

Introduction

- In collaboration with the Department of Wildlife Resources (DWR) we have begun an investigation of ectoparasite prevalence on Mule Deer in Eastern Utah.
- Two methodologies have been adopted for collection of these deer to be combed for ectoparasites.
 - Helicopter captures in collaboration with DWR
 - Hunter checkpoints alongside DWR
- While both approaches have provided promising results of ectoparasites. We aim to extend our research to a larger population of deer by introducing hunter collection kits. This initiative represents a citizen science project that will facilitate the collection of more samples, enabling us to conduct more in-depth analysis of ectoparasites and obtain a more accurate representation of pathogen rates in our region



Pathogens

Table 1. This table is to present what types of pathogens have been detected from ticks located in other areas of Utah. The objective of our research is to determine if similar pathogens are present in ticks inhabiting our region. This is crucial in understanding the potential risk of transmission of these pathogens to people in Eastern Utah.

Disease	Pathogen	Type	Vector	Symptoms
Rocky Mountain Spotted Fever	<i>Rickettsia rickettsii</i>	Bacteria	¹ RMWT; ² BDT; ³ WFT	Sudden onset of chills and fever, headache, blood-shot eyes; leakage of blood from capillaries over the entire body.
Tularemia	<i>Francisella tularensis</i>	Bacteria	RMWT	Chills, fever, prostration, ulceration at bite location, and tender, swollen lymph nodes.
Colorado Tick Fever	Orbivirus	Virus	RMWT	Sudden onset, intermittent fever, headache, muscular pain, leukopenia.
Tick Paralysis	Saliva Toxin	Neurotoxin	RMWT	Paralysis spreading from feet to upper regions of the body; may cause death if tick is not removed.
Tick-Borne Relapsing Fever	<i>Borrelia hermslii</i> ; <i>Borrelia parkeri</i>	Bacteria	⁴ Os	Episodes of fever, headache, muscle and joint pain; nausea.
Lyme Disease	<i>Borrelia burgdorferi</i>	Bacteria	⁵ IP	Fever, chills, headache, fatigue, muscle and joint aches, swollen lymph nodes; erythema migrans rash (target-shaped rash occurring at attachment site). See the CDC page on Lyme Disease symptoms for more.

Methods and Ectoparasite Collection kits

- A standardized method was used to collect ectoparasites from the mule deer.
- The animal was placed on one side and split up into three sections. The Head, Anterior (front), and Posterior (Rear) as shown in Fig. 2.
- A timer was set to two minutes for each section.
- Combing against the hair grain, one hand holding the comb while the other holding the skin taught for parasite identification on the skin.
- Ectoparasites were removed with tweezers, ensuring complete removal.
- Specimens then placed in centrifuge vials filled with 70% isopropyl alcohol to be preserved.
- Hunter collection kits are to be made, taking care that their contents have all the tools and information that is needed to be able to appropriately collect the ectoparasites.
- Within each kit, as shown in Fig. 2., an instruction booklet, tweezers, tick combs, micro-vials, and a datasheet are included.
- Each kit is stored inside a bubble mailer that has our return address and is already stamped to get shipped back to our research team.

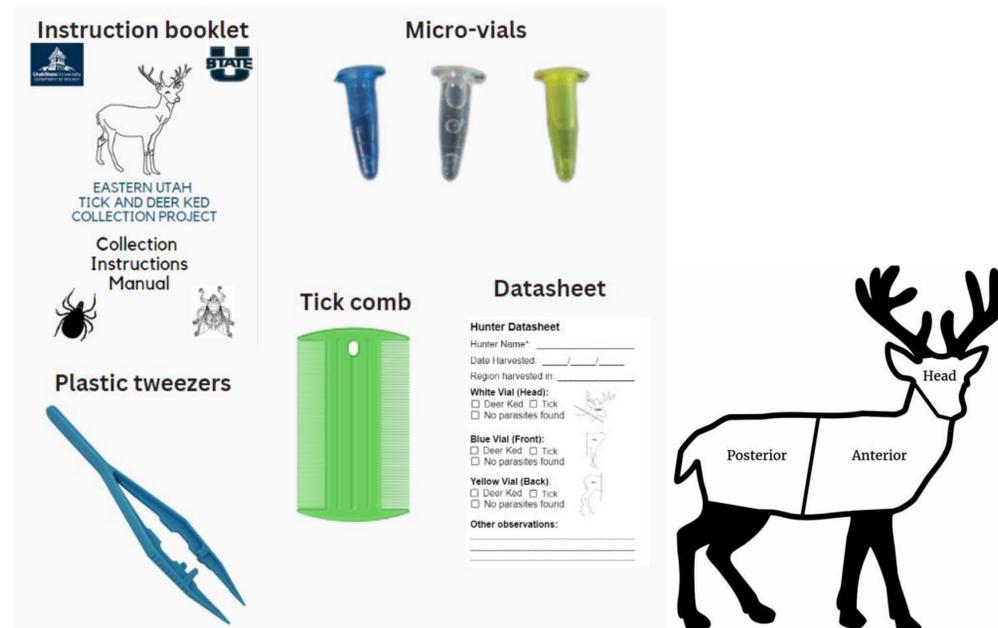


Fig. 1. Showing a brief overview of the collection kits we plan to distribute.

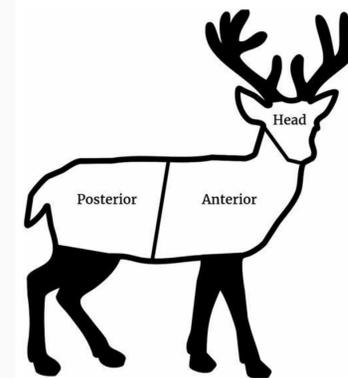


Fig. 2. This image shows how each animal is split up to be surveyed for ectoparasites. With each section being combed for 2 minutes.

Moving Forward

Though our ectoparasite collection efforts have yielded successful results through the implementation of helicopter captures and hunter checkpoints. We propose that our study's focus should shift towards collaborating with the Department of Wildlife Resources to distribute hunter collection kits as our primary method of ectoparasite collection.

Adopting this approach would allow us to obtain a more substantial sample size while dedicating additional time for ectoparasite identification. Furthermore, we would have more time to devote to conducting tests to determine their pathogen load, providing valuable insight into pathogen prevalence on ectoparasites in Eastern Utah.

References

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- Karen C Poh, Michael Skvarla, Jesse R Evans, Erika T Machtinger, Collecting Deer Keds (Diptera: Hippoboscidae: Lipoptena Nitzsch, 1818 and Neolipoptena Bequaert, 1942) and Ticks (Acari: Ixodidae) From Hunter-Harvested Deer and Other Cervids, Journal of Insect Science, Volume 20, Issue 6, November 2020, 19, <https://doi.org/10.1093/jisesa/ieaa024>