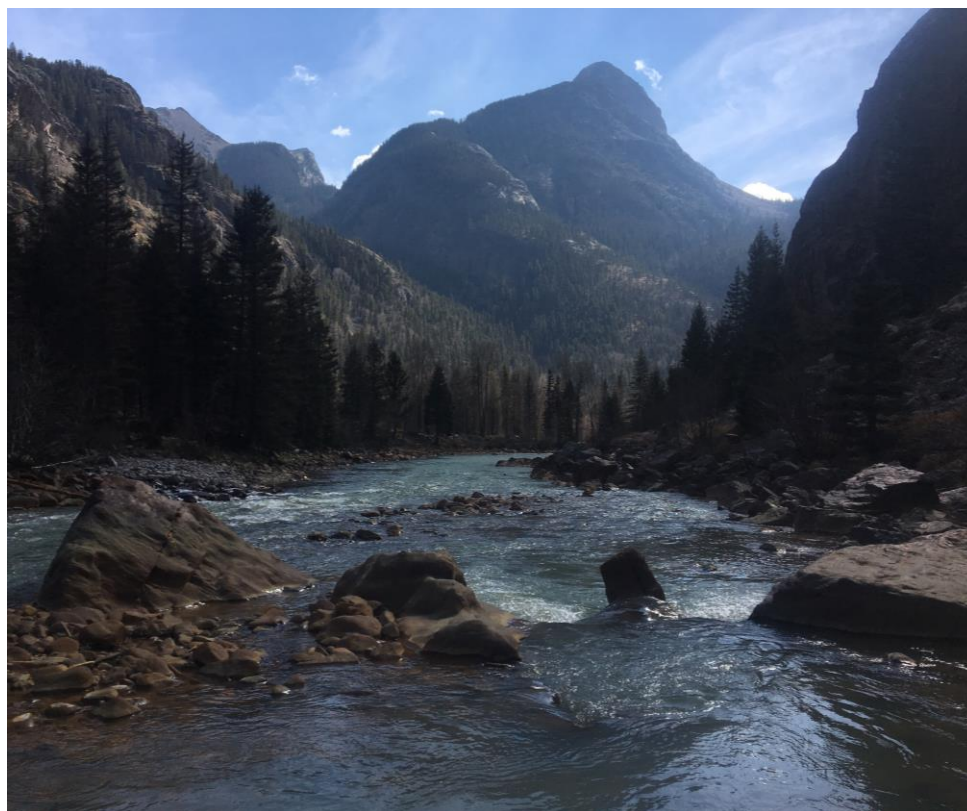


Great Outdoors Colorado
Resilient Communities Grant Program:
San Juan Stewardship Project



January 2022

Prepared for:
San Juan County

Prepared By:



***San Juan Mountains
Association***

EXPLORE ♦ LEARN ♦ PROTECT



Mountain Studies Institute
SAN JUAN MOUNTAINS COLORADO

1. San Juan Stewardship Project Introduction

Among the many impacts of the coronavirus pandemic, public lands throughout the San Juan Mountains experienced an overwhelming increase in visitation and backcountry use in 2020. Growing numbers of visitors to San Juan County are impacting fragile watersheds, irreplaceable high-alpine tundra, and forests already suffering from drought. San Juan County's 2020 tourist season culminated with a human-caused wildfire at Ice Lakes Basin, one of the region's most beloved places, momentarily threatening the Town of Silverton and requiring an emergency evacuation of 23 hikers. San Juan County has borne the brunt of this recent surge in public lands visitors, posing unprecedented challenges to land managers and the local community.

The San Juan County Public Lands Stewardship and Visitor Education Project (San Juan Stewardship Project) endeavored to protect and conserve local public lands and watersheds that were faced with unprecedented pressure during the pandemic, a multi-tiered, data-driven approach was launched to engage visitors with this unique and beautiful landscape. This San Juan Stewardship Project was a unique collaboration between conservationists, scientists, law enforcement, and land managers. Our team consisted of San Juan County (applicant), the San Juan County Sheriff, San Juan Mountains Association (SJMA), and Mountain Studies Institute (MSI); each entity brought complementary expertise to the effort, providing a comprehensive approach to stewarding the San Juan Mountains.

The goal of the San Juan Stewardship Project was to help San Juan County accommodate recent and anticipated (for 2021) pandemic-driven growth in outdoor recreation while reducing impacts to local resources and preventing human-caused wildfires.

Utilizing a collaborative approach of staff, volunteers, and social media, we educated the public at local recreation hotspots on the importance of outdoor stewardship, 'Leave No Trace' ethics, and wildfire safety. We used water quality data to document watershed impacts from human waste and encourage visitors to properly dispose of their waste. Our on-the-ground stewardship team helped repair the damage caused by unmanaged recreation and enhanced the visitor experience, thereby promoting community vitality and ensuring the sustainability of the local outdoor recreation economy. We also engaged youth through our citizen science program and internship opportunities to help foster a new generation of conservationists in San Juan County. San Juan County has experienced a substantial surge in public lands visitors, posing unprecedented challenges to land managers and the local community.

2. Accomplishments

2.1 Citizen Science Water Quality Monitoring

2.1.1 Methods

MSI recruited and trained 19 volunteers for the Citizen-Science Water Quality Monitoring program. We collected a total of 145 surface water samples from 16 sites over four different sampling events. The San Juan National Forest hydrologist helped MSI pick the sampling locations. Each sampling event consisted of a primary sample and a duplicate to ensure quality control. Our volunteers used a field incubation method to grow fecal borne coliform bacteria, *Escherichia coli* (*E. coli*), from surface water samples. During two sampling events, we collected additional samples to be analyzed by San Juan Basin Public Health (SJBPH) in order to validate the data collected by our volunteers.

The Ice Lakes trail was an important area of study because it is likely the most traveled trail in the area and rangers have observed impacts such as unburied toilet paper and feces, as well as the human-caused wildfire of 2020. Because of the fire, this area was closed to recreationalists during our sampling period, so volunteers could not access our four Ice Lakes Basin sites. To overcome this obstacle, we partnered with the San Juan National Forest hydrology crew who had permission to enter the area for related work. Two hydrology crew members attended our training and sampled our Lakes basin sites. While it required further coordination, this provided a unique opportunity to collect data when the area was unused that may serve as a baseline for future data.

Volunteer Procedure: After filtering a 100ml sample of water through specially designed filter membranes, the sample was left to grow *E. coli* colonies on an agar plate designed to feed the bacteria (Figure 2). Since the samples required heat to incubate properly, volunteers kept each petri dish near their bodies for a total of 48 hours, noting the number of CFU (colony forming units) at the 24- and 48-hour marks.



Figure 1: Agar plate used to grow *E. Coli* colonies in the field.

2.1.2 Results

E. coli results varied spatially (Figure 3). We found the highest concentrations at South Mineral Creek below Kendall Campground; outlet of Potato Lake; Mineral Creek above Red Mountain Ditch; and Porphyry Gulch. Several locations had *E. coli* concentrations similar to or less than our reference/control site, Deadwood Gulch, which was chosen to represent surface water conditions with very little upstream recreation: Outlet of Ice Lake Basin; Molas Lake; Crater Creek; Clear Creek; and Cascade Creek.

In partnership with the San Juan National Forest Hydrology Crew, we collected *E. coli* samples at a greater spatial resolution within South Mineral watershed west of Silverton (Figure 4). There are many popular forest service dispersed camping areas along South Mineral Creek. South Mineral also hosts the Ice Lake trail, one of the most popular day hikes in Southwest Colorado (ranked #35 on All Trails for best trails in Colorado; the trail receives upwards of 1,000 visitors per day during peak summer recreation season). The upper portion of South Mineral was closed to the public for one year after the October 2020 Ice Fire, presenting a unique opportunity to assess surface water *E. coli* concentrations in the absence of visitors. Of the four sampling locations within the South Mineral watershed, three locations were within the closure area and had lower *E. coli* concentrations than the furthest downstream location that remained open to the public. The Ice Lake trail and

adjacent dispersed camping have reopened to the public, presenting an opportunity in the coming years to compare surface water *E. coli* concentrations in the South Mineral watershed with and without recreation.

Colorado Department of Public Health and Environment (CDPHE) assesses human health recreational risk from *E. coli* in surface waters by comparing the geometric mean of samples collected in a 61-day period to a water quality standard of 126 CFU/100ml. For each sampled location, we calculated the geometric mean across all four sample events. *E. coli* geometric means, and maximum single sample concentrations never surpassed the 126 CFU/100ml recreational standard for any site (Figure 5). Maximum single sample *E. coli* concentrations are not assessed by the CDPHE, however concentrations above 235 CFU/100ml are considered unsafe for recreational use per the Environmental Protection Agency's (EPA) standards. *E. coli* has been shown to mobilize with surface runoff and our results supported these findings. *E. coli* concentrations were generally highest during the second sampling event taken at the end of July, which corresponds to a storm event that amounted to at least 10 times greater precipitation accumulation three days leading up to the sampling event compared to the other three sampling events.

We found that the field incubation method and SJBPH lab method yielded similar results (Figures 6-7). For sampling events #2 and #3 when both methods were employed, the difference in *E. coli* results between samples ranged from 0 to 38.4 and had a median of 1.6 CFU/100ml. We found no significant difference between field incubation results and SJBPH lab results (paired t-test p value 0.49) and a 95% confidence interval range of 2.1 to 8.2 CFU/100ml.

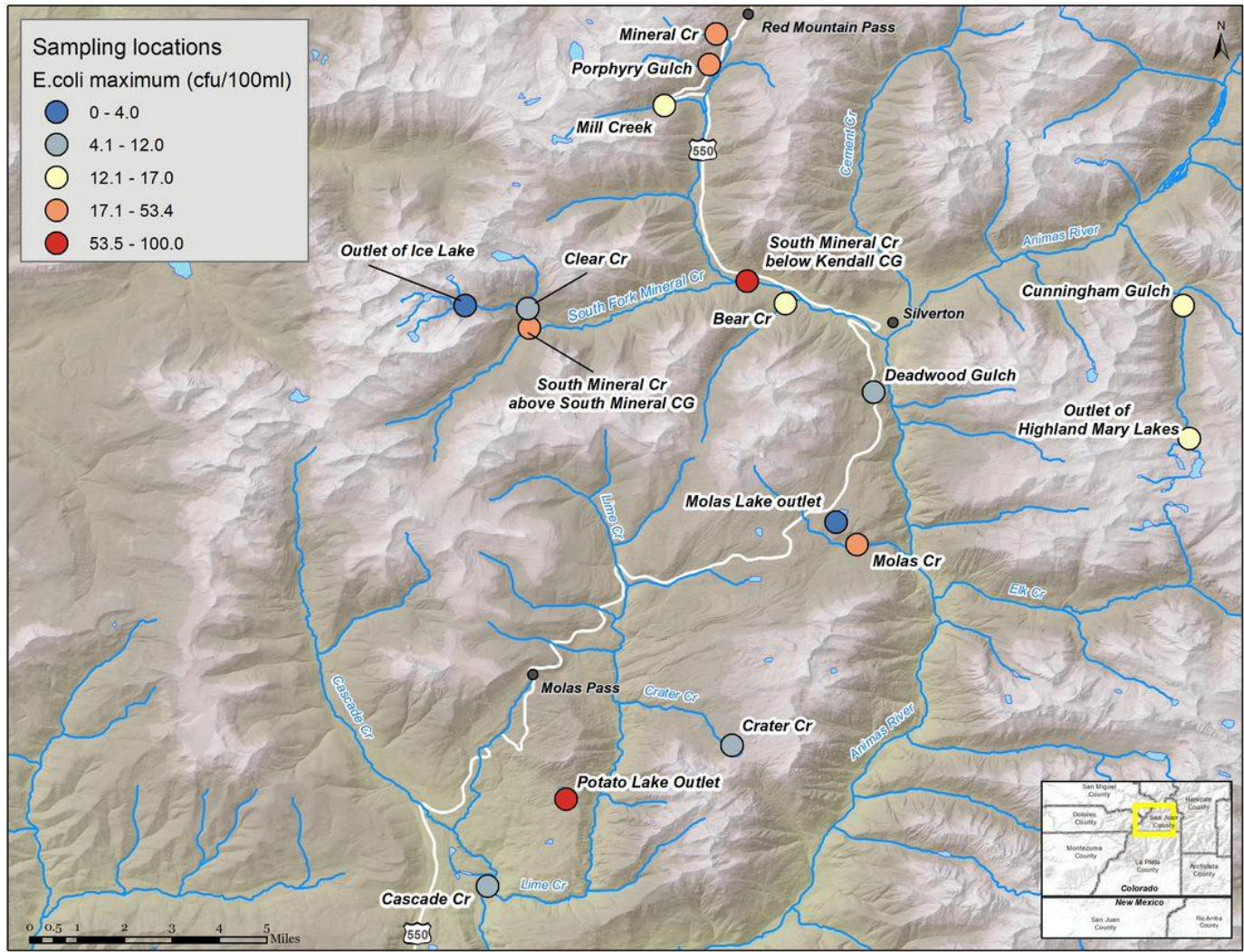


Figure 2: Maximum *E.coli* concentration across sampling events for each site.

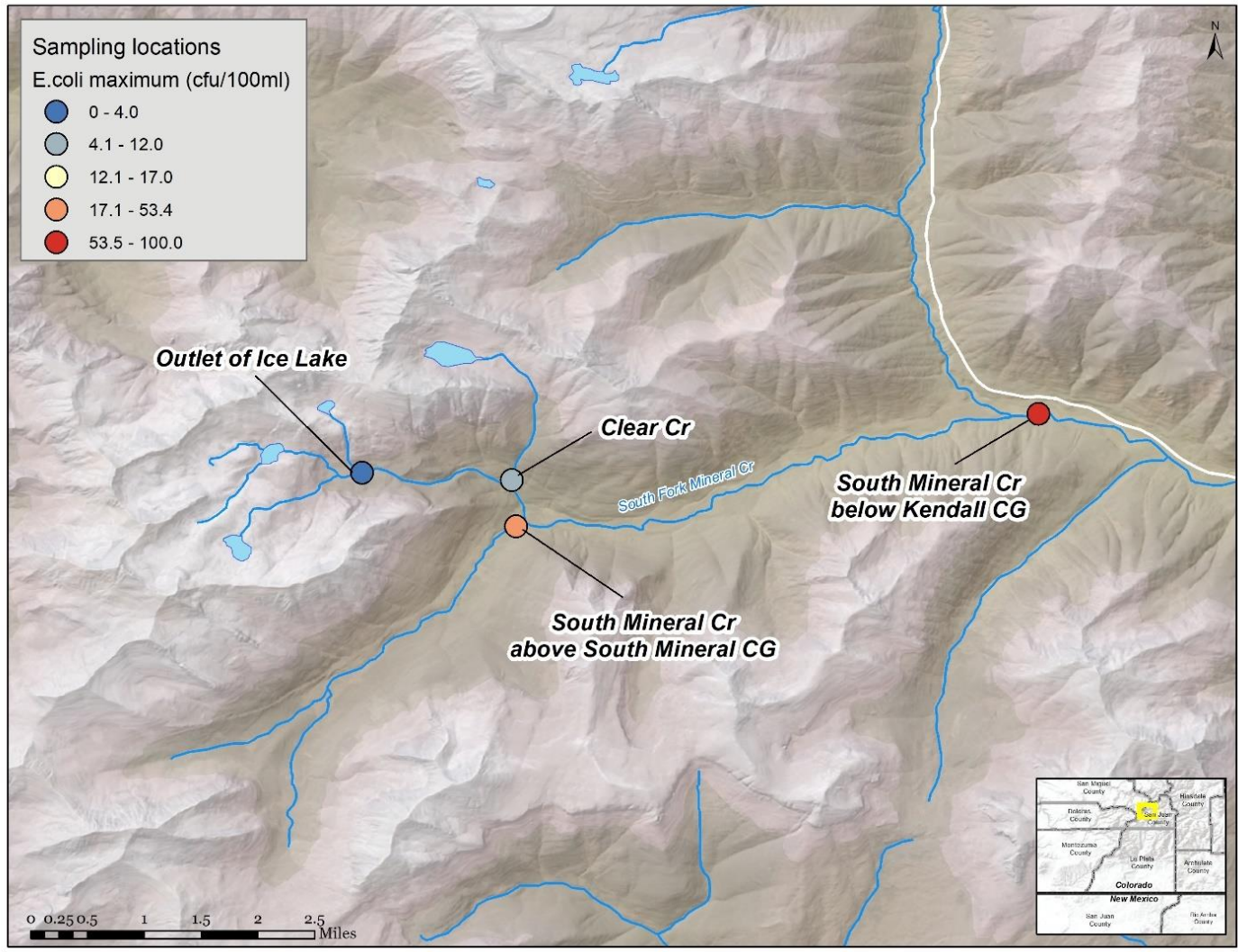


Figure 3: Maximum *E.coli* concentration across sampling events for South Mineral sites.

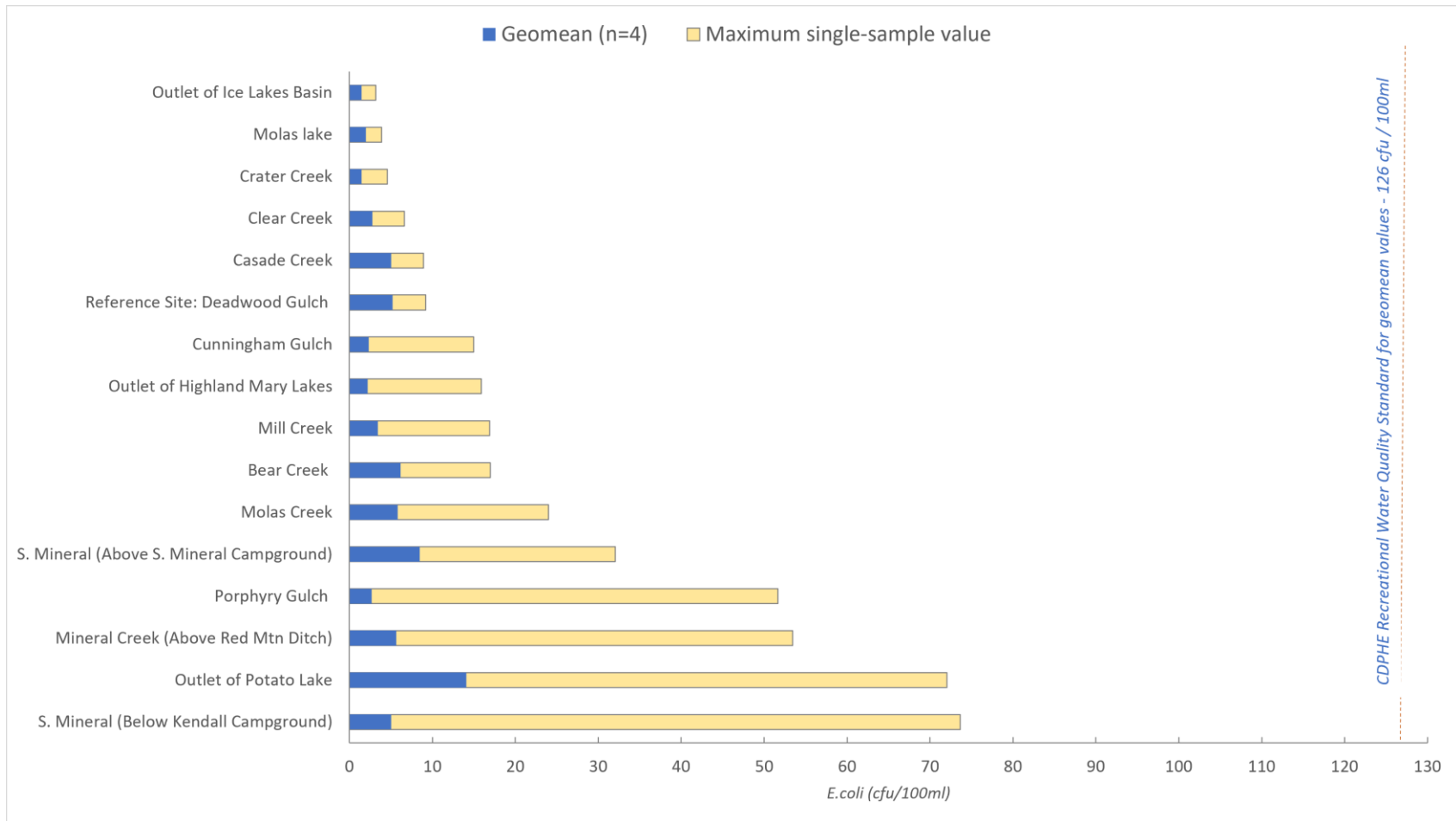


Figure 4: *E. coli* geometric mean and maximum concentration for each site.

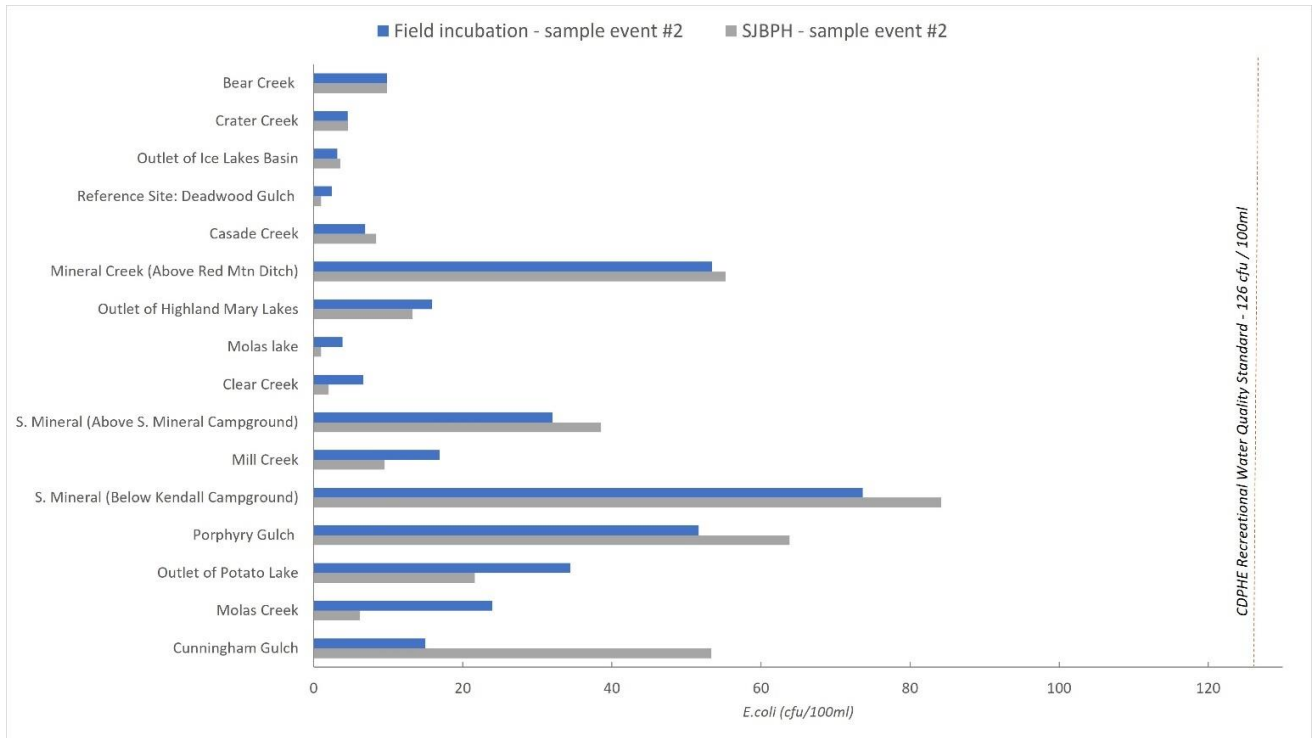


Figure 5: Comparison of field incubation and SJBPH results for sample event #2.

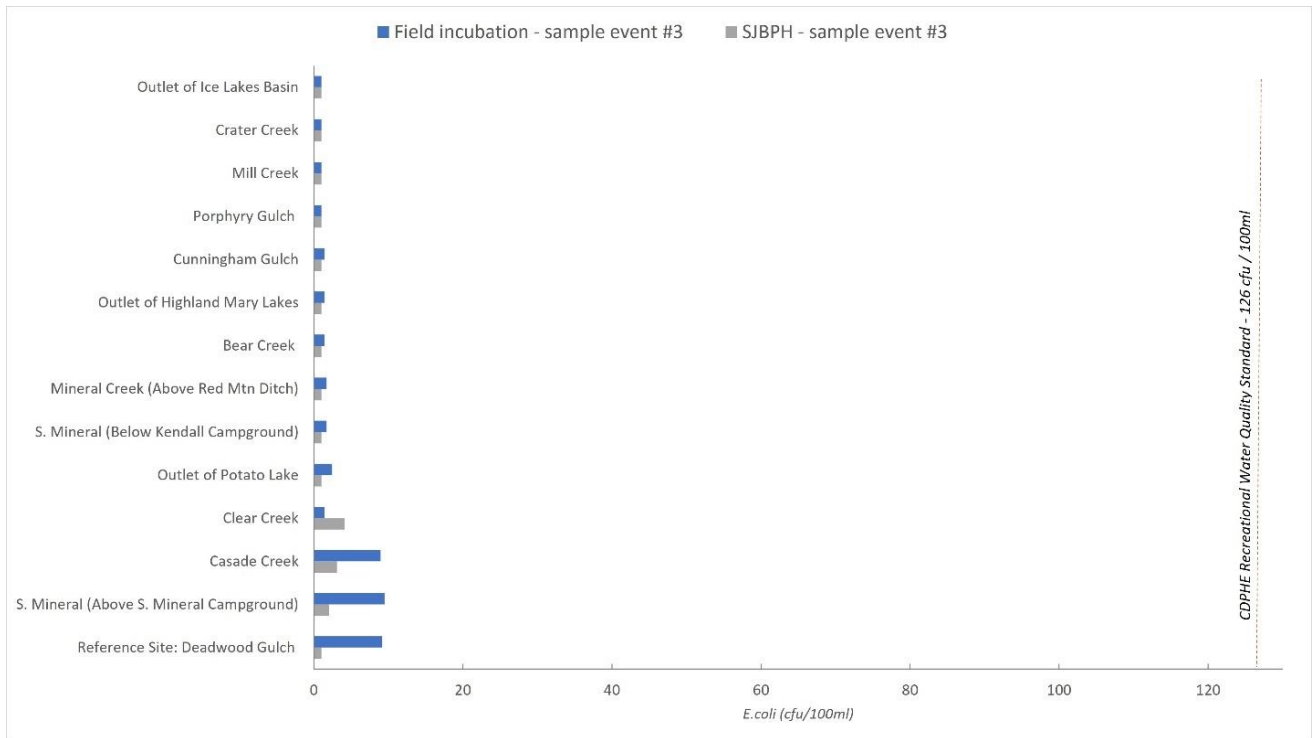


Figure 6: Comparison of field incubation and SJBPH results for sample event #3.

2.1.3 Site Information (A note on each site using Forest Ambassador observations and our own spatial observations):

Site	Description
Deadwood Gulch	"Reference/control site" for what we assumed to be low use areas (no road or trail upstream).
Crater Creek	Popular for backpackers. The only site within a wilderness area. Restroom at trailhead.
Bear Creek	Increased mtn biking (one of Silverton's drinking water sources). No restroom facility.
Cascade Creek	Popular day use area. Equestrian traffic from a guest ranch stable. No restroom facility.
Molas Creek	Adjacent to a popular segment of the Colorado Trail and easily accessible by a major highway. No obvious nearby restroom facility.
Porphyry Gulch	Popular for off-roading, fishing, hiking, and day-use.
Molas Lake	High use recreation area with restroom facility.
Outlet of Potato Lake	High use area that is popular among anglers, day hikers, car campers, and backpackers. No restroom facility.
Mineral Creek (Above Red Mtn Ditch)	Popular dispersed camping area with no restroom facility.
Cunningham Gulch	Downstream of Highland Mary Lakes. Popular dispersed camping with restroom facility. Further upstream is a popular hiking and backpacking area without a restroom facility.
Outlet of Highland Mary Lakes	A popular hiking and backpacking area. No restroom facility.
S. Mineral (Below Kendall Campground)	Popular dispersed camping with restroom facility (was closed for a portion of the summer).
S. Mineral (Above S. Mineral Campground)	Popular dispersed camping, fishing, hiking, and backpacking with restroom facility at the campground. Although this area was closed for most of 2021, it has historically been a very high use area and the high <i>E. Coli</i> concentrations observed at this site could be persistent from prior use.
Clear Creek	Popular dispersed camping, fishing, and day use with no restroom facility. Closed to the public during most of 2021.
Outlet of Ice Lakes Basin	Extremely popular hiking, fishing, and backpacking destination with no restroom facility. Closed to the public during most of 2021.
Mill Creek	Drains Columbine Lake which is an extremely popular hiking, fishing, and backpacking destination with no restroom facility.

2.1.4 Recommendations for future programs

- Couple *E. coli* data with quantification of use in the area (trail use data).
- South Mineral Creek was largely closed to the public in 2021 but will be open in 2022. This presents an opportunity to repeat sampling efforts at these sites to assess whether *E. coli* levels reflect the anticipated drastic increase in recreational use.
- Conduct multiple sampling events throughout the year to capture greater temporal variability.
- Conduct storm event sampling since *E. coli* mobilizes during precipitation runoff and compare with non-storm conditions.
- These data support that the field incubation methodology conducted by volunteers results in similar outcomes as the SJBPH lab method. Use of the field incubation method has several advantages over the SJBPH method including a lower cost and an increased engagement of citizen scientists.
- These data provide baseline information for future assessment of surface water *E. coli* in San Juan County.

2.1.5 Outreach

The data gathered from this effort is being distilled into an infographic format by MSI staff, working in coordination with a local company graphics company, Animas Outdoor. This infographic will be incorporated into an ongoing outreach effort, which was initiated by San Juan Mountains Association in cooperation with San Juan National Forest, to encourage recreators to properly dispose of toilet paper and human waste in the backcountry. The infographic will appear on signage that will be displayed during the spring through fall of 2022.

2.2 Forest Ambassadors

Following two weeks of rigorous training on forest ecology, public contact techniques, local naturalist history, and Leave No Trace education, our seasonal crew of “Forest Ambassadors” offered a boots-on-the-ground presence at recreation hotspots to encourage LNT practices and led small-scale stewardship projects with local youth and community volunteers. Our goal was to provide a broad-based education and stewardship presence at trailheads, busy trails, campgrounds and gathering points, and it was effective as we recorded over 12,000 educational contacts over the course of summer. We chose these spots to maximize interactions with the public and provide a stewardship and public education presence where it is needed most.



Figure 7: Forest ambassadors engage hikers on the trail.

In addition to the educational efforts, SJMA’s ambassadors partnered with volunteers from Deerhill Expeditions, Backcountry Horsemen of America, and Footprints Running Camps to conduct trail maintenance on three of our busiest trails. These ambassadors also completed 80 miles of trail maintenance, improved 200 drainage structures, cleared 835 downed trees from trails, hauled out 424 pounds of trash, removed 95 illegal fire rings, and naturalized 23 illegal campsites. The Alpine Loop Ambassadors made 1935 public contacts, naturalized 117 illegal fire rings, and hauled out 960 pounds of trash. Mountain Studies Institute staff contributed over 300 hours to the forest ambassador program.

To reinforce the messages carried by Alpine Rangers and Forest Ambassadors in the field, SJMA created outreach materials including our Respect the San Juans brochure, and utilized social media educational videos targeted at visitors to encourage “Leave No Trace” ethics and reduce impacts to the high-alpine tundra and local watersheds. We also collaborated with Altra Footwear to create a promotional video highlighting challenges in the San Juans and our efforts to mitigate them.

The Ice Fire of October 2020 demonstrated the risk of human-caused wildfire posed by increased public lands visitation. Our collaborative team expected fire restrictions to be enforced during the summer of 2021. By creating a proactive wildfire safety education plan and establishing exhibits, the ambassadors increased awareness of fire restrictions and reduced the risk of human-caused ignitions in the area. MSI staff, from the Forest Health and Environmental Education teams, worked together to create the exhibits to inform visitors about wildfire ecology and the impacts of human caused fire. Signs were installed at three high use areas and stayed throughout the entirety of the summer (South Mineral Road at the Ice Lakes closure point; the Silverton Visitor Center; and at the Molas Pass rest stop area on US Highway 550) (Figure 1). The exhibits included examples of fire-scarred tree sections and a visitor pledge that they signed to be safe with fire. Visitors received a custom-designed “Forest Hero” sticker for participating. SJMA’s Public Lands Ambassadors were stationed on site four days a week for June through early September to provide additional context, educate people on leave no trace principles, pass on information regarding public lands regulations, and answer any general recreation questions.



Figure 8: Educational Signs at a popular rest stop at the top of Molas Pass taught visitors about forest and wildfire ecology and how to avoid starting wildfires.

This Molas Pass Public Lands Discovery Center provided visitor information and education to public lands visitors that may not otherwise be reached. This Discovery Center housed the Wildfire Safety Exhibit and staff logged 2,301 public contacts, not including passive contacts by people viewing the exhibit.

2.2.1 Outcomes and Impacts of the Forest Ambassadors Program

As expected last winter, the summer yielded big visitor numbers for San Juan County and the surrounding mountains. Based on feedback from visitors, locals, and land managers, the Forest Ambassadors and Alpine Rangers funded by this proposal greatly enhanced these fragile lands by educating the public on how to responsibly visit their public lands. The local volunteers were highly engaged in stewardship projects and public education efforts, and this project helped spur some really great conversations among the public and land managers about the role of boots-on-the-ground stewardship efforts in this region.

The collaborative successfully avoided any substantial human-caused wildfire, improved trail access across the project area, educated the public about human waste and cleaned up trash at our recreation sites. This concerted community response to growing numbers of visitors to our federal public lands will hopefully be the spark necessary to build out future programs.



Figure 9: Forest Ambassadors perform trail work to improve recreation.