

Wood Brothers Report: A Collaboration between OSMP, Heatherwood Elementary School & Growing Up Boulder

An implementation project of the Gunbarrel Hill Integrated Site Project Including Appendix B: Gunbarrel Hill Student Art Project

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Table of Contents

Table of Contents	1
Overview	2
Executive Summary	2
About Growing Up Boulder	3
Open Space and Mountain Parks Integrated Site Projects	3
Gunbarrel Hill Integrated Site Project	3
Wood Brothers Property Project Description	4
Heatherwood Project-Based Learning Unit	5
By the Numbers	5
Summary of Findings: Fall 2020	5
Most Salient Student Recommendations	6
Reflection Questions	7
Engagements with Heatherwood Elementary School	9
GUB's Wood Brothers Project Introduction	9
Student Materials to Support Learning	10
Wood Brothers Site Visits	10
Final Recommendations Discussions	13
GUB Staff Engagement Reflections	13
Conclusion	14
Partners and Appreciation	15
Appendix A: Additional Wood Brothers Resources	16
Appendix B: Gunbarrel Hill Student Art Project	17
By the Numbers	17
Summary of Student Learning and Art Project: Spring 2021	17
Engagements with Heatherwood Elementary School	18
Teacher Led Project Introduction	18
Student Engagement Materials	18
Virtual Synchronous Presentation	18
Gunbarrel Hill Site Visits	19
Student Artwork	22
Student Reflections	22
Partners and Appreciation	24



Students move between stations



Wood Brothers property view looking through the Curly Dock to the west

Overview

Executive Summary

The two collaborative projects discussed in this report (one in the body of this report, the other in the report's Appendix B) are implementation projects resulting from the City of Boulder's Open Space and Mountain Parks (OSMP) "Gunbarrel Hill Integrated Site Planning (ISP) project," finalized in February 2020. As part of the ISP process, OSMP staff and the public identified opportunities to improve nature-based learning on OSMP land called the "Wood Brothers" property and to engage youth voice through verbal, written and artistic communications to support restoration efforts on additional, nearby OSMP land called "Gunbarrel Hill."

For the Wood Brothers property, Growing Up Boulder (GUB) led the engagement of the 4th grade class of the neighboring Heatherwood Elementary School. This project started in Fall 2020 and was completed by the end of the school year in 2021. The body of this report details the GUB engagement process and the ideas the students developed and shared as part of this collaborative project. Moving forward, OSMP can utilize these student-generated ideas to inform nature discovery opportunities on the Wood Brothers property and other relevant OSMP properties, in accordance with site needs, plan guidance, and existing regulations.

To continue to expand the students' understanding of stewardship, the same 4th grade students and teachers were asked to support a separate project within the Gunbarrel Hill ISP umbrella in the Spring of 2021. This project, called the "Gunbarrel Hill Student Art Project," asked students to develop artwork and messaging for signs that will be installed in late 2021 or early 2022 to support restoration efforts on Gunbarrel Hill's Loop A. Due to the GUB's existing workload, GUB was unable to facilitate this project; however, the OSMP and Heatherwood team were able to adopt and adapt the GUB methodology for this project, and they completed this project through their partnership under the ISP implementation umbrella. The results have been included in Appendix B of this report.

About Growing Up Boulder

Growing Up Boulder (GUB) is Boulder's child and youth-friendly city initiative established in 2009 as a formal partnership between the City of Boulder, Boulder Valley School District, and University of Colorado. GUB's mission is to make Boulder an exemplary child and youth-friendly city by empowering Boulder's young people with opportunities for inclusion, influence, and deliberation on local issues that affect their lives. Since its inception, GUB has engaged with more than 6,500 young people on more than 100 projects.

Open Space and Mountain Parks Integrated Site Projects

Open Space and Mountain Parks (OSMP) has developed Integrated Site Projects (ISPs) for several specific locations, one of which is the [Gunbarrel Hill ISP](#) (completed in February 2020). The goal of an ISP¹ is to “holistically plan for, have clarity, and alignment across the community about the ‘on the ground’ actions for an area in order to proceed to the implementation phase.” ISPs strive to achieve:

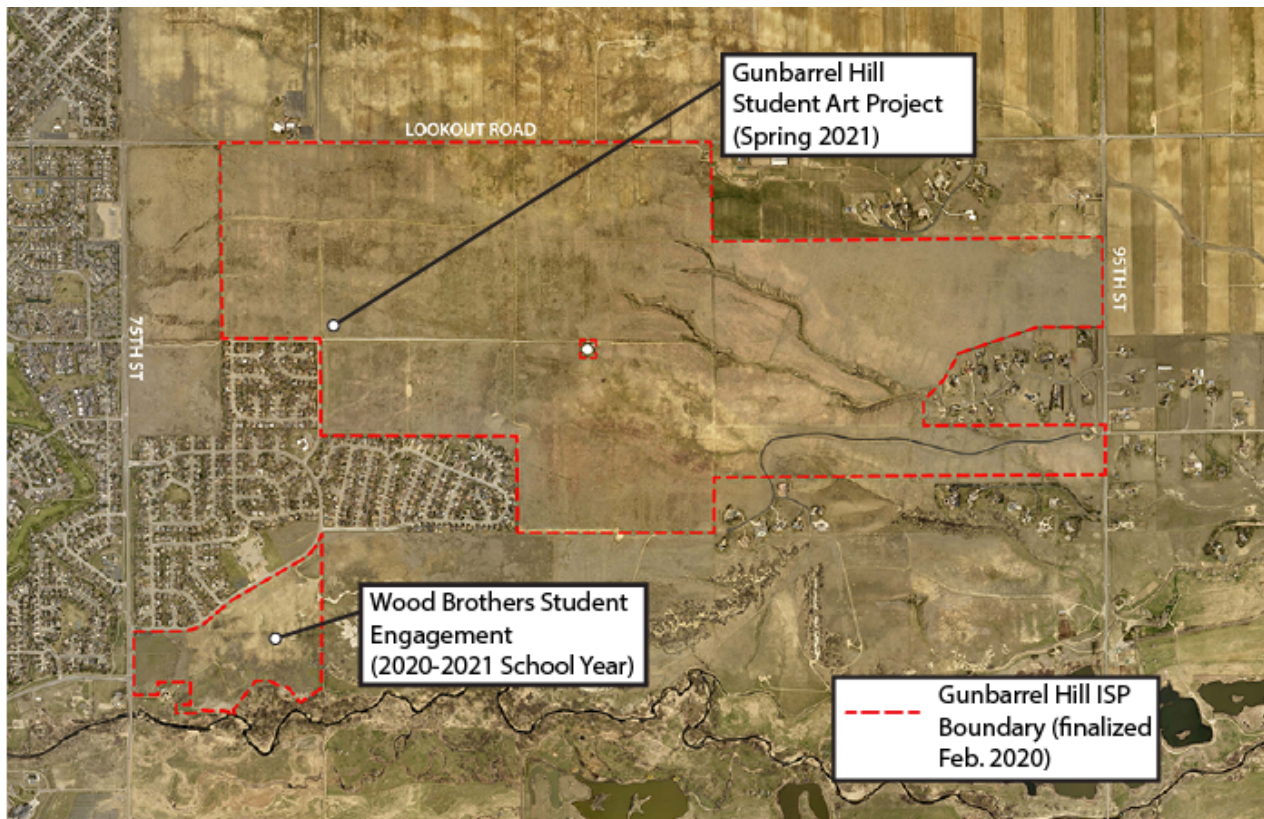
- How best to implement “on-the-ground,” previously-approved plans
- Sustain natural areas
- Improve visitor experiences
- Improve operations, services, and programs in the area
- Address other open space values as outlined in the Boulder City Charter

Gunbarrel Hill Integrated Site Project

In partnership with the community, the goal of the Gunbarrel Hill ISP was to improve the quality of the habitat for native ground-nesting birds and other wildlife, while providing an enhanced visitor experience to promote enjoyment of the area². OSMP outlined three primary objectives: enhancing opportunities for access and enjoyment, restoring and conserving the high-quality habitats on Gunbarrel Hill, and partnering with the community in planning, design, and stewardship efforts.

¹ <https://bouldercolorado.gov/osmp/integrated-sites-projects>, retrieved 12-13-20

² <https://bouldercolorado.gov/osmp/gunbarrel-hill-isp>, retrieved 12-13-20



The Gunbarrel Hill ISP covered two geographic areas within the larger ISP boundary (shown above). As a defined implementation action item of the ISP, and to engage youth voice and inspire youth stewardship of the land, OSMP, GUB and Heatherwood Elementary School (BVSD) launched a collaborative project to explore design solutions for nature-based learning on OSMP’s Wood Brothers property adjacent to the school. The Gunbarrel Hill Student Art Project, aimed at inspiring responsible recreation behavior on Gunbarrel Hill, is addressed in Appendix B of this report.

See the City project webpage for more information about the Gunbarrel Hill ISP [here](#).

Wood Brothers Property Project Description

The Gunbarrel Hill ISP identified a number of implementation projects within the project area. The Wood Brothers property was one implementation project selected to explore design options to improve *nature-based learning*. As staff began to implement this project and explore the scope, three primary OSMP Master Plan strategies were identified to guide the work. These include: 1) connecting youth to the outdoors, 2) inspiring environmental literacy and new involvement in OSMP, and 3) developing a learning laboratory approach to recreation. Ultimately, OSMP intends to support the development of young eco stewards in the adjacent Heatherwood and Gunbarrel communities. In partnership with Growing Up Boulder and Heatherwood Elementary, OSMP will evaluate youth-generated ideas for the nature discovery space in accordance with existing regulations and site needs and explore on-the-ground opportunities for improved outdoor learning experiences. It’s important to note that the physical location of the Wood Brothers property, directly across the street from the Heatherwood Elementary School playground, creates a rich learning landscape opportunity that may otherwise be difficult to achieve in other locations throughout OSMP.

Heatherwood Project-Based Learning Unit

From the onset, Heatherwood 4th grade teacher Cathy Zimmerman envisioned creating a Boulder Valley School District (BVSD) social studies unit called “Indigenous Peoples of Colorado” for the school year 2020-2021. Steeped in [project-based learning \(PBL\) principles](#), the unit was written so that students would have a highly collaborative, rigorous, and deeply meaningful place-based learning experience; the Wood Brothers property served as a local outdoor learning space. Mrs. Zimmerman would teach the unit to both of Heatherwood’s 4th grade classes throughout the year (while her teaching partner, Mrs. Lockhart, would teach science).

PBL unit timeline: An interim report highlighting the Wood Brothers Property collaboration was released in December 2020. Throughout spring 2021, Heatherwood teachers and students continued their collaboration with OSMP through the Gunbarrel Hill Student Art Project (see Appendix B), and their BVSD study of Indigenous Peoples of Colorado. In May 2021, students hosted a final share out event showcasing their learning for interested stakeholders.

By the Numbers

- 33 Heatherwood Elementary 4th grade students, ages 9 and 10
- 2 Heatherwood Elementary 4th grade teachers
- 2 Heatherwood Elementary administrators
- 2 GUB staff
- 2 University of Colorado GUB Undergraduate Interns
- 5 OSMP staff
- 1 OSMP Volunteer Naturalist
- 30 Engagement hours by teacher and young people

Summary of Findings: Fall 2020

“I’d like to walk the trails with my parents and teach them what I’m learning about the Wood Brothers property (eco stewardship).”

--4th grade Heatherwood Student

OSMP staff requested students’ feedback in regards to the nature discovery and outdoor learning experiences they want to have on the Wood Brothers parcel and other OSMP properties. The engagement data analyzed here stems from two in-person site visits to the Wood Brothers Property and four online classroom engagements with Heatherwood Elementary, OSMP staff, and GUB staff.

The data clearly shows that students view the Wood Brothers property as a community asset with great potential to teach residents about the natural world and also as a place in which to enjoy the benefits of spending time in nature. Additionally, students want to see measures to protect and preserve the area. Students recommend structured and unstructured experiences

and are interested in a broad range of learning and exploring opportunities. In the students' eyes, there is natural overlap between what "discovering nature" and what "outdoor learning" mean.

Most Salient Student Recommendations

Top student responses for each question are recorded below, and overarching themes from both questions are listed following each question:

What kinds of nature discovery experiences do you want to have on the Wood Brothers property?

1. **Interpretative/Educational Signage** - provide an information board and map welcoming visitors to the area (like at other OSMP locations), list the rules of using the area (ie. stay on the trails), include information about plants, animals, geology, and history of the land throughout the property at key "landmark" locations (Prairie Dog Town, White Rocks, lookout points, eagles' nests/perch trees, etc.). Explore QR code technology to list the information above, including scheduled naturalist programs and OSMP website.
2. **Wildlife Viewing Stations/Treehouse Observation Tower** - Vista points where visitors pause, take in the view, learn something--provide binoculars and animal identification materials (name, facts, footprints on laminated cards) for referencing, observing, and learning about wildlife "up close" (Bird watching, owls, raptors, cranes, nesting sites, etc.)
3. **Designated Trails to Preserve & Protect** - Protect plants (especially the lichen on White Rocks) and animals by having designated trails with signage; preserve ample "pristine" areas for plant and animal ecosystems; walk the trails with family and talk about what you see
4. **Opportunities to Explore - Unstructured** - hands on, opportunities for visitors to interact with nature ("see, feel, observe"), including getting closer to the creek to view its ecosystem and inhabitants
5. **Opportunities to Explore-Structured** - small nature center where you can look at plants and animals (preserved) close up, touch. Opportunities to go "off trail", get down on hands and knees and discover what's happening in the prairie "at the ground level"
6. **Naturalist Programming** - OSMP staff to provide free, inclusive programming about the area for anyone who is interested (plants, animals, geology, history of Wood Brothers property, history of Native peoples, appreciation of land, etc.), post the schedule and have frequent programs
7. **Opportunities to Play** - opportunities for young visitors to freely climb, dig, build, and imagine
8. **Area to Build** - place to get creative, make art with nature objects
9. **Nature Playground** - logs for climbing, tree stumps for jumping, hopping, and stepping on and off, ropes for swinging
10. **Shelters & Benches** - for shade, resting, relaxing, taking in the view
11. **Picnic Tables** - seating for groups and families, eating lunch or snacks
12. **Trash/Compost/Recycle Bins** - keep area as natural and pristine as possible
13. **Maintain Sledding Hill** - keep the popular and long tradition

What kind of outdoor learning/outdoor classroom experiences do you want to have?

1. **Naturalist Programming** - OSMP staff to provide free, inclusive programming about the area for anyone who is interested (plants, animals, geology, history of Wood Brothers, history of Native peoples, appreciation of open space, "lichen is delicate", etc.)

2. **Take Our Classroom Outdoors (Outdoor Classroom)** - be together as a class, learn about anything, outside in nature--could be about science and history, animals, plants, "everything around us," could be math and writing, "all we need is our teacher, a whiteboard and something to sit on"
3. **Natural Amphitheater** - build a nature amphitheater for visiting classes or programs, use tree stumps or flagstone for seating in a half circle formation
4. **Wildlife Viewing Stations/Treehouse Observation Tower** - around the property in key locations (White Rocks, Prairie Dog Town, etc.), Treehouse viewing to identify birds, raptors, insects, plants and animals
5. **Amenities for Outdoor Learning** - seating, shelter, shade, benches, tables, designated trails

Five overarching themes emerged from young people's responses:

1. Education--About and in Nature

- a. Learn about the Wood Brothers property (and about other OSMP locations)-- its environment, history, plants, and animals
- b. Active, in-person programming with naturalists AND passive programming, where you can explore independently and at your own pace
- c. Learn in the space (outdoor classroom concept) about a wide variety of topics--students reported feeling calm, happy, relaxed, and content just being outside of the classroom and with their classmates; they want more outdoor classroom learning time

2. Enjoyment of Nature

- a. Spend time on the land with friends and family--enjoy time in nature, take in the beauty and the views, sledding, just be out-of-doors

3. Nature Discovery & Interactivity

- a. Students want time to explore and play in nature. They want to interact with the land and have hands-on experiences

4. Protection of Natural Areas

- a. Designated trails to preserve area, keep it pristine (Student: "Did you know that it takes centuries for the lichen to grow back--please don't step on it?")

5. Focus on Community

- a. Students expressed their desire that everybody should be able to access the Wood Brothers land for enjoyment and for learning about its inhabitants.

Reflection Questions

In addition to determining themes of the children's recommendations, GUB asked the students to reflect upon the learning experiences and curriculum itself.

1. What's one thing you learned today or one thing you'll remember about your visit today?

Top 5 responses were topics related to:

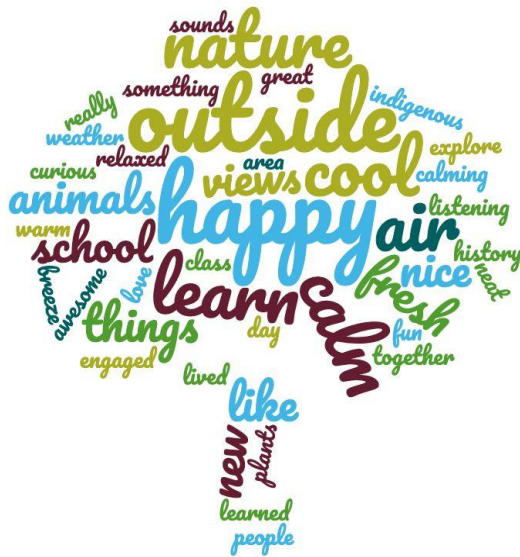
1. Prairie Dogs, facts and behaviors

2. White Rocks and the lichen, facts about the geologic formation and need for protecting the lichen and the sandstone
3. History of the land, facts about the land being underwater 70 million years ago and Indigenous Peoples who have traversed, lived in and stewarded lands in the area for thousands of years.
4. Positive feelings about spending time on the land
5. Miscellaneous animals, facts and behavior

2. Would you like to have regular outdoor learning time during the week? 97% of students responded yes.

3. Do you think regular time to explore in nature is important? 100% of students responded yes.

4. How did you feel spending time on the Wood Brothers property?



Word cloud illustrates student responses



Student explores OSMP learning materials



Prairie dogs yelp as students come close



White Rocks view from below

“Working with GUB has been such a benefit to our 4th graders and teachers. The organization, the enthusiasm, the help that was given connecting us to resources was beyond any program we have ever worked with. GUB staff were incredibly supportive and clear about expectations and the process. Staff was also helpful in connecting the project to our curriculum, thoroughly going above and beyond in finding resources for us. I would definitely work with GUB again.”

--Mrs. Zimmerman, 4th grade lead teacher for Wood Brothers Project

Engagements with Heatherwood Elementary School

Working within Boulder Valley School District Coronavirus protocols, GUB staff, OSMP naturalists, and Heatherwood teachers and students had both in-person and online engagements. Four components framed and enriched student learning for each 4th grade classroom: a GUB-led project introduction, student engagement materials, an in-person (masked) Wood Brothers site visit, and a “final recommendations” discussion session. Each project component is summarized below:

GUB’s Wood Brothers Project Introduction

GUB staff provided an online project introduction via a slideshow to each of the two 4th grade classes. Slide presentations included essential project background such as the location of the property (right across from the school), some of its physical properties, and plants and animals inhabiting the area. Presentations also described the goal of the work--to give OSMP feedback on two priority topics: 1) What kinds of nature and nature discovery experiences would you like to have on the Wood Brothers property? and 2) What kinds of outdoor learning/outdoor classroom experiences would you like to have on this and other OSMP properties?

Student Materials to Support Learning

OSMP staff drafted several key documents for the students' inquiry, and GUB staff and Mrs. Zimmerman helped refine them. After the project introduction session, students had ample opportunity to explore the following learning materials and build excitement for the site visit:

1. *Wood Brothers Opportunity and Considerations Map*: This two page document had an annotated map with legend of the Wood Brothers property on one side and an explanation of the legend's terms itemized on the other. Both documents were designed to further orient the students to specific opportunities and considerations of the property. Legend examples include: the Prairie Dog Colony, Myrtle Spurge Infestation, and Lichen Habitat.
2. *Wood Brothers Vegetation and Wildlife Snapshots*: Also double-sided, this guide gave students a clear visual of the many plants and animals that inhabit the property. Vegetation examples include: Yucca, Prickly Pear Cactus, and Curly Dock and wildlife examples include: Red-Tailed Hawk, New Zealand Mudsnail, and Western Meadowlark.
3. *Student Exploration Journal*: A resource for students to capture learnings, ideas, questions, and observations at each station during the site visit.
4. *Large Wood Brothers Property Map*: A large map was created and is displayed in a central location within the school. Fourth graders are bringing awareness of the Wood Brothers project to the entire school community (students and parents) by adding artifacts, research, and descriptions of their actions as the unit unfolds throughout the remainder of the school year.

Please see Appendix A for links to each of the above documents.

Wood Brothers Site Visits

On Friday, November 6th and Monday, November 9th, 2020 OSMP naturalists hosted 4th grade students on the Wood Brothers property. The purpose of the visit was to inspire student connection to and curiosity of the Wood Brothers property, providing experiences to discover the plants and animals who call Wood Brothers home.

Engagement theme: All members of this ecosystem, including people, are connected to each other.

Five stations were planned: White Rocks History & Lichen, Prairie Dogs as a Keystone Species, Plants and Microclimates, Animals, and Reflection Journals.

"I'll always remember being with my 4th graders on this land together during COVID and what a special day that was."

--Mrs. Lockhart, 4th grade Heatherwood Teacher

Friday, November 6, 2020 Site Visit

- 20 Heatherwood students (the in-person students)
- 8 adults (4 OSMP naturalists, 2 Heatherwood teachers, 1 Heatherwood paraeducator, 1 GUB staff member)
- 67 degrees at time of visit
- 4 OSMP staffed stations: The weather permitted students to write in their Exploration Journals during their visit.

Monday, November 9, 2020 Site Visit

- 9 students (the online students)
- 5 adults (3 OSMP naturalists, 1 Heatherwood teacher, 1 GUB staff member)
- 34 degrees at time of the visit
- 4 OSMP staffed stations--No Exploration Journals because of cold weather



Prairie Dog as keystone species lesson



White Rocks and lichen observations



Students listen to site visit overview



Students learn to observe overall patterns and the topography

Station 1 Topics: Natural History, Lichen, and White Rocks Sensitivity

An OSMP naturalist introduced the Wood brothers property starting from a macro level and zooming down into micro observations. She traveled back in time through different geological

moments. Students were fascinated that 70 million years ago, the area would have been underwater. Mountains have risen and fallen 3 times. Next, the naturalist shared the story of the White Rocks and the evidence that scientists used to understand its history. Last, students were encouraged to observe and discover some of the lichens that have colonized the white rocks. They learned about their fragility, and the critical role of biological soil (cryptobiotic crust) to provide the substrate for vascular plants to grow. They answered the question, “What can we do to protect this community of organisms?”

Station 2 Topic: Prairie Dogs as a Keystone Species

Prairie dogs are the key to a healthy prairie ecosystem wielding unparalleled ecological importance. This industrious rodent enriches prairie habitat through its burrowing activities, benefiting a multitude of prairie species: animals use their burrows as homes, others prey on prairie dogs and their associates, and the way prairie dogs graze and dig improves soil and vegetation quality, increases water concentration and contributes to the overall plant and animal diversity in and around colonies. Biologists consider the prairie dog a keystone species, in the short and mixed grass prairie ecosystems, due to the 150 species associated with prairie dog towns. Lastly, these community creators have the most advanced communication system ever decoded by a scientist, and it is often considered a language.

Station 3 Topics: Plants, Microclimates, and the Power of Observation

At the Wood Brothers plants station, the students learned two main concepts: if we use the power of observation, we are always equipped to learn about nature (by using our eyes, hands, senses, etc.); and through observation, we can identify different microclimates that support (or do not support) different plant communities or species. After identifying the importance of sun, water, and soil in supporting plant life, the students participated in an exercise to help them identify overall patterns and the topography within their viewshed. After the exercise, students discussed their observations and identified the differences they observed and their theories of why these differences exist (ie: more available water due to Boulder Creek); the term “microclimate” was defined as the term used to describe these differences. Students were introduced to the key takeaway that they need nothing more than their senses and attention to begin learning about the natural world.

Station 5 Topic: Reflection Journaling

The final station encouraged students to pause and think about their time on the Wood Brothers property. On Friday, November 13th, 2020 the warm weather permitted the students to find a sit spot and complete journal pages independently as GUB staff walked around and checked in with students one-on-one. Journal questions such as, “How does it feel to spend time on this property?” and “What do you see and smell?” gave students the opportunity to pause and reflect. Given Monday’s cold weather, it was decided to forego the physical journal writing and facilitate an oral group reflection instead. Students’ thoughts were tape recorded using a smartphone related to the following questions:

- How do you feel out here on the Wood Brothers property? And why do you feel that way?
- Name one thing you learned today
- What’s one thing that you want to remember about your visit today?

Final Recommendations Discussions

To wrap up the fall engagements, GUB staff facilitated one hour-long class discussions with each 4th grade class. Small break out groups were created, and GUB staff and interns supported students in sharing their ideas related to the topics of nature discovery and outdoor learning. After small group time, each group shared out the highlights of their group's thinking. GUB staff outlined next steps as 1) GUB staff would write up their ideas in a report to share with OSMP staff and their families, 2) Students would continue learning about Indigenous People of Colorado and the Wood Brothers property, 3) Students would invite GUB, OSMP, and other stakeholders to a share out event in May 2021, and 4) GUB staff would add any further students recommendations and actions to this report.

GUB Staff Engagement Reflections

GUB staff finds it useful to reflect upon the lessons that come out of each project. Four topics emerged after the Wood Brothers work with:

Extensive Collaboration & Planning: GUB and OSMP staff met multiple times to plan for the Wood Brothers engagement work, and the result was a cohesive, effective working team. GUB staff and Heatherwood teacher Cathy Zimmerman also met several times to collaborate and research unit connections. Extensive collaboration and planning requires an investment of time, but we believe the investment pays dividends.

Integrated, Year-Long Project-Based Learning Unit: Projects that extend over the course of a semester or longer, are often rated by teachers, students, and GUB/city staff to have higher degrees of success and impact than engagements that are shorter in length. As students immerse themselves in the work, they find meaning, connection, and purpose, build project expertise, and cultivate higher degrees of ownership. With teacher Cathy Zimmerman envisioning the Wood Brothers property work as an integral part of her Indigenous Peoples of Colorado unit, the May 2021 share out event revealed thoughtful and inspired student recommendations and actions. Mrs. Zimmerman's goal of cultivating eco stewardship attributes in her students is aligned with OSMP's mission.

OSMP Staff Adaptability & Expertise: First, when the Coronavirus impacted the animal station, OSMP naturalists readily shifted and found ways to talk about animals within each of their stations. Then, when the weather turned cold, staff suggested a shift to an oral reflection instead of writing in journals. Serendipitously, many of the children's oral answers to reflection questions were far more in depth than if they would have written them themselves. The adaptability that OSMP staff demonstrated in the face of obstacles was a reminder that the best outdoor (or any) learning happens when educators are flexible and responsive. The site visit was a very high quality program, and everyone benefited from the experience.

Appreciation for Nature & the Project & Prioritizing Outdoor Learning: Getting permission to organize a field trip during a pandemic takes significant effort, and it was the first time GUB and partners faced this situation. We want to give special thanks to parents, teachers and staff at

Heatherwood for making the site visits happen for their children. The children repeatedly expressed how happy they were to have the opportunity to be with their classmates, learning in the outdoors--albeit masked and socially-distanced. Parents were enthusiastic and supportive of the outing at drop off and pick up.



Prairie dog table illustrating connected ecosystem and keystone species

Conclusion

Engaging children is an important part of public participation, as children are active members of the community. Engaging youth in participatory planning outreach with a relevant project like this plays a key role in helping students understand the dynamics of city decision-making in addition to contributing valuable ideas to the city from key users. GUB consistently finds that children, youth and their families are willing and able participants in community projects if the projects are presented in a sensitive and engaging manner. During this challenging time of COVID, this project offered a degree of normalcy, mooring, and meaning to children's learning, as well as reinforcing the importance of community.

The same can be said of the positive impact this series of engagements had on GUB and OSMP staff. Students demonstrated a strong desire to learn about the Wood Brothers property and a keen interest in sharing their recommendations for making the property an even better community asset for nature-based learning. Student recommendations included 5 key themes:

1. Education--About and in Nature
2. Enjoyment of Nature
3. Nature Discovery & Interactivity
4. Protection of Natural Areas

5. Focus on Community

Students' recommendations reflected their desire to spend time in nature--they want to explore it, appreciate it, learn in it and about it! They expressed a strong desire for the Wood Brothers land to have both structured and unstructured programming for everyone. They are keen to have viewing stations to use binoculars to see wildlife and other forms of biodiversity up close, and they want to build their background knowledge about the geology and history of the land, its plants and animals. **Young people recognized that spending time in nature elicited feeling calm, content, relaxed, and happy: 97% of students reported wanting to have regular outdoor learning time during the school week and 100% of students think having regular time to explore in nature is important!** The students offered well-thought out, creative, and feasible ideas for this community resource.

Partners and Appreciation

This project was the result of a true collaborative process. Several key partners made this project possible, including many City of Boulder staff from Open Space and Mountain Parks. GUB would like to especially thank the partners who directly gave their time and energy to make this engagement possible, including students at Heatherwood Elementary School. Finally, thank you to 4th grade teachers Cathy Zimmerman and Aubrey Lockhart for their tireless efforts throughout the year and their dedicated partnership.

- Boulder Valley School District (BVSD)
 - Ghita Carroll, Sustainability Coordinator
 - Jennifer Garfield, Director of Curriculum and Standards - NW Network
 - Kit Howard, Heatherwood Paraeducator
 - Genna Jaramillo, Heatherwood Principal
 - Marlys Lietz, Heatherwood School Office Manager
 - Aubrey Lockhart, Heatherwood 4th grade teacher
 - Kiffany Lychock, Director of Instructional Practices - NW Network
 - David Rivers, Heatherwood Art teacher
 - Cathy Zimmerman, Heatherwood 4th grade teacher
- Experts from the City of Boulder, Boulder County and Beyond
 - Margaret Cole, American historian and author
 - Bonnie Sundance, Executive Director, Our Sacred Earth; Right Relationship Boulder, Schools Group Facilitator
 - Jim Tolstrup, Executive Director of the High Plains Environmental Center
- Growing Up Boulder Staff/Team
 - Cathy Hill, Education Director
 - Bryan Martino, ENVD GUB undergraduate intern
 - Mara Mintzer, Executive Director
 - Lauren Oertel, ENVD GUB undergraduate intern
 - Vanessa Schatz, Business Development
 - Nettie Skievaski, ENVD GUB undergraduate intern
- Open Space and Mountain Parks Department
 - Casey Bries, OSMP Education & Outreach Coordinator
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- Mark Davison, OSMP Service Area Manager, Community Connections and Partnerships
- Lisa Dierauf, OSMP Education and Outreach Supervisor
- Juanita Echeverri, OSMP Education and Outreach Coordinator
- Dave Gustafson OSMP Ranger/Educator
- Will Keeley, OSMP Wildlife Ecologist Coordinator III
- Whitney May, OSMP Planning and Design Specialist
- Usha Narayanswami, OSMP Volunteer Naturalist
- Jenny Natapow, OSMP Education and Outreach Coordinator
- Lynn Riedel, OSMP Plant Ecologist Coordinator II
- Curry Rosato, OSMP Education Supervisor
- Deryn Wagner, OSMP Planning and Design Supervisor
- Phillip Yates, OSMP Media Relations

Appendix A: Additional Wood Brothers Resources

[Gunbarrel Hill Site Management Plan](#)

[Student Wood Brothers Exploration & Reflection Journal](#)

[Vegetation and Wildlife Snapshot at Wood Brothers](#)

[Wood Brothers Opportunities and Considerations Map](#)



Heatherwood 4th graders prepare for site visit



Close up view of lichen on White Rocks

Appendix B: Gunbarrel Hill Student Art Project

An Art Project for Restoration

Guided by GUB's youth engagement framework, the OSMP education team offered subject matter expertise and nature education experiences to support teachers in the development of the (PBL) Project Based Learning unit that integrated 4th grade curriculum with the Gunbarrel Hill art/communications project and goals. This work also sought to teach students the concepts of eco stewardship.

By the Numbers

- 33 Heatherwood Elementary 4th grade students, ages 9 and 10
- 2 Heatherwood Elementary 4th grade teachers
- 1 Heatherwood Elementary Art Teacher
- 2 Heatherwood Elementary administrators
- 2 GUB staff (project advisors)
- 7 OSMP staff
- 99 Engagement hours by teacher and young people

Summary of Student Learning and Art Project: Spring 2021

"I learned that a lot of birds nest in the grasses of the (prairie), like one giant den. In conclusion, the (prairie) is a beautiful place and we should protect it."
--4th grade Heatherwood Student

OSMP staff requested students' thinking through artistic expression so that visitors to Gunbarrel Hill will know about the grasshopper sparrows and the other ground-nesting birds, wildlife, and plants that inhabit Gunbarrel Hill and understand why it is important for people and dogs to stay on the trails. OSMP believes that student ideas and artwork incorporated into signs placed on fences supporting restoration will help educate neighbors on OSMP's trail restoration and habitat protection goals.

Students' written and artistic communications show the Gunbarrel Hill property as a place to discover the plants and animals that call the prairie home and a place to enjoy the benefits of spending time in nature. They also want to see measures to protect and preserve the area. Through artwork, students shared information so visitors may learn about the plants and animals that inhabit Gunbarrel Hill and embody responsible recreation behaviors.

Engagements with Heatherwood Elementary School

Working within Boulder Valley School District Coronavirus protocols, OSMP naturalists and Heatherwood teachers and students had both in-person and online engagements. Six components framed and enriched student learning for each 4th grade classroom: a teacher-led project introduction, student engagement learning materials, an on-line Gunbarrel Hill live virtual presentation, an in-person (masked) Gunbarrel Hill site visit, a student art project, and a project reflection discussion.

Teacher Led Project Introduction

Ms. Zimmerman provided a project introduction via a slideshow to each of the two 4th grade classes. The presentation included essential project background such as the location of the property, some of its physical properties, the specific plants and animals inhabiting the area, the impacts of off trail use and the value of restoration for habitat protection. The presentation also described the goal of the work: (1) to create artwork for signs that would inform visitors about the plants and animals that call Gunbarrel Hill home and (2) the importance of staying on designated trails.

Student Engagement Materials

OSMP staff drafted several key documents to support the students in this project. Students received the following learning materials prior to and at the site visit.

1. [*Gunbarrel Hill Art Project for Restoration Student Letter*](#): The purpose of the student letter was to start to tell the story of Gunbarrel Hill and spark student interest both in the site and the stewardship project. Through images and words, the letter introduced students to the project area, the animals and plants that inhabit the area, and the OSMP restoration project. It highlights why OSMP would like visitors to know about the plants and animals that call Gunbarrel Hill home, and how students can help by creating artwork for signs to help educate visitors on OSMP's trail restoration and habitat protection goals.
2. *Gunbarrel Hill Map*: This map includes proposed locations for signs which will include student artwork. The purpose of the map was to orient students to the project site and to show probable sign locations.
3. *Gunbarrel Hill Vegetation and Wildlife Snapshots*: This double-sided guide gave students a clear visual of the many plants and animals that inhabit Gunbarrel Hill. Vegetation examples include: Big Bluestem, Little Bluestem, Western Wheat Grass, Hairy Golden Aster and Smooth Brome. Wildlife examples include: Grasshopper Sparrow, Western Meadowlark, Leonards Pawnee Skipper and Burrowing Owl.

Virtual Synchronous Presentation

On March 31, 2021 from 11:00 - 11:45 am, OSMP Education and Outreach Assistant, Jenny Natapow, led a synchronous virtual presentation to facilitate student discovery of the prairie ecosystem and the plants and animals that call Gunbarrel Hill home. The presentation aimed to

inspire students to consider what responsible recreation would look like at Gunbarrel Hill. A link to the recorded presentation can be found [here](#).

Gunbarrel Hill Site Visits

On Monday, April 5th and Tuesday, April 6th, 2021 OSMP naturalists hosted 4th grade students on the Gunbarrel Hill property. The purpose of the visit was to inspire student connection to and curiosity of the Gunbarrel Hill property, providing experiences to discover the plants and animals who call Gunbarrel Hill home, and inspire responsible recreation behaviors that support protecting the ground nesting bird habitat.

OSMP Engagement Theme: *All members of this ecosystem, including people, are connected to each other. By staying on designated trails and sharing the stories of the plants and animals that call Gunbarrel Hill home, we can do our part and inspire others to help protect the prairie.*

OSMP staff planned and implemented three education stations: 1) Enjoy and Protect (Mini Trail Building), 2) Prairie Dogs as a Keystone Species, 3) Plants and Microclimates, Animals, and Reflection Journals.

"I love that the students were able to learn about the animals and plants that live near their school and home. Learning about and in their immediate environment really helps the kids retain and make sense of the information. It makes learning relevant"

- 4th grade parent, Heatherwood Elementary

Station 1: Enjoy and Protect (Mini Trail Building)

The goal of this station was for students to practice designing a trail that enables future visitors to enjoy the landscape while also protecting the plants and animals that inhabit the area. Using the wildlife and plant snapshots, students were invited to select a favorite plant or animal species they'd like to protect while answering the question, "How can my trail be designed to allow people and dogs to enjoy and protect the Gunbarrel Hill prairie ecosystem?" Students identified a 2 square foot area where they used string to design their trail. As a final component of the activity, students took turns presenting the animal/plant they chose, the trail they designed, and the reasoning behind their trail design.



Station #1. Student explaining their looped trail around their protected species' habitat

Station 2 Topic: Prairie Dogs as a Keystone Species

As a supplement to the Wood Brothers property station and to deepen student exploration and learning about prairie dogs as keystone species, students learned that prairie dogs are the key to a healthy prairie ecosystem. This industrious rodent enriches prairie habitat through its burrowing activities, benefiting a multitude of prairie species. Animals use their burrows as homes, others prey on prairie dogs and their associates. At this station students learned about the important role of associates in the prairie ecosystem and the interconnections. Kids explored their habitats and discussed why and how, as eco stewards, community members can play a critical role in supporting this species' survival.



Station #2. Teacher Mrs. Zimmerman and students learning about prairie dogs from OSMP's Juanita Echeverri

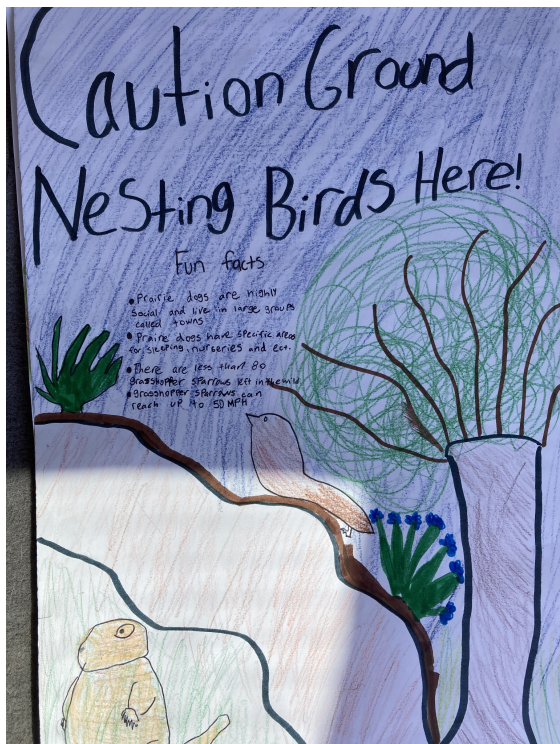
Station 3 Ground Nesting Birds

At the Gunbarrel Hill ground nesting bird station, the students learned two main concepts: if we use the power of observation, we are always equipped to learn about nature (by using our eyes, hands, senses, etc.); and through observation, we can identify evidence of ground nesting birds that live on Gunbarrel Hill. After identifying the importance of sun, water, and soil in supporting plant life, the students participated in an exercise to help them identify nests from different ground nesting bird species. After the exercise, students discussed their observations and identified the importance of staying on trails to protect ground nesting bird habitat.



Station #3. Staged nest identified by a group of students and OSMP's Jenny Natapow

Student Artwork



Student Reflections

At the end of the spring semester, Mrs. Zimmerman asked students in each 4th grade class to respond to 4 prompts. These questions are stated below with 2 student samples for each:

- 1) If you could sit down to talk to Indigenous People, what would you say to them?

Sample 1: "I respect your way of thinking and admire how you treat the land."

Sample 2: "I think it is amazing how you take care and protect the earth and I wish that some people would treat the earth the same way."

- 2) What was your favorite part of working with OSMP and GUB, and learning about Indigenous Peoples?

Sample 1: My favorite part was going to the sites. It was easier to learn when you were actually there.

Sample 2: Learning that Indigenous Peoples have always been here and are still here today.

- 3) How did it make you feel to give your input to OSMP about the Wood Brothers and Gunbarrel Hill Properties?

Sample 1: "It made me feel important and happy."

Sample 2: "I felt like I was saving the world."

- 4) Learning about the Indigenous Peoples was _____.

Sample 1: "Awesome"

Sample 2: "Very interesting and fun!"

OSMP/GUB Staff Engagement Reflections

Similar to GUB, OSMP staff finds it useful to reflect upon the lessons that come out of each project. Two topics emerged after the Gunbarrel Hill work with:

Extensive Collaboration & Planning: OSMP staff, Ms. Zimmerman, Mr. Waters and GUB communicated via email and met to plan for the Gunbarrel Hill engagement work throughout the semester and the result was a cohesive, effective working team. Extensive collaboration and planning requires investment, but we believe the investment pays dividends.

Student Eco Stewards: The Gunbarrel Hill work also sought to teach students the concepts of eco stewardship. Through guided, independent and group activities on the land and in the classroom, students dug deep into learning about the important role the prairie species play in a healthy ecosystem and explored threats to their habitat. Students considered responsible recreation activities to support species survival and explored their own concept of what it means to be an eco steward. The student artwork highlights student stewardship ethic, communicating responsible recreation actions through written and artistic elements.

Curriculum Model: Boulder Valley School District recognizes this collaborative project-based learning unit as a model PBL unit for teachers throughout the district. As a result, BVSD invited Mrs. Zimmerman and OSMP staff to help develop a model unit for 4th grade teachers titled, "Colorado: The Landscape and Earth's Features." The Social Studies and Science unit will cover the following priority standards, in addition to other standards.

SS.4.2.1.c. Create and investigate geographic questions about Colorado in relation to other places.

SS.4.2.2.a Describe how the physical environment provides opportunities for and places constraints on human activities.

SS.4.3.1.d. Explain how productive resources (natural, human, and capital) have influenced the types of goods produced and services provided in Colorado.

SC.4.3.1.a. Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.

Partners and Appreciation

This semester of work was the result of a great degree of collaboration with BVSD, Heatherwood Elementary, OSMP, and GUB staff. Special thanks to the students and teachers at Heatherwood Elementary School, Boulder Valley School District. Partners who were new to this semester's engagement work are indicated using the * symbol.

- **Boulder Valley School District**
 - Ghita Carroll, BVSD Sustainability Coordinator*
 - Jennifer Garfield, BVSD Director of Curriculum and Standards - NW Network*
 - Genna Jaramillo, BVSD Principal, Heatherwood Elementary
 - Marlys Lietz, BVSD School Office Manager, Heatherwood Elementary
 - Aubrey Lockhart, BVSD 4th Grade Teacher, Heatherwood Elementary
 - Kiffany Lychock, BVSD Director of Instructional Practices - NW Network
 - David Rivers, Art Teacher, Heatherwood Elementary*
 - Cathy Zimmerman, BVSD 4th Grade Teacher, Heatherwood Elementary*

- **Open Space and Mountain Parks**
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 - Casey Bries, OSMP Education & Outreach Coordinator*
 - Mark Davison, OSMP Service Area Manager, Community Connections and Partnerships*
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 - Juanita Echeverri, OSMP Education and Outreach Coordinator
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 - Patrick Harbert, OSMP Sign & Graphics Crew Lead*
 - Will Keeley, OSMP Wildlife Ecologist Coordinator III
 - Whitney May, OSMP Planning & Design Specialist
 - Jenny Natapow, OSMP Education Coordinator
 - Lynn Riedel, OSMP Plant Ecologist Coordinator II
 - Zack Stansfield, OSMP Trails Coordinator II*
 - Curry Rosato, OSMP Education Supervisor
 - Deryn Wagner, OSMP Planning and Design Supervisor
 - Bill Wildenberg, OSMP Signs & Graphics Coordinator*
 - Phillip Yates, OSMP Media Relations