



Introduction

Coyotes (*Canis latrans*) have lived in Colorado for many millennia and have evolved alongside humans (2). Through their remarkable adaptability, they thrive even amidst massive anthropogenic changes (8). As a species with a diverse and expanding habitat, coyotes shape the ecosystems they live in. They balance populations of rodents, ungulates, and mesocarnivores, which can lead to greater bird diversity, disease control, and increased plant diversity (3,5).

Motivation

Though coyotes can be elusive, they often use human trails for ease of travel and olfactory communication (4). A current study, led by CU PhD candidate Emily Golden Beam and ENVIS professor Joanna Lambert, is underway to investigate what we can learn about these animals from the scat they leave behind in Boulder County Open Space. These scat samples will be collected and then analyzed in the lab so we can learn about coyote gut microbiome, parasite load, hormone levels, and diet. These data will tell us more about how people and the environment may be shaping coyote behavior, and how we can improve human coyote coexistence (6). However, while ample coyote scat evidence can be seen on the 155 miles of Boulder County trails, even with 2-3 researchers in the field, it is random and rare that they are in the right place or time to collect fresh scat samples (10). Boulder County Open Spaces host almost two million visitors per year, and to boost collection rates, researchers could recruit trail users as citizen scientists to report potentially viable scat found on trails (9). Public participation can be a vital tool for open science, which aims to make scientific engagement more accessible, *and* benefits scientists through crowdsourcing (7).

More curious eyes on the trails and greater distances traveled; leads to higher chances of locating scat samples, gathering more data, and gaining deeper insights!

Future Directions

In one week, 43 responses were gathered. An overwhelming majority of respondents showed an interest in learning more about coyotes and 36 people said they would engage with QR code, training, and share a photo and location of fresh scat if they saw it on the trails. This assistance could have a substantially beneficial effect on the study collection rates. Engaging the public in this research could provide multi-faceted opportunities like educational hikes for scat and wildlife identification, teaching through scientific and indigenous Coyote storytelling perspectives, programs oriented towards children's engagement in learning about animal scat, presentations on coyote and human coexistence, teaching predator tolerance, sharing research results with interested community members, engaging visitors, and supporting researchers.

Methods

Partial scat collection is an effective and non-invasive way for scientists to learn more about animals (6). Coyotes communicate to one another via scat, so we never take the whole scat when collecting (4). Scat samples need to be fresh enough (~1-4 days old) to contain viable DNA and microbiome material (12).

1. Coyote Scat Collection: many kilometers traveled and many hours in the beautiful summer weather.

- Between 5/21/2024 – 7/16/2024 undergrad researchers Renae Hernandez and Michaela Perez visited trails at Lagerman Reservoir, Heil valley, Hall Ranch, Reynold's Ranch, Rabbit Mountain, Pella Crossing, and Caribou Ranch transects in search of coyote scat samples.
- Once located, data was logged for time, GPS coordinates, elevation, site name, age and appearance. Samples were safely collected and transported to CU Boulder lab freezers.
- Data of seven transect sites from May-August 2024 was analyzed for scat collection rates.

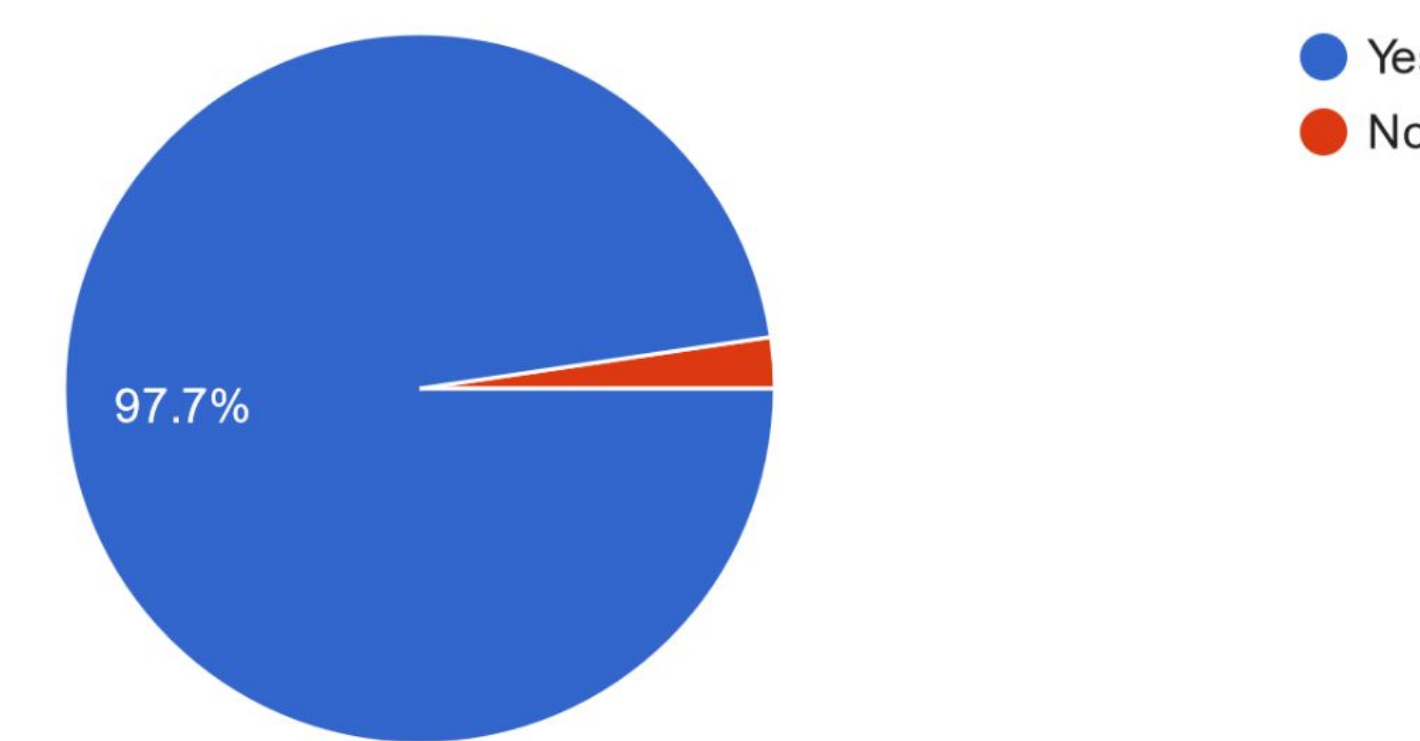
2.) Feasibility Poll: the aha moment; so many recreators on Boulder trails, so much potential!

- To gauge public interest for a Boulder County citizen science coyote scat notification project, feasibility data was collected.
- A poll was emailed to CU Ecology and Evolutionary Biology grad list, and posted one time only to Next-door, Facebook via "Boulder Collective" and "Boulder County Family Nature Events" group.
- Poll data was collected for one week.

Results

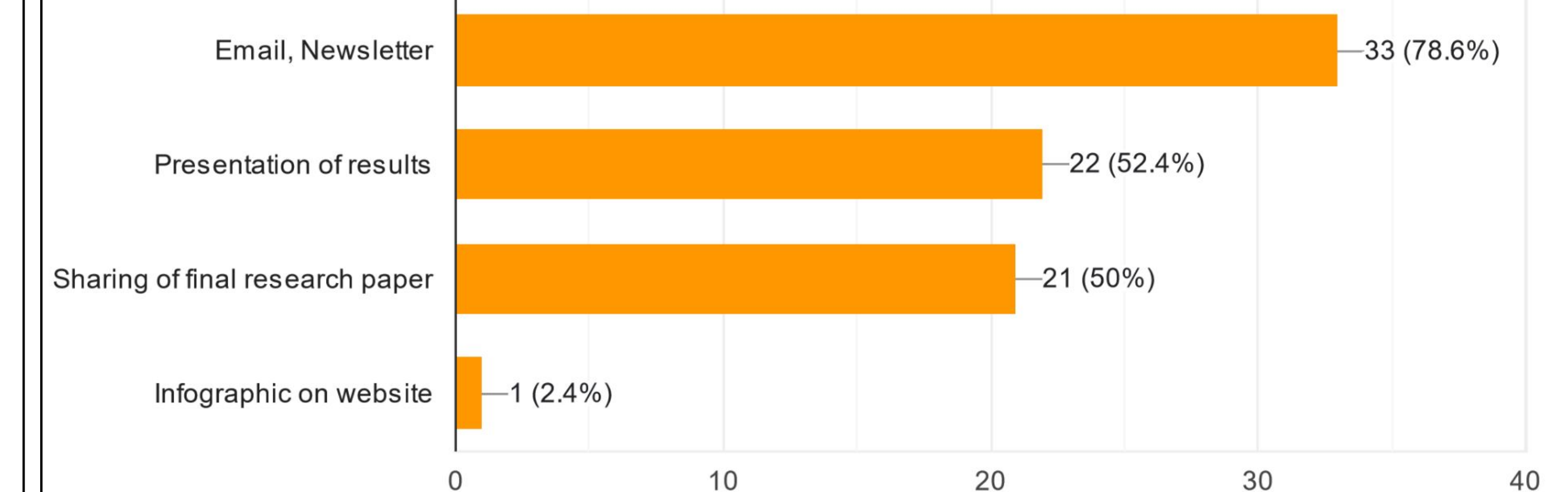
Are you interested in learning more about coyotes in Boulder County open spaces?

43 responses



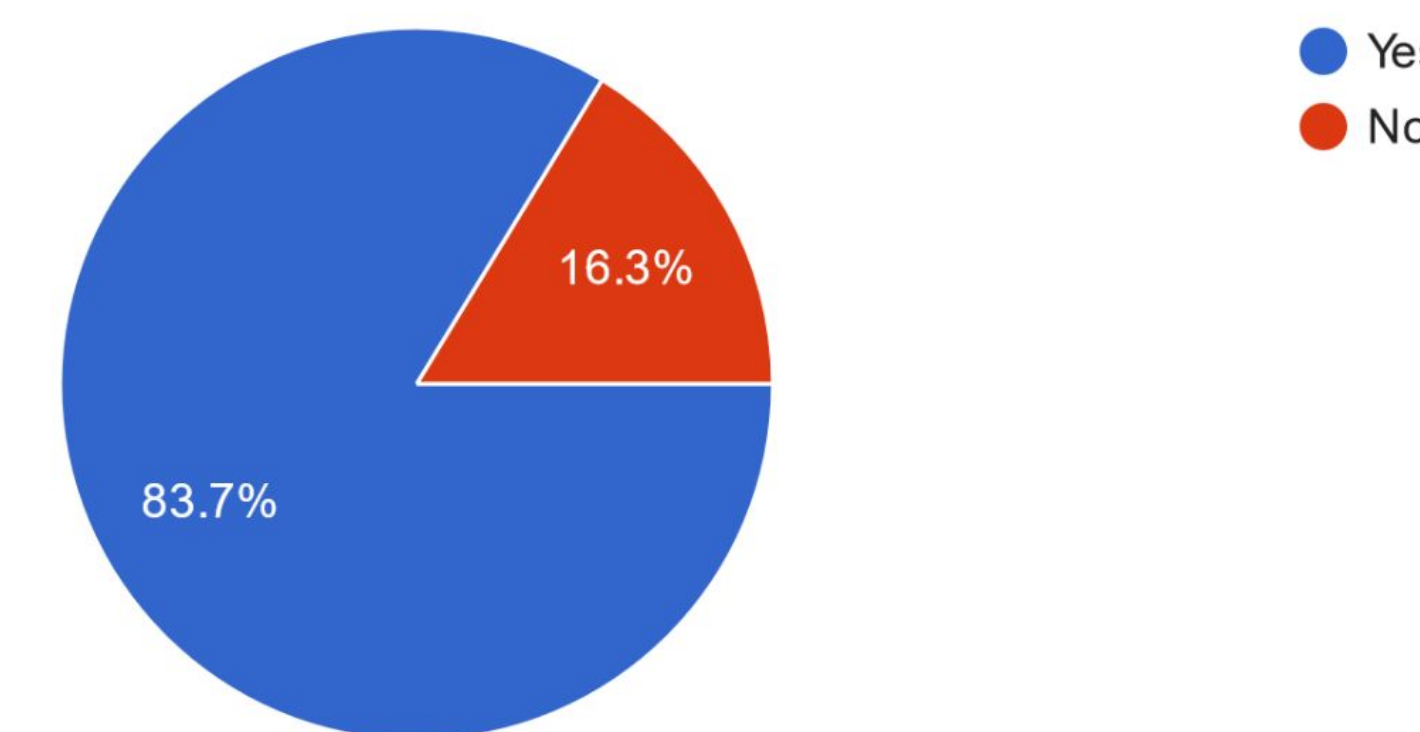
How would you be interested in learning about the results of the study? (Select all that apply)

42 responses



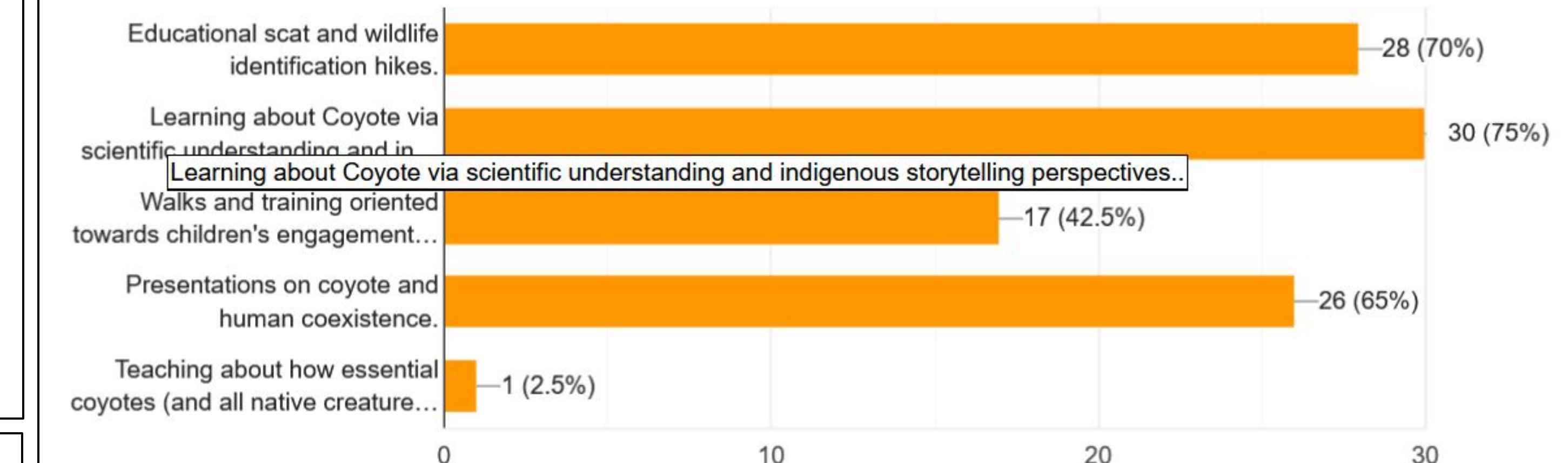
Are you interested in identifying coyote scat in Boulder County open spaces with the goal of sharing GPS coordinates and a picture of the scat with local researchers?

43 responses



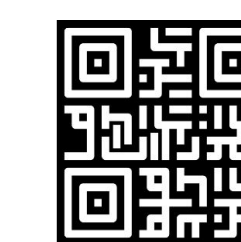
In what other ways would you be interested in engaging with project(s) like this? (select all that apply)

40 responses



The Citizen Scientists' tasks would be simple:

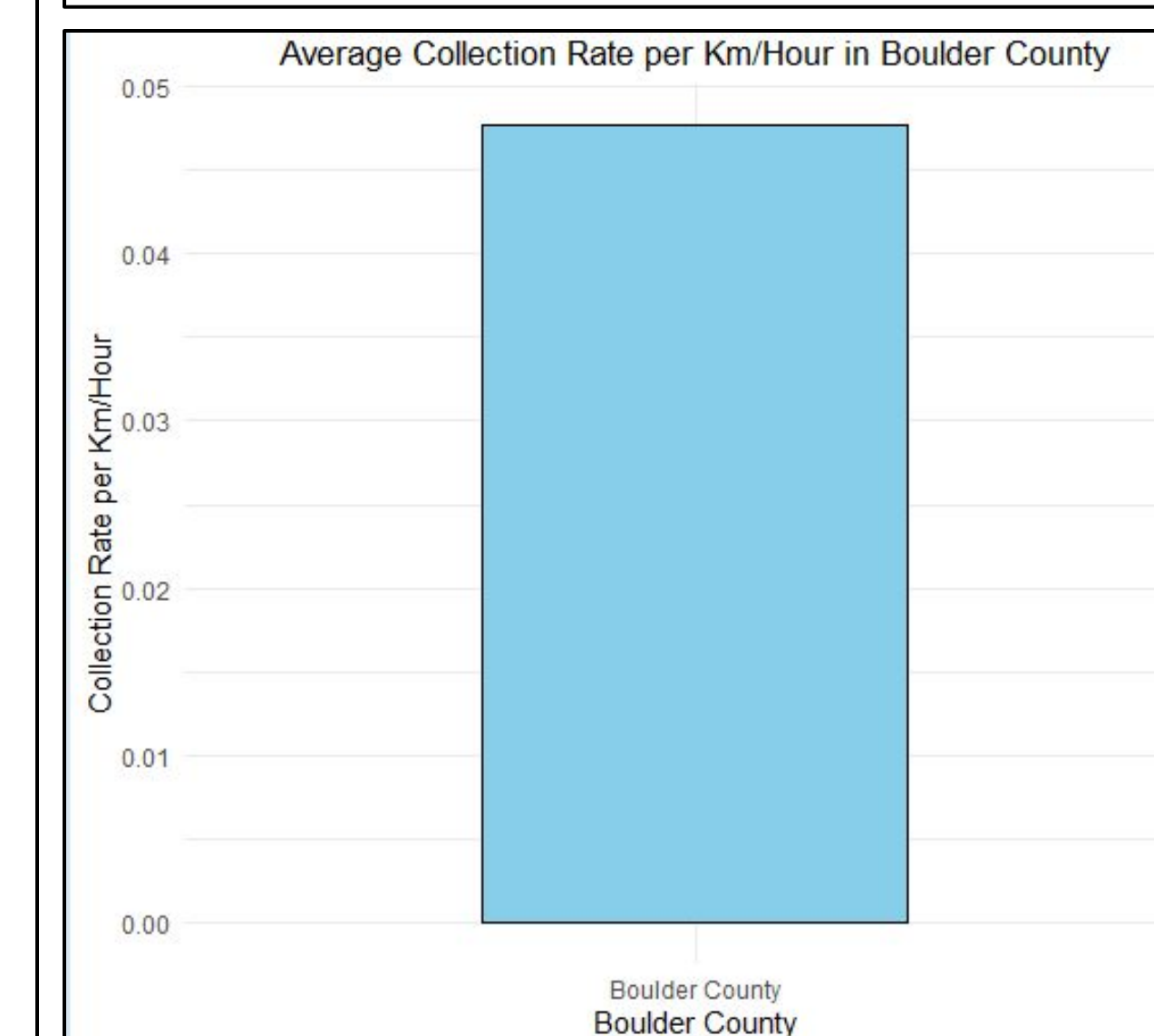
- 1.) Visit provided QR codes on trailheads to our upload form for quick training.
- 2.) Share GPS coordinates of suspected scat site.
- 3.) Upload a picture (to provided QR code form or to iNaturalist app on your smartphone).



With more leads researchers could visit more viable sites in a timely manner for collection.

*It is important to note that NO CONTACT with coyote scat would be required and a safe distance when taking pictures would be required for safety.

**This project would require the collaboration of Boulder County Open Spaces, we have not yet gotten permissions to do the citizen science project. This poll is intended to assess feasibility and gauge public interest. It will only be implemented once the necessary permissions are obtained.



On seven trail transect sites, with two researchers present we collected an average of 0.047 scats/km/hr. Between 5/21/2024 – 7/16/2024 we traveled 57 hours and 108 kilometers. Average time required to find one scat = 6.33 hours per scat. Distance traveled to find one scat = 12 kilometers per scat.

On average, it took about 6.33 hours and 12 kilometers to find one scat.



Lead field tech Renae Hernandez is engaged in sharing indigenous and personal stories about Coyote as a way to advocate for human/coyote coexistence.

GOALS



Feasibility polling/ gauging public interest.

Collaborate with City of Boulder, OSMP, and Parks & Open Spaces to obtain appropriate permits and approval.

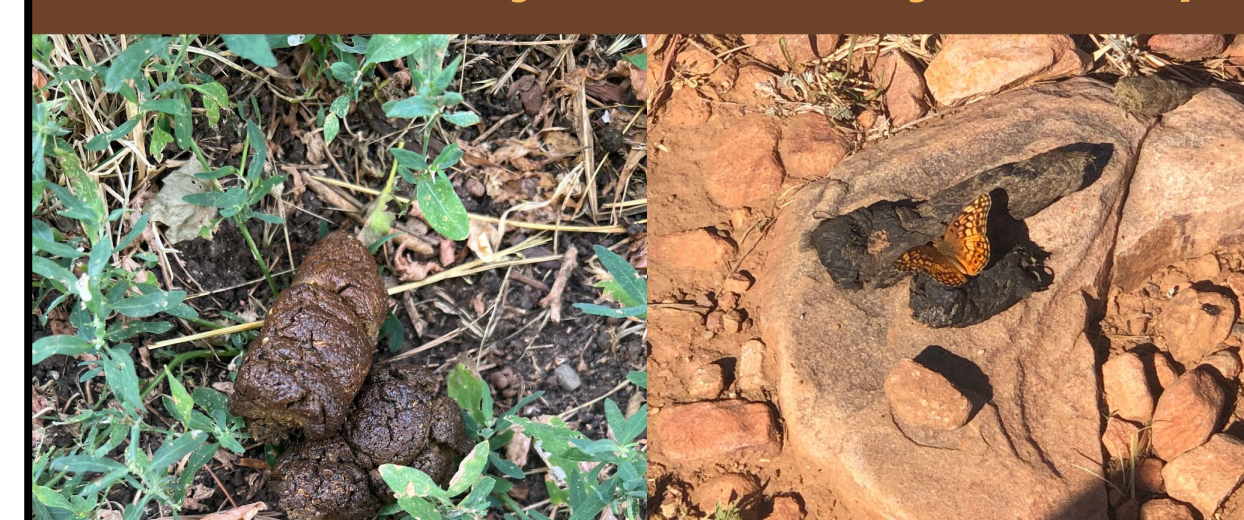
Post QR codes at trailheads. Provide instructions and easy training for citizens. Utilize iNaturalist or online form.

Citizen scientists post pictures and GPS coordinates of potential coyote scat.

Field researchers can gather many more samples, leading to greater coyote knowledge and coexistence.

Engage citizens in coyote education via indigenous-led storytelling, sharing scientific results, nature walks, scat ID.

Can You Identify Which Is Coyote Poop?



Answer: picture on the right with the butterfly!

- According to Emily Beam, when searching for fresh coyote scat it can be helpful to observe where butterflies and other flying insects are drawn to.
- Dog poop is usually all one color and not as tapered.
- Coyote scat often has visible hair, bones, and a dark appearance when fresh.
- Once you get acquainted you start seeing it on trails and dirt roads often!



Please visit QR code for abstract, acknowledgements, and references.