



YELLOWSTONE FOREVER

To: Meg and Burt Raynes Wildlife Fund

From: Kim Yablonski, Foundation Relations/Park Project Manager Yellowstone Forever

Re: Report on Yellowstone Wolf Project Grant

Date: January 14, 2021

Unseen Challenges: Identifying parasite communities infecting Yellowstone wolves and their impacts on host fitness

Project Lead: Ellen E. Brandell

Describe how the granted money was used:

These funds were applied to a project to identify helminths infected Yellowstone wolves and explore patterns of helminth infections, such as spatial heterogeneities and sex-bias. Specifically, the funds were used to pay for wolf genotyping at the U.S. Department of Agriculture Animal and Plant Health Inspection Service lab in Colorado.

Discuss how the project objectives in the approved grant application were achieved or explain why not:

Individual wolves and their infections were tracked from summer 2018-summer 2020, and the lab work that this grant funded was an integral part of this project. The project objectives have been achieved thus far. Through this project, we hope to gain an understanding of the intestinal parasites infecting Yellowstone wolves, the patterns of infection, and consequences of infection on wolf fitness.

State the conclusions and effectiveness of the project:

This project is not completed, as samples are currently at a lab where parasites are being extracted from wolf scat, identified, and genotyped. Still, we have successfully tested more than 50 samples for parasites, glucocorticoids, and wolf genotyping. Twenty-six percent (26%) of all samples were positive for a helminth infection, mainly *Echinococcus granulosus*. Surprisingly, we identified a *Taenia* species never before identified in wolves occurring in the Rocky Mountains.

Wolf genetic material was able to be extracted and successfully genotyped in 48% of samples, which is considered highly successful as scat is a poor source for host DNA. There was higher infection prevalence in wolf packs of eight or more wolves, suggesting that transmission within packs is important. We have yet to detect a relationship between infection and sex, age, or stress levels.

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As the study continues, the team plans to:

- Complete all laboratory testing (wolf genotyping, parasite genotyping);
- Construct a Bayesian hierarchical model predicting helminth infection, accounting for wolf age, sex, pack size, location, and coat color;
- Assess trends in wolf helminth infections through time, with a particular focus on fitness measures. For example, were infected wolves less likely to breed?
- Examine the efficacy of using scat for parasitological studies. For example, we will examine how wolf and parasite genotyping success differed by season, with temperature, rainfall, and ultraviolet radiation. Preliminarily, these all have important ramifications on the ability to extract quality DNA from the scat samples.

Progress Report

The spread of the Coronavirus throughout the world resulted in many shutdowns, including Yellowstone National Park from mid-March through May and then an extended partial shutdown until June 1. The Yellowstone Wolf Project scaled back many aspects of research including aborting Early Winter Study in March and minimizing efforts for both summer predation and Late Winter Study in order to ensure the health and safety of employees. Project Leader Ellen E. Brandell was unable to access her office to ship samples. Funding sources for lab work was also impacted and fieldwork was stunted from March-July.

As the study continues in 2021 and beyond, Yellowstone National Park biologists plan to:

- Construct and test models; ensure models adequately describe patterns in parasite infection
- Interpret results, publish and make them publicly available.
- Meet with local agencies, conservation groups, and plan other education/collaboration opportunities to share and discuss our findings and broader implications.



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Executive Summary:

Unseen Challenges: Identifying parasite communities infecting Yellowstone wolves and their impacts on host fitness

Project Lead: Ellen E. Brandell

January 2020 marked the 25th anniversary of wolf reintroduction to Yellowstone National Park. The wolf population in Yellowstone National Park provides an unparalleled opportunity to study parasite dynamics. This study is identifying which parasites the wolves have accumulated post-reintroduction and how they affect individual health.

At the end of December 2020 there were at least 121 wolves in nine packs (7 breeding pairs) living primarily in Yellowstone National Park (YNP). This census was the highest park count since 2008 (124 wolves) and marked a one-year increase of 30.1% after a decade of very little population change year-to-year. Much of the growth was attributed to successful pup production and survival in multiple packs, most notably the Junction Butte pack which produced four litters and raised 18 pups through the end of the year. The 2020 total is 30.5% lower than the high count of 174 wolves in 2003.

With the support of the Meg & Bert Raynes Wildlife Fund, this wolf project study was able to move forward with data collection and testing despite the obstacles presented by the coronavirus. While the work progresses in 2021, biologists plan to construct and test models; ensure models adequately describe patterns in parasite



infection; interpret results, publish and make them publicly available and meet with local agencies, conservation groups, and plan other education/collaboration opportunities to share and discuss their findings and broader implications. This study is vital work to better understand wolf population persistence, conservation and management.

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