INTRODUCTION

In October of 2004, a deceased juvenile Gray Fox (Urocyon cinereoargenteus) was discovered on the Relativistic Heavy Ion Collider (RHIC) road on Brookhaven National Laboratory (BNL) property. This discovery led to many questions concerning the abundance of this species at BNL. Information regarding Red Fox (Vulpes vulpes) and Gray Fox populations on Long Island, New York is scarce and outdated with no current study focused on observing mitochondrial DNA markers in feces, which enable us to distinguish between the two species. A positive scat sample and camera trap shot have confirmed the presence of gray fox at BNL.

RESULTS

The camera trap provided a positive result for a gray fox identification on the east portion of the laboratory. The fox was initially caught on the time set images on 7/21/06 at 09:11 hours and 7/22/06 at 02:50 hours. On 8/2/06 canned dog food was deposited in the line of the camera trap in the hopes of gaining cleaner motion images where the specific pelage distinctions between red and gray foxes could be observed. The individual did not have the black legs and ear tips normally associated with the red fox but did have a darker pelage, muzzle and the black tail tip associated with the gray fox species.

Although 90% of DNA extraction performed on stools (n = 39) yielded that DNA was present in samples, PCR proved successful in (n = 14) or 36% of scat samples. Two samples produced unexpected PCR product. PCR was successful in yielding the desired 412bp segment. Enzyme restriction of the control sample that was run on tissue from an assumed gray fox yielded bands that matched the expected patterns of a red fox. PCR was conducted again on the tissue and results were positive for gray fox. Two unknown pcr products yielded no bands during enzyme restriction.

DISCUSSION

Due to heavy precipitation sample collection was limited and quality of samples was compromised. Many samples had been exposed to sun, rain and other weather occurrences for unknown lengths of time effecting sample quality for DNA extraction. DNA of unknown species may have been extracted from the samples where DNA was present in the initial gel but had no PCR success. The method of storing samples at 80°C in DET buffer may improve DNA extraction for future results [6]. Lack of PCR product from some of the scat samples can be due to lack of fox DNA present in samples. It is unknown if the origin of DNA that resulted from extraction was from fox species or from prey and vegetation consumed by the deceasing individuals. It is assumed that a lack of PCR product means the original DNA did not originate from a fox species.

An interesting note in the study came from the suspected Gray Fox control that turned out to in fact be of the species Vulpes vulpes. When the nucleotide sequence of this individual was run through genbank database it was discovered that this individual showed no significant DNA mutations and contained a unique nucleotide sequence that was different from other published sequences.

The future of this project will be focused on locating more evidence of gray foxes as new scouting could occur if the laboratory or surrounding area is of interest to gray foxes. The BNL property in the more undeveloped sections where the specific pelage distinctions between red and gray foxes could be observed. The individual did not have the black legs and ear tips normally associated with the red fox but did have a darker pelage, muzzle and the black tail tip associated with the gray fox species.

The differences between the two species are mainly in pelage coloring with the gray fox having a black tipped tail and the red fox having a white tipped tail. The pelage of the gray fox is mostly gray but does include reddish marks along its neck. The red fox has black tipped ears and black legs that also help to distinguish it from the gray fox. Both species are crepuscular and nocturnal and share the same foraging techniques in their search for prey. They both are general opportunistic feeders subsisting mainly on small mammals, insects, and whatever carcass may be in season except the gray fox is more inclined to subsist on insects and vegetation than the red fox [5]. Another distinguishing is that the gray fox is the only North American canid that has the ability to climb trees enabling it to escape from most terrestrial predators.

Acknowledgements

We would like to thank the Department of Energy for the opportunity to participate in the Student Undergraduate Laboratory Internship (SULI) Program. Thanks goes out to all the staff of the Environment and Waste Management Services Division for a pleasant work environment. Endless thanks to Dr. John Dunn and his staff at Biology for volunteering their time. Thanks to Charles Leafly, Val Yous and Chris Canacchi for their invaluable insights. A very special thank you goes to Mr. Mel Morris at the Office of Educational Programs.

References

3. Chamberlain, Michael J. and Lopollo, Bruce D. Spatial Use Patterns, Seasonal Habitat Selection, and Interactions Among Adult Gray Foxes in Mississippi
5. Hodgman, J. Gregory, and Chapman, Joseph A., Comparative Feeding Habits of Red Foxes (Vulpes vulpes) and Gray Foxes (Urocyon cinereoargenteus) in Maryland.