.

To our very supportive parents, super thank you for willingly providing the funding for our study and for the consideration and understanding. For the glass of warm milk in the early mornings, when we did not get any sleep just finishing requirements. For the short-notice visits to the dorm whenever we need anything.

Thank you to **Pfizer** for providing us, Pisay students, with resources that have contributed so much for our research.

Special thanks to the trisikad drivers at Brgy. Baldoza, Lapaz and the nice families at Brgy. Ingore, Lapaz for helping us with our collection.

And the greatest thanks to our **Almighty Father**. Everything would not have been possible without Your grace. All those challenges and difficulties that we have faced have taught us and helped us to become better persons.

Shannen D. Abenido

Lucille Marie S. Jusa

Marie Claire P. Mandar

Fourth Year - Tau

LIST OF FIGURES

FIGURE	PAGE
Figure 1. Cat Scat	9
Figure 2. Identification Key to Scat by Dennis Ferraro	11

LIST OF APPENDICES

APPENDIX	PAGE
Appendix A. Raw Data	18

Appendix B. Acknowledgments	xx
Appendix C. List of Figures	xxii
Appendix D. List of Appendices	xiv

CHAPTER

I. INTRODUCTION

A. Background of the Study	1
B. Statement of the Problem	3
C. Objectives	3
D. Significance of the Study	4
E. Scope and Limitations	4
F. Definition of Terms	5

II. REVIEW OF RELATED LITERATURE

A. Cats	6
A.1. Description	6
A.2. Feeding Behavior	6
A.3. Diet	6

TABLE OF CONTENTS

	PAGE
Abstract	x
Acknowledgement	xi
List of Figures	xiii
List of Appendices	xiv
CHAPTER	
I. INTRODUCTION	
A. Background of the Study	1
B. Statement of the Problem	3
C. Objectives	3
D. Significance of the Study	4
E. Scope and Delimitation	4
F. Definition of Terms	4
II. REVIEW OF RELATED LITERATURE	
A. Cats	6
A.1. Description	6
A.2. Feeding Behavior	6
A.3. Diet	6

A.3.1 Assessment	7
B. Method	7
B.1. Frequency of Occurrence	7
C. Related Studies	7

III. METHODOLOGY

A. Time, Place and Duration of Study	9
B. Materials and Equipment	9
C. Scat Identification	9
C.1. Cat Scats	9
D. Methodology	11
D.1. Collection of Scats	12
D.2. Transportation of Scats	12
D.3. Scat Analysis	12
D.4. Data Gathering	12
D.5. Data Analysis	13
E. Safety and Precautions	13
E.1. Scat Handling	13
F. Waste Disposal	14
G. Data Organization	14

IV. RESULTS AND DISCUSSION

A. Results	15
B. Discussion	15

V. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

A. Summary of Findings	17
B. Conclusions	17
C. Recommendations	17

LITERATURE CITED

APPENDICES

CHAPTER 1

INTRODUCTION

A. Background of the Study

Domestic cats (*Felis catus*), also called house cats, are domesticated members of the family Felidae, order Carnivora, and the smallest member of that family. Like all felids, domestic cats are characterized by supple, low-slung bodies; finely molded heads, long tails that aid in balance, and specialized teeth and claws that adapt them admirably to a life of active hunting. Domestic cats possess other features of their wild relatives in being basically carnivorous, remarkably agile and powerful, and finely coordinated in movement.

Cats prefer areas in and around human habitation (Fitzwater, 1994) although they cover a wide geographic distribution (Reina, 2010). They use abandoned buildings, barns, haystacks, post piles, junked cars, brush piles, weedy areas, culverts, and other places that provide cover and protection (Fitzwater, 1994). They produce 2 to 10 kittens during any month of the year. Cats may be active during the day but typically are more active during twilight or night. They are territorial and move within a home range of roughly 1.5 square miles (4 km²).

Predators in nature tend to be rare with respect to prey populations. Wild predators are dependent on their prey, and will naturally decline with a declining prey base. Cat predation of birds is unlike that by any native predator, perhaps most importantly because outdoor cats are maintained in numbers far above natural carrying capacity. There are also a number of other important ways in which cats are distinct from native predators that may compound their negative effects on bird and other wildlife populations (Dauphine and Cooper, 2008). Owned cats have huge advantages over native predators. They receive protection from disease, predation, competition, and starvation—factors which control native predators such as owls, bobcats, and foxes. Cats with dependable food sources are not as vulnerable to changes in prey populations. Unlike many native predators, cats are not strictly territorial. As a result, cats can exist at much

higher densities and may outcompete native predators for food. Unaltered cats are also prolific breeders. In warmer climates, a female cat can have 3 litters per year, with 4 to 6 kittens per litter.

Studies from around the world show that domestic cats kill large numbers of wildlife, including a wide range of bird species. In a global review of IUCN listed Critically Endangered bird species, Butchart et al. (2006) found that exotic predators, especially feral cats and rats, were among the most important threats to these species and, likewise, that invasive predator control was an important management action taken to prevent many extinctions. Historically, cats have been specifically implicated in at least 33 bird extinctions, making them one of the most important causes of bird extinctions worldwide (Nogales et al. 2004).

Extensive studies of the feeding habits of free-roaming domestic cats have been conducted over the last 55 years in Europe, North America, Australia, Africa, and on many islands. These studies show that the number and types of animals killed by cats varies greatly, depending on the individual cats, the time of year, and availability of prey. Roughly 60% to 70% of the wildlife cats kill are small mammals; 20% to 30% are birds; and up to 10 are amphibians, reptiles, and insects. However, birds can be up to 100% of a cat's prey on some islands. Some free-roaming domestic cats kill more than 100 animals each year. One well-fed cat that roamed a wildlife experiment station was recorded to have killed more than 1,600 animals (mostly small mammals) over 18 months. Rural cats take more prey than suburban or urban cats. Birds that nest or feed on the ground are the most susceptible to cat predation, as are nestlings and fledglings of many other bird species. Since the mid-1960s, long-term data on breeding birds have indicated that many species are declining or fluctuating. These declines and fluctuations have been attributed to factors such as habitat fragmentation and destruction, landscape change, and other causes (Lepczyk and others, 2003).

Although the eradication of introduced mammals, including cats, in order to restore habitats is now a common measure adopted by managers of insular ecosystems (Nogales and others, 2004), the control of induced pets should not be considered without a preliminary

evaluation of the role of target species in the local food webs (Matias and Catry, 2007). Trophic relationship between cats and their native and introduced prey can be complex. Although the impacts ship rats, mice and rabbits have on the New Island ecosystem have not fully quantified, it seem possible that cats, by limiting the numbers of their mammal prey, could play a positive role in the maintenance of local biodiversity.

It is well known that cats, especially feral cats, usually prey on birds in the wild. In Iloilo City, Hinactacan Mangrove Area is known as a bird sanctuary. It is home to about two dozen species of birds. Nowadays, the extinction of species has become a worldwide problem. Cats are one of the major reasons of bird population decline in islands all over the world. The status in the Philippines could be the same. From a cat's diet, it can be determined if they are preying on local bird populations. If cats are confirmed to cause bird population decline in Hinactacan Mangrove Area, a proposal for an animal shelter, where animals like feral cats can be taken care of so they cannot anymore bring harm to local bird species, can be brought in to the local government of Iloilo City. Through this effort, both cat and bird populations will be benefited.

B. Statement of the Problem

Do Domestic Cats around Hinactacan Mangrove Area prey on birds?

C. Objectives

General Objective: To determine the presence or absence of birds in the diet of the Domestic Cat based on their scats.

Specific:

- To determine the frequency of occurrence of 'bird remains' in the scats of the Domestic Cat found around Hinactacan Mangrove Area.

D. Significance of the Study

Hinactacan Mangrove Area, being a bird sanctuary, is home to about two dozen species of birds. It is also a home for other animals like cats. Cats prey mostly on birds. Nowadays, extinction of species is a major problem worldwide. And cats have been the main cause of bird population decline in many parts of the world. Philippine cats could also be the same. It can be found out from the diet if the cats are feeding on birds. If they are found responsible, a plan for an animal shelter will be proposed to the local government of Iloilo City to protect the birds in Hinactacan Mangrove Area. Not only will the bird populations be protected, but also the cats will be given a home and be taken care of properly.

E. Scope and Delimitation

Living organisms will not be needed in the conduct of this study. Only cat scats will be collected and analyzed. Cat scats will be identified following a guide on the appearance of various animal scats. Then prey items will no longer be classified based on their species. They will only be classified whether any of them are bird species.

F. Definition of Terms

- **Scat**

-excrement of a cat

(<http://www.merriam-webster.com/medical/scat->)

In this study, a scat is the excretion of a feral cat from which their diet may be determined.

- **Predator**

-animals that live by preying on other organisms for food

<http://www.biology-online.org/dictionary/Predator>

In this study, a predator is one that consumes prey that it hunts for.

- **Prey**

-the animal being hunted; the organisms being eaten

<http://www.biology-online.org/dictionary/Prey>

In this study, a prey is the organism consumed by a feral cat

- **Frequency of Occurrence**

-The number of times a given event occurs at specified sample points during a defined period.

http://www.biology-online.org/dictionary/Frequency_of_occurrence

In this study, frequency of occurrence is the number of times a certain prey item is found in the scats.

CHAPTER 2

REVIEW OF RELATED LITERATURE

A. Cats

A.1 Description

Feral cats are the free-roaming offspring of the domestic cat, *Felis catus*. They generally fall into two categories: 1) domestic animals adapted to living on their own in rural and urban areas; or 2) homeless, lost, or abandoned pets that live on their own. The cat is a medium-sized carnivore of the family *Felidae* which usually weighs between 3.3 and 4.5 kg and measures between 73 to 79 cm in length (Ogan and Jurek).

A.2. Feeding Behavior

Adult cats should eat enough of a high-quality, nutritious food to meet their energy needs and to maintain and repair body tissues. The amount to be fed to an adult cat should be based on his or her size and energy output.

A.3 Diet

Cats feed on small prey, primarily birds and rodents. Feral cats and house cats that are free-fed tend to consume many small meals in a single day, although the frequency and size of meals varies between individuals. Domestic cats select food based on its temperature, smell and texture, strongly disliking chilled foods and responding most strongly to moist foods rich in amino acids, which are similar to meat. Cats may reject novel flavors and learn quickly to avoid foods that have tasted unpleasant in the past. They may also avoid sugary foods and milk; since they are lactose intolerant, these sugars are not easily digested and may cause soft stools or diarrhea. They can also develop odd eating habits. Some cats like to eat or chew on other things, most commonly

wool, but also plastic, paper, string, aluminum foil/Christmas tree tinsel, or even coal. This condition is called pica and can threaten their health, depending on the amount and toxicity of the items eaten. Since cats cannot fully close their lips around something to create suction, they use a lapping method with the tongue to draw liquid upwards into their mouths. Lapping at a rate of four times a second, the cat touches the smooth tip of its tongue to the surface of the water, and quickly retracts it, drawing water upwards.

A.3.1 Assessment

The most common type of diet assessment is the analysis of body components, in example, stomachs, guts and scats. However, scats were the most frequent type to be analyzed in various previous researches. A minimum of 100 scats should be considered to identify principal prey items which comprise 5% of the scats from a cat's diet.

B. Method

B.1 Frequency of Occurrence

Frequency of occurrence is the measure of how many times a certain object or item is found in samples within a defined period of time. It can be solved using this formula, specifically for this study:

$$\frac{\text{\# of scats found containing bird remains}}{\text{total \# of scats collected}} \times 100\%$$

C. Related Studies

Pontier D. et. al. described the diet of cats at five different sites in the Kerguelen

archipelago. They collected samples in five sites on the eastern part of the Grande Terre which was characterized by the highest diversity of nesting bird species, including an especially large colony of black-browed albatrosses and numerous pairs of light mantled sooty albatrosses. In their results it was shown that the diet of feral cats differed markedly among sites on the Grande Terre. In addition, the site where bird diversity in the diet was lowest (site A, Port-aux-Franc, ais) was where cats were first introduced (in 1951), before spreading throughout the Courbet Peninsula (Pascal 1980).

Hawkins C. C. et. al. conducted a study about the effect of house cats, being fed in parks, on California birds and rodents. They examined the relative abundance of birds and small ground-dwelling native rodents at sites that have high-cat populations with sites that do not have high-cat populations in 2 EBRPD parks to test the hypothesis that cats were having no impact on wildlife. The distribution of rodents between the 2 treatments was very different: more than 85% of the deer mice and harvest mice occurred in the no-cat area and 79% of the house mice were in the cat area, whereas the voles showed no apparent preference. Over 70% of the native rodents (i.e. excluding house mice) were caught in the no-cat area. Since voles and deer mice have been observed to out-compete house mice in field studies, it is unlikely that house mice were out-competing the native rodents in the cat area. Thus, it appears that cats have a negative impact on deer mice and harvest mice, but their effect on house mice is less obvious.

CHAPTER 3

METHODOLOGY

A. Time, Place, and Duration of Study

This study was carried out at Brgy. Ingore and Brgy. Baldoza Lapaz, Iloilo City. These barangays surround the Hinactacan Mangrove Area. This study was conducted in a period of 3 months from October 2012 to January 2013.

B. Materials and Equipment

- 250ml beakers
- 100ml graduated cylinder
- Metal strainer
- Distilled water
- Ziploc/plastic counter bags
- Paper towels

C. Scat Identification

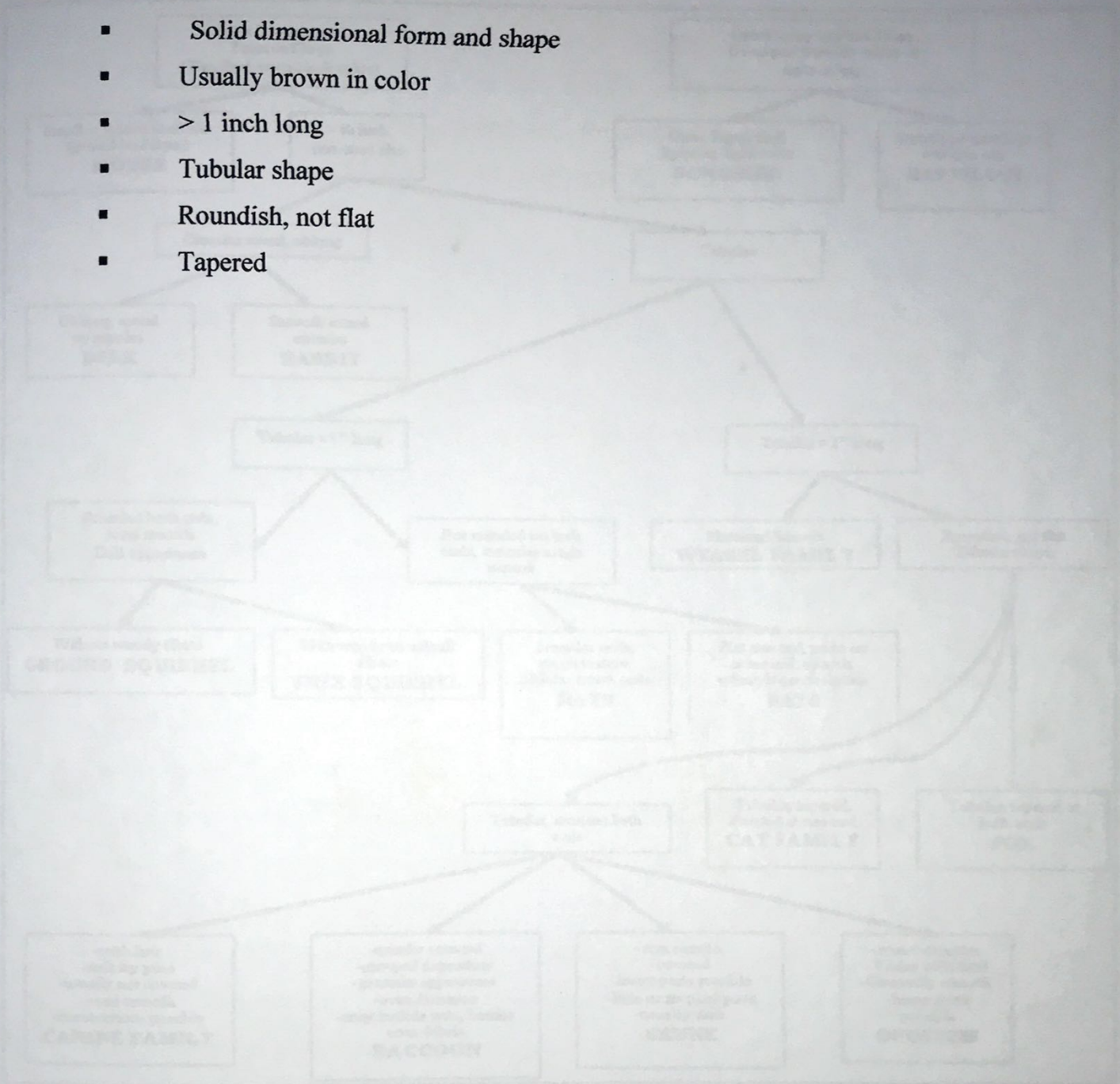
C.1 Cat Scats



[Figure 1: Cat Scat]

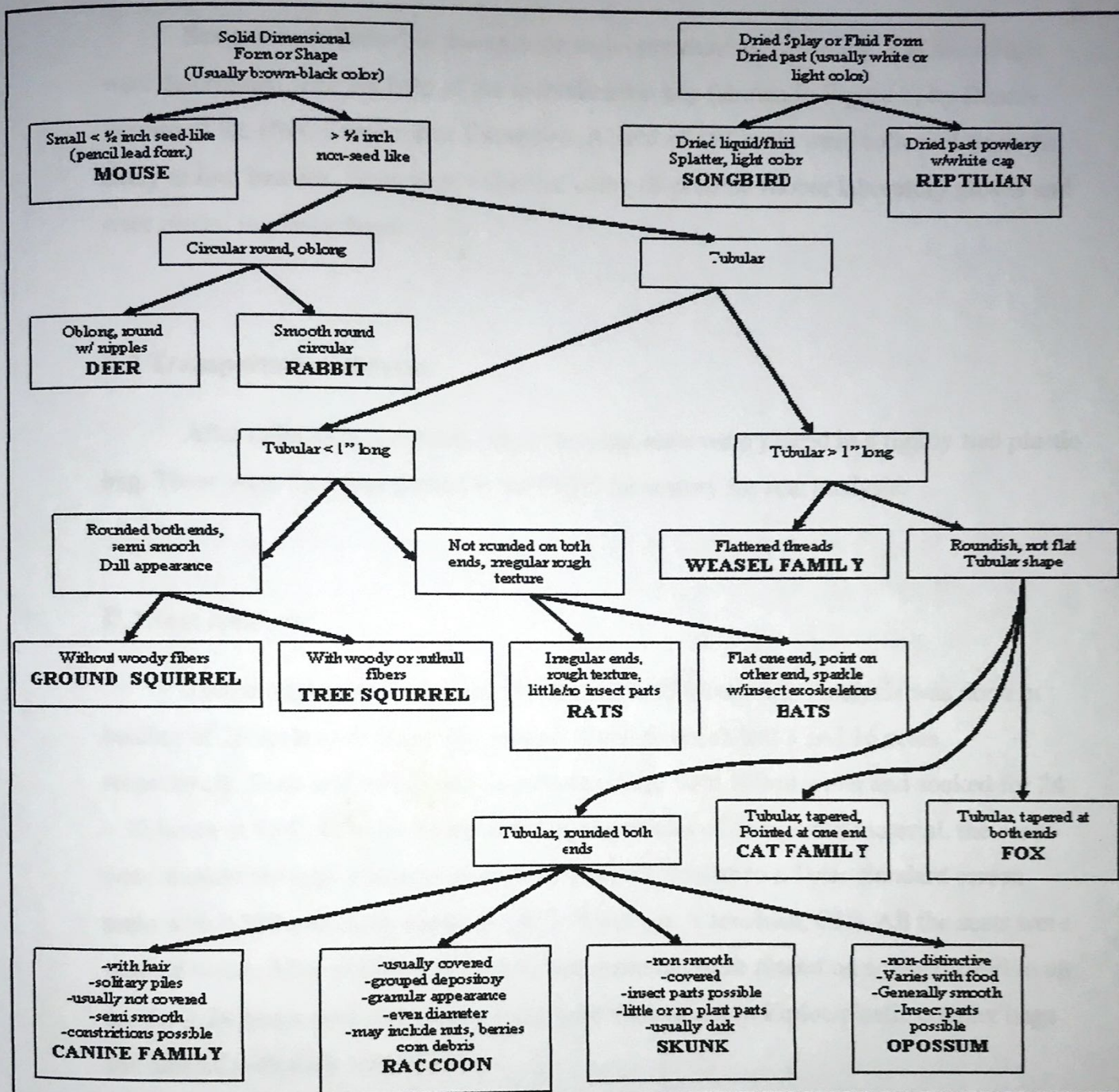
The properties of the scats of cats are the following:

- Solid dimensional form and shape
- Usually brown in color
- > 1 inch long
- Tubular shape
- Roundish, not flat
- Tapered



[Figure 1: Identification Key to Scat by Dennis Futera]

D. Methodology



[Figure 1: Identification Key to Scat by Dennis Ferraro]

D. Methodology

D.1 Collection of Scats

Scats were collected in the area through opportunistic sampling. Cat droppings were determined with the help of the identification key (shown in Figure 1) by Dennis Ferraro of the UNL Cooperative Extension. A total of 101 scats were collected from the study in four batches. Scats were collected using disposable rubber laboratory gloves and were placed in plastic bags.

D.2 Transportation of Scats

After collection, the plastic bags carrying scats were placed in a tightly tied plastic bag. These were then transported to the PSHS laboratory for scat analysis.

D.3 Scat Analysis

Scat analysis was performed inside the PSHS laboratory. Analysis was done in batches of 20 scats each except for batches 2 and 6, which had 5 and 16 scats respectively. Each scat was placed in a beaker filled with 100ml water and soaked for 24 – 72 hours at 40 C. In order to separate larger particles of undigested material, the scats were washed through a strainer acquired from ISC, similar to a Tyler standard screen scale with 0.589 mm mesh openings (W.S. Tyler Co., Cleveland, OH). All the scats were washed twice. After washing, the remaining materials were placed on a paper towel to air dry for ≥ 24 hours until they dried. They were then stored in Ziploc/plastic counter bags and labeled with their scat number.

D.4 Data Gathering

After the scats were washed and dried, they were searched for bones, feathers, beaks, claws and the like. Results are presented in terms of frequencies of occurrence and

percent frequency of occurrence. Frequency of occurrence is the number of occurrences of a prey item divided by the total number of scats and the percent frequency of occurrence is the number of occurrences of a prey item divided by the total number of occurrences of all prey items. Frequency of occurrence of the diet composition of cats was obtained by this formula:

$$\frac{\text{\# of occurrence of prey item}}{\text{total \# of scats collected}} \times 100\%$$

D.5 Data Analysis

The data gathered from the whole duration of the study was analyzed. The diet composition of the cats was determined through the results of the frequencies of occurrence of each of the prey items found in the scat. The data is presented by the table showing the frequencies of occurrence of each species found in the scat in section G. The higher the frequency of occurrence, the higher the probability that it is what the cats always eat.

E. Safety and Precautions

E.1 Scat Handling

Scats are wastes that came from cats. It may contain bacteria, fungi, and/or viruses that can endanger the life of the researcher. Proper laboratory techniques were observed. The researchers used protective gloves during collection and handling of the scat samples to avoid contamination. They also observed proper wearing of uniform inside the laboratory -- lab gowns, protective masks, gloves. Washing of hands before and after the conduct of the experiment was also properly observed.

F. Waste Disposal

The cat scats, which were strained, were disposed of through the laboratory sinks. Garbage (ie. plastics) was immediately removed during the straining process and was thrown out into proper waste bins.

G. Data Organization

See Appendix A.

RESULTS

The frequency of occurrence of hard prey items found in the scats of cats living around Hinaciacan Mangrove Area is 0%. There were no hard remains found in all of the scats that were collected and processed. Most of the things that were found in the scats were plastics, plant seeds, and fish bones. Other items such as paper and fiber were also found in the scats.

Our results show that no hard prey items were found in cats living around Hinaciacan Mangrove Area. And because of this, we can say that cats living around Hinaciacan Mangrove Area do not eat birds.

Compared to the study conducted by Pontier et al. in which they described the diet of cats at five different sites in the Kerguelen archipelago, the scats that were used for this study were collected from three different sites from around Hinaciacan Mangrove area. They collected 149 scats whereas in this study, only 101 scats were collected. They acquired their samples from the forests of the Kerguelen Archipelago which explains the fact that the scats they have collected contained the remains of birds and other mammals living in those areas. The cats that were involved in the study of Pontier et al. were feral cats while the cats involved in this study were domestic cats. Feral cats are considered wild and these cats prey on a variety of mammals.

Pontier et al. conducted their study in a span of one year, specifically between the months of November 1995 and November 1999. In relation, the scat collection in this study was only conducted for roughly 4 months.

CHAPTER 4

RESULTS AND DISCUSSION

This study aimed to determine the presence or absence of birds in the diet of domestic cats based on their scats.

It specifically aimed to determine the frequency of occurrence of 'bird remains' in the scats of domestic cats found around Hinactacan Mangrove Area.

RESULTS

The frequency of occurrence of bird prey items found in the scats of cats living around Hinactacan Mangrove Area is 0%. There were no bird remains found in all of the scats that were collected and processed. Most of the things that were found in the scats were plastics, plant seeds, and fish bones. Other materials like grass and fur were also found in the scats.

DISCUSSION

Our results show that none of the 101 scats were found to contain any bird remains. And because of this, we conclude that the cats around Hinactacan Mangrove Area do not eat birds.

Compared to the study conducted by Pontier D. et. al. in which they described the diet of cats at five different sites in the Kerguelen archipelago, the scats that were used for this study were collected from three different sites from around Hinactacan Mangrove area. They collected 149 scats whereas in this study, only 101 scats were collected. They acquired their samples from the forests of the Kerguelen Archipelago which explains the fact that the scats they have collected contained the remains of birds and other mammals living in those areas. The cats that were involved in the study of Pontier et. al. were feral cats while the cats involved in this study were domestic cats. Feral cats are considered wild and these cats prey on a variety of mammals.

Pontier et. al. conducted their study in a span of one year, specifically between the months of November 1998 and November 1999. In relation, the scat collection in this study was only conducted for roughly 4 months.

It is said that the presence of people affects the behavior of the cats. The cats are more tamed and they don't go out and wander to faraway places to look for food. This is most probably because of more interaction with humans leading to more domestication. Instead of hunting to look for food, cats just wait for humans to give them food. In this study, the cats were collected in barangays where a number of people reside. This can also explain why no bird or mammal remains were found in the scats.

The result from this study is different from the previous studies concerning the effect of the cats' diet in the decline of bird population. However this study's results are considered significant since it explains that the cats found around Hinactacan Mangrove Area do not prey on birds, contrary to the cats found in other countries.

B. Conclusions

Since no bird prey items were found in all 101 scats collected, we therefore conclude that the cats living around Hinactacan Mangrove Area do not prey on the birds residing there.

C. Recommendations

1. A longer period of time (if possible, years) to collect and analyze a greater number of samples is recommended.
2. An improvement on the method of straining the samples, like a stronger continuous flow of tap water to wash the samples or a helping tool to make straining easier is recommended.
3. A wider coverage of sampling areas around Hinactacan Mangrove Area is recommended.

CHAPTER 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This study was aimed to investigate whether or not domestic cats living around the Hinactacan Mangrove area prey on any of the bird species thriving in said bird sanctuary.

Specifically, this study aimed to determine the frequency of occurrence of prey items found in the scats of domestic cats.

A. Summary of Findings

The frequency of occurrence of bird prey items found in the scats of cats living around Hinactacan Mangrove Area is 0%.

B. Conclusions

Since no bird prey items were found in all 101 scats collected, we therefore conclude that the cats living around Hinactacan Mangrove Area do not prey on the birds residing there.

C. Recommendations

1. A longer period of time (if possible, years) to collect and analyze a greater number of samples is recommended.
2. An improvement on the method of straining the samples, like a stronger continuous flow of tap water to wash the samples or a helping tool to make straining easier is recommended.
3. A wider coverage of sampling areas around Hinactacan Mangrove Area is recommended.

APPENDIX A

RAW DATA

The Presence or Absence of Prey Items in the Collected Cat Scats

Batch #	Date collected	Scat #	Collected where?	Prey?	
				YES	NO
1	November 17, 2012	1	Ingore, Lapaz		/
		2		/	
		3		/	
		4		/	
		5		/	
		6		/	
		7		/	
		8		/	
		9		/	
		10		/	
		11		/	
		12		/	
		13		/	
		14		/	
		15		/	
		16		/	
		17		/	
		18		/	
		19		/	
		20		/	
2	November 17, 2012	21	Ingore, Lapaz		/
		22		/	
	November 24, 2012	23	Baldoza, Lapaz		/
		24		/	
		25		/	

3	November 24, 2012	26	Baldoza,		/
		27	Lapaz		/
		28			/
		29			/
		30			/
		31			/
		32			/
		33			/
		34			/
		35			/
		36			/
		37			/
		38			/
		39			/
		40			/
4	November 24, 2012	41			/
		42			/
		43			/
		44			/
		45			/
		46	Baldoza,		/
		47	Lapaz		/
		48			/
		49			/
		50			/
		51			/
		52			/
		53			/
		54			/
		55			/
56			/		

		57			/
		58			/
		59			/
		60			/
		61			/
		62			/
		63			/
		64			/
		65			/
5	December 8, 2012	66	Ingore,		/
		67	Lapaz		/
		68			/
		69			/
		70			/
		71			/
		72			/
		73			/
		74			/
		75			/
		76			/
		77			/
		78			/
		79			/
		80			/
		81			/
		82			/
		83			/
		84			/
		85			/
6	January 19, 2013	86	Baldoza,		/
		87	Lapaz		/

		88			/
		89			/
		90			/
		91			/
		92			/
		93			/
		94			/
		95			/
		96			/
		97			/
		98			/
		99			/
		100			/
		101			/

LITERATURE CITED

- van Aarde RJ. 1980. The diet and feeding behaviour of feral cats, *Felis catus* at Marion Island. S.-Afr. Tydskr. Natuurnav. [1980 March 20, cited 2012 Sept 8] Mammal Research Institute, University of Pretoria.
- Nogales, M., Martín, A., Tershy, B. R., Donlan, C. J., Veitch, D., Puerta, N., Wood, B. and Alonso, J. (2004), A Review of Feral Cat Eradication on Islands. *Conservation Biology*, 18: 310–319. doi: 10.1111/j.1523-1739.2004.00442.x
- Nogales, M., Rodríguez-Luengo, J. L. and Marrero, P. (2006), Ecological effects and distribution of invasive non-native mammals on the Canary Islands. *Mammal Review*, 36: 49–65. doi: 10.1111/j.1365-2907.2006.00077.x
- Medina, F. M., Bonnaud, E., Vidal, E., Tershy, B. R., Zavaleta, E. S., Josh Donlan, C., Keitt, B. S., Le Corre, M., Horwath, S. V. and Nogales, M. (2011), A global review of the impacts of invasive cats on island endangered vertebrates. *Global Change Biology*, 17: 3503–3510. doi: 10.1111/j.1365-2486.2011.02464.x
- Campos, C. B., Esteves, C. F., Ferraz, K. M. P. M. B., Crawshaw, P. G. and Verdade, L. M. (2007), Diet of free-ranging cats and dogs in a suburban and rural environment, south-eastern Brazil. *Journal of Zoology*, 273: 14–20. doi: 10.1111/j.1469-7998.2007.00291.x
- Campos, C. B., Esteves, C. F., Ferraz, K. M. P. M. B., Crawshaw, P. G. and Verdade, L. M. (2007), Diet of free-ranging cats and dogs in a suburban and rural environment, south-eastern Brazil. *Journal of Zoology*, 273: 14–20. doi: 10.1111/j.1469-7998.2007.00291.x
- Krauze-Gryz, D., Gryz, J., Goszczyński, J. (2012), Predation by domestic cats in rural areas of central Poland: an assessment based on two methods. *Journal of Zoology*, 288: 260–266. doi: 10.1111/j.1469-7998.2012.00950.x
- Matias R, Catry P. 2008. The diet of feral cats at New Island, Falkland Islands, and impact on breeding seabirds. *Polar Biology* [Internet]. Volume 31, Issue 5, pp 609-616.

- Medina FM, Nogales M. 2009. A review on the impacts of feral cats (*Felis silvestris catus*) in the Canary Islands: implications for the conservation of its endangered fauna. *Biodiversity and Conservation* [Internet]. Volume 18, Issue 4 , pp 829-846.
- Medina FM, Garcia R, Nogales M. 2006. Feeding ecology of feral cats on a heterogeneous subtropical oceanic island (La Palma, Canarian Archipelago). *Acta Theriologica* [Internet]. Volume 13, Issue 3 , pp 581-603.
- Bonnaud E, Medina FM, Vidal E, Nogales M, Tershy B, Zavaleta E, Donlan CJ, Keitt B, Le Corre M, Horwath SV. 2011. The diet of feral cats on islands: a review and a call for more studies. *Biological Invasions* [Internet]. Volume 13, Issue 3 , pp 581-603.