

28 August 2023

Mr. Todd Stiles
District Ranger
Bridger-Teton National Forest-Jackson Ranger District
25 Rosencrans Lane
P.O. Box 1689
Jackson, WY 83001

Dear Mr. Stiles, Ms. Radue, Ms. Milo and the Jackson Ranger District Team,

Thank you for the invitation and opportunity to comment on this process of rebuilding the Astoria Bridge over the Snake River. I am speaking on my own behalf and not any of the organizations I am associated with.

I am writing in support of the bridge reconstruction project and offer comments for mitigating the potential impacts on invertebrate populations, specifically on ground dwelling spiders who make their home in the project area.

While there are currently over 51,000 described species of spiders, I will focus my comments on impacts to ground dwelling spiders in two groups with species found locally: wolf spiders (in the family Lycosidae) and mason or mound building spiders (in the family Corinnidae: Genus *Castianeira*).

Background:

I first fell in love with this place when I came to teach at the Teton Science School in 1990, then served as a volunteer EMT on the ambulance in Jackson, and now I conduct research here. I'm focused on how we can better care for our interdependence—ecological and societal systems together. The unexpected entry point into this work is often the Beauty and Wonder of spiders. Spiders give us the metaphor of the web and remind me how impact anywhere affects even seemingly distant parts. The Astoria bridge is built to technically connect two points, yet the current impact of this one structure has revealed a web of impacts to communities near and far – from local residents, to tour buses who now sit and idle in the hot canyon waiting for their guests, to large shipment drop-offs trucked over in smaller loads, to horses being unloaded highway side and walked across the bridge and the re-routing of vehicles through Hoback, impacting residents there.

I began my formal study of spiders with the late Prof. Herbert Levi at Harvard's Museum of Comparative Zoology and am currently retracing his steps from 1950 when he and his research partner and wife Lorna traveled from Wisconsin to Yellowstone and the Tetons to study spiders. They worked from what was then the Jackson Hole Wildlife Park, staying at the former field station where they listened to a talk by the Muries one evening. His work here in the Tetons is honored by his colleagues, naming a jumping spider (*Pellenes levii* Lowrie and Gertsch, 1955) that was found on what is now national forest and national park lands.

Herb told me how he took every class and field trip he could with Prof. Aldo Leopold so that he could learn as much as he could about wildlife management and apply it to invertebrates. Aldo and his son Luna are considered largely responsible for the Wilderness Act and the Wild and Scenic Rivers Act respectively, which together provide guidelines on how to govern and care for the Snake River and other critical waterways. These Acts contribute to the ongoing stewardship of the Upper Snake River by the Shoshone-Bannock Tribes and other tribal nations who have stewarded this waterway over the course of millennia and continue to do so today.

Here's what I recommend and why:

Why consider the impact on such a tiny animal like spiders here in the land of charismatic animals such as wolves and bears and cut throat trout and bald eagles?

Invertebrates comprise over 90% of all animals here. Spiders are top predators of the invertebrate world and critical to maintaining balance of a healthy ecosystem. By Astoria, crab spiders help pollinate flowers, orb weaving spiders catch biting insects, and ground dwellers feast on many insects, including midges and other emerging insects. These ground dwelling spiders are helping maintain healthy populations of these insects – similar to a wolf and a herd of elk – that are important for fish such as cut throat trout, and by association, anglers.

A study by Drs. Nyeffeler and Birkhofer reported that while humans are estimated to consume 440 million metric tons a year of meat and fish, this is dwarfed by spiders' consumption of between 440-880 million metric tons a year!

In the Brooks Range in Alaska (where arctic wolf spiders outweigh arctic wolves in biomass by 80x), a team led by Dr. Amanda Koltz found that a shift in the wolf spider's diets may be having a buffering effect on global temperatures for us all by helping keep carbon in permafrost banks.

The ground dwelling spiders I study use the heat of the rocks as engines and incubators for vital life functions like hunting and courtship and mating. Spiders do not regulate body temperature as we do, but rely more on external sources for thermal regulation. During the summer, rock temperatures can span a range of more than 50 degrees throughout the course of the day. You can find the starflower-shaped shadows of at least two species of wolf spiders basking on cobbles near the river, which they share as hunting ground with the mound building spiders. Further up near the highway are rocks that the mound building spiders come back and use every year.

Concerns: Specific to this project, my primary concern is to avoid what happened in another building project north of here where a generation of these animals appear to have been subsumed during construction, and rocks that were used year after year as sites for securing egg sacs of future generations were hauled off or used as back fill. I am concerned about the loss of a large swath of habitat currently used by mound building spiders in this locality. This summer I recorded 95 egg sacs and mounds on 57 rocks in the area south of the highway between the bridge and the boating ramp. Approximately a couple dozen of these rocks are in the proposed project site. These rocks hold 36 (or 37.8%) of the recorded egg sacs.

According to the plans presented at the public hearing in Hoback Junction, this part will be paved to make way for the new bridge entrance. Additionally, there will be serious impact to the cobbled area, affecting both mound building and wolf spider populations. To my knowledge, it is difficult to find a population of mound building spiders of this size in this region.

These animals are already impacted by the following ongoing conditions:

- Increased vibrational impact. Mound building spiders have specialized structures on their bodies called trichobothria that are super sensitive to vibration and help the animals navigate their world. Because of this, they are very sensitive to our vibrational impact such as the compounding and accumulative effects of increased traffic through the canyon throughout the day and night, shooting fire arms on

both sides of Highway 89, leaf blowing and weed whacking. The structure of the river canyon seems to amplify and ricochet the reverberation of all of these activities in that area.

- Changes in habitat, such as the thick and quick spread of sweet clover (perhaps especially this year due to the wetter conditions), which is over 5 feet high in places, combined with thriving alfalfa plants have contributed to some of the microclimates and historically used rocks not being used this season. The sweet clover and alfalfa “forest” has impacted approx. 33-50% of their habitat on the south and north sides of the highway combined this season.
- Competition with other species like ants who often disrupt construction activities and steal/take the seeds females gather over their young.
- As cheatgrass mitigation continues across the valley and in the canyons, it is unknown what the impact of this herbicide will have on these spiders who carry hundreds of seeds in their jaws and accumulate them in mounds over their young.
- Increased storm frequency and intensity that may be washing their mounds off with more frequency and sometimes egg sacs too.
- Road crossings to the habitat on the north side of the highway.
- Global invertebrate collapse, which could directly affect their food source.

Recommendations:

My recommendations are grounded in my field observations spanning approx. 8 years.

- Relocate rocks that are already designated as part of the new roadway. These rocks have been historically used by multiple females for mound making and as well as mating.
 - Create the chance to complete a life cycle for this generation.
- Conduct an impact study.
- Create a “temporary nursery” perhaps on the north side of the highway so that this next generation of spiders can emerge. I recommend rocks in the affected area be moved at the end of mound building season, typically towards the end of September so any spiderlings can overwinter and emerge in the spring.
 - Many factors appear to impact rock selection to support reproductive behavior. What I have observed is that females “try on” a nook in a rock to lay her eggs. Not all rocks are selected, yet others are used year after year by multiple females.
 - An example of a rock I recommend moving into a nursery is a rock that, as of this writing, has seven egg sacs. I have seen females using this specific rock since I began observing this population in 2015.

- Move the rocks into a similar configuration as they are currently (as best as possible).
- For wolf spiders, and other ground dwellers, minimize high impact vibrational work between July and September when reproduction occurs, as well as during spiderling emergence in April and May.

Closing:

I have an appreciation of the many challenges and threads that need to come together to do a construction project like this in a place with extreme and rapidly changing weather. Removing and rebuilding this bridge has far reaching ripple out into a myriad web of interconnections from supply chain deliveries, to recreational use, to residents and visitors alike. Here's an opportunity to minimize the impact of this bridge work on the largest group of neighbors to the bridge – invertebrates.

I offer these suggestions for mitigating the disturbance of critical habitat of these spiders – top predators of the 90% of animals living in the proposed site – and to increase beneficial impacts for residents, anglers, visitors, as well as bears and bald eagles, and throughout the web of life.

Thank you for considering these recommendations. Feel free to contact me with questions as I'm available to discuss things further.

Sincerely,

S. J. Karikó, PhD

Citations:

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