

# Wyoming Tick Blitz: Launching a Citizen Science Initiative

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## INTRODUCTION

One Health is the concept that human, animal, and environmental health are inextricably linked<sup>1</sup>. Through the lens of One Health, something that is harming one of the facets, is harming all of them. A growing issue closely related to One Health, is vector-borne diseases.

Vector-borne diseases carried by ticks and mosquitoes are on the rise in America, invariably harming human and animal health here in Wyoming<sup>2</sup>. Increases in temperature and humidity are directly affecting arthropod vectors by giving them favorable conditions, which result in an increased range<sup>3</sup>.

We know little about the species of ticks living in Wyoming, their ranges, or their disease prevalence. Specific diseases we are concerned about include Tularemia, Rocky Mountain Spotted Fever, Lyme disease, and Q fever. The major problem that we are facing in Wyoming is that there is no historical data. We don't have the knowledge necessary to begin combating the growing problem of tick-borne disease.

By organizing a Tick Blitz in collaboration with Teton County Weed and Pest, Wyoming Public Health Labs (WPHL), Wyoming State Veterinary Lab (WSVL) and engaging citizen scientists, we will obtain vital information about the movement of tick-borne diseases in Wyoming. Investing in a surveillance program will help the prevention and management of emergent diseases before they become a large, costly problem<sup>4</sup>. A state-wide Tick Blitz will give us geographical information about the ranges of tick species in Wyoming, as well as information about the prevalence of diseased ticks in Wyoming. Our project also aims to educate the public on tick-borne diseases to increase awareness of vector-borne diseases as well as the One Health concept. By tracking ticks in Wyoming, we would have essential knowledge that would have far reaching impacts in epidemiology, public health, tick-borne disease research, and One Health in Wyoming.

## OBJECTIVES, HYPOTHESES, & AIMS

### Objectives:

- Increase awareness and surveillance of tick species and tick-borne diseases present in Wyoming.
- Include the public in tick collection, creating personal investment for citizen scientists.
- Demonstrate the need for increased investment into public health infrastructure pertaining to tick-borne diseases.
- Complete an up-to-date survey of tick species in Wyoming.

### Hypotheses:

- By including the public in the Wyoming Tick Blitz, reporting our experimental findings, and providing citizen scientists with general education on ticks we will increase civilian awareness by providing knowledge on tick-borne diseases and disease prevention.
- As compared to CDC-predicted ranges for tick species (CDC, 2022), the Wyoming Tick Blitz data will show additional/unpredicted species of ticks present in Wyoming.
- By involving Wyoming citizen scientists, WPHL, WSVL, and Teton County Weed and Pest in this research, we will collect ticks from diverse climate zones and every participating county in Wyoming.

### Specific Aims:

- Establish community outreach programs to increase public awareness of tick-borne diseases in Wyoming.
- Start a Wyoming Tick Blitz program in areas with high tick prevalence in Wyoming and encourage citizen scientists to submit their samples.
- Develop a survey administered to the citizen scientist involved in the Wyoming Tick Blitz to collect data on knowledge gained.
- Ensure that tick samples are sent to our partners for testing and identification of the species of the tick, as well as any diseases carried. Specific diseases include Tularemia, Colorado Tick Fever, Rocky Mountain Spotted Fever, Q Fever, and Lyme disease.
- Provide support to Teton County Weed and Pest and offer potential opportunities to expand their efforts to launch a tick blitz by May 2024.

## METHODS & MATERIALS

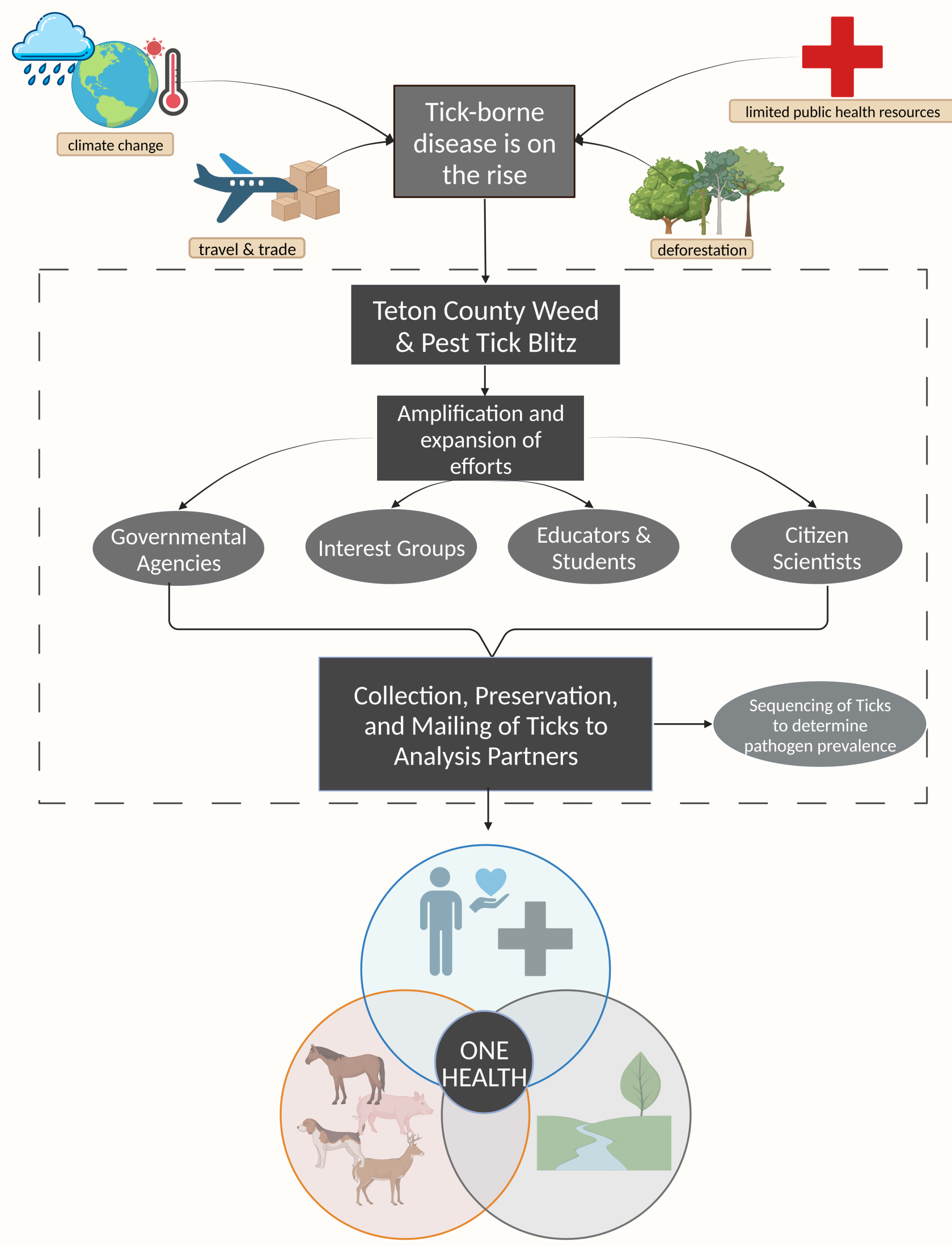


Figure 1. Our conceptual model demonstrates the change in tick-borne disease that leads to the need to create new surveillance initiatives to track these changes.

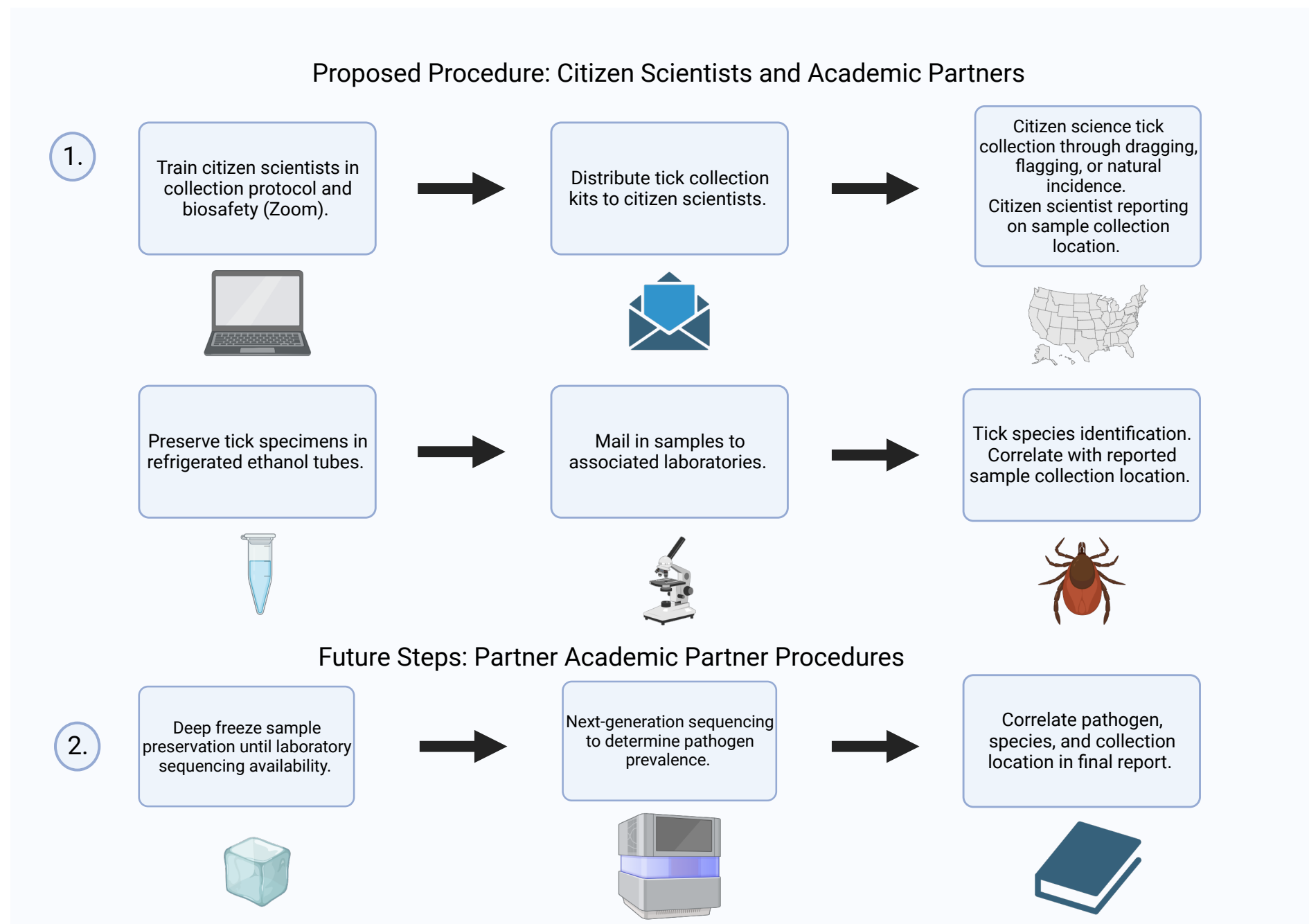


Figure 2: Proposed protocol to complete a tick blitz in Wyoming from start to end. This schematic excludes academic preparation and protocol troubleshooting.

## What is a Tick Blitz? What is Citizen Science?

Citizen science is a method of conducting research through public volunteer assistance. The volunteers gain meaningful and valuable connections to science and community<sup>5</sup>. The most common citizen science initiatives include data monitoring and collection programs. Citizen science is inherently a collaborative process between scientists, community groups, educators, and numerous other stakeholder groups in communities<sup>6</sup>. Citizen science is also a cost-effective way to conduct studies that would otherwise be cost-intensive due to labor.

A Tick Blitz is a way of using citizen science to sample tick populations. Tick sampling and testing is sorely needed due to changes in species range and increases in tick-borne diseases. Coordinating agencies usually create a protocol that involves safety training, environmental sampling, and submission of ticks into laboratories. The proposed Wyoming Tick Blitz will follow that same structure (Figure 2). Previous Tick Blitzes across the United States have discovered unusual tick species range expansion, and discovered rates of pathogen-carrying ticks. This highlights the need for tick surveillance and the need for responses to increasing tick-borne disease burdens<sup>7</sup>.

There have been no formalized tick surveillance projects in Wyoming. With this initiative, we hope to bring knowledge of ticks and tick-borne diseases to the public. Citizen scientists will receive a kit to safely collect, preserve, and mail in ticks to associated laboratories. Collection will be facilitated through "tick drag" apparatus, which is a piece of cloth on a long rod to sweep the environment and pick up ticks. The ticks will be preserved in ethanol and mailed in to our collaborative laboratory agencies for species identification and pathogen sequencing. This information will be reported back to the citizen scientists that participated in our Tick Blitz, other community stakeholders, and relevant governmental and healthcare agencies

## TICK BLITZ KIT



Image 1: A Tick Blitz kit sent out to citizen scientists for the New York State Tick Blitz in the Spring 2021. Our proposed Tick Blitz kit will look very similar.

## FUTURE DIRECTIONS

Our hopes are to launch a Wyoming Tick Blitz with the help of Teton County Weed and Pest, WPHL, WSVL, and citizen scientist volunteers. We plan to have this take place in the Spring of 2024. Climate change has led to an increase in both precipitation and temperatures in Wyoming. Based on previous research, this is the ideal climate for tick survival. This being said, we are expecting to see new and unexpected tick species present in Wyoming as compared to the CDC reports. The species listed as being present in Wyoming by the CDC include *Dermacentor variabilis*, *Rhipicephalus sanguineus*, and *Dermacentor andersoni*. Also, as compared to data from the CDC, we are expecting to see an increase in the prevalence of tick-borne diseases in Wyoming. A pre- and post-survey will be given to the volunteers to fill out and hand in, so that we can measure the amount of knowledge gained by the citizen scientists during the Wyoming Tick Blitz. Our survey structure and content will be guided by a model established by researchers in Maine.<sup>8</sup> In the future, we would like to continue the project. We hope to learn from this first one, and use our new information to improve future Wyoming Tick Blitzes every year after Spring 2024.

## REFERENCES

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