



# San Juan Water Conservancy District Funds in Action 2022

## \$2,500

### DIRECTLY SUPPORTED:

- Inclusion of local concerns, challenges, and interests in the 2-3-2 Cohesive Strategy Partnership, Rio Chama CFLR, and Southwest CO CFLR.
- Highlighting and elevating stakeholders concerns and perspectives of proposed actions on Jackson Mountain
- Discussion of post-fire impacts, fire mitigation, fuels reduction treatments, and lessons learned on a tour of the Plumtaw Fire
- Documentary film development to tell the story of community forestry which is scheduled for release in May 2023
- Development of snowtopography network expansion proposal to support research in Pagosa Springs area
- Improved public outreach through updates to the San Juan Headwaters Forest Health Partnership website
- Ongoing, open discussions for stakeholders to discuss science-based priorities for forest and watershed management

Thank you for your support,

San Juan Headwaters Forest Health Partnership



# Plumtaw Fire

*An example of how previous management increased decision space during a fire event*



## Context

The spring of 2022 was exceptionally dry for southwest Colorado, with low relative humidity, low fuel moisture, and a **fire deficit** across much of the forested landscapes. These were perfect conditions for a devastating, long-lasting wildfire event. When the Plumtaw Fire started on May 17th, 2022, just 7 miles north of Pagosa Springs, Colorado, fire officials feared the worst.

The Plumtaw Fire burned a total of 721 acres in a warm dry mixed-conifer forest with gambel oak in the understory. There were many downed trees in the area, and the gambel oak acted as ladder fuels for the fire to climb to the tree canopy, where it was sustained for much of the event. The fire is suspected to be of human origin.

### What is a fire deficit?

Certain ecosystems, like the warm dry mixed-conifer forest that the Plumtaw Fire burned through, rely on frequent wildfire to reduce the amount of fuels on the ground. When a landscape is in a fire deficit, it hasn't had its regular dose of wildfire, so fuels accumulate to higher levels, leading to an uncharacteristic wildfire when it eventually ignites.



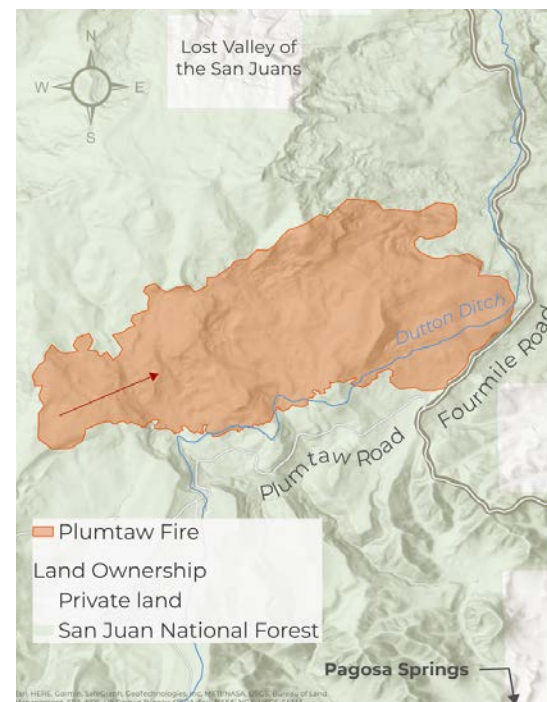
Left: Active fire behavior during backfiring operations the night of May 17

"While we acknowledge the role of luck, we also work to improve the odds of achieving incident objectives by investing in pre-planned tools such as PODs. We have witnessed their value at all levels of incident response" -Brad Pietruszka

## Previous management

San Juan Headwaters Forest Health Partnership identified the Plumtaw area as a priority for treatment years before the Plumtaw Fire started. Dutton Ditch provides **critical drinking water** for the Town of Pagosa Springs, and the partnership foresaw the devastating consequences of a large fire in this watershed. **Private subdivisions** like Lost Valley of the San Juans and the **proximity to town** provided additional reasons for concern if a fire started in the area. The Pagosa Ranger District of San Juan National Forest, who manages this land, heard the community's concerns and took action, completing a fuels reduction treatment along Fourmile Road in 2021. Brush and understory vegetation were cleared and masticated along the road, creating a fuel break for effective management of future fires, just like it did for the Plumtaw Fire.

Weather and fuel conditions also contributed to the successful outcome of this event, but "It was exciting to hear about how the hazardous fuels treatment done on Fourmile Road last year offered and continues to offer fire crews several options while managing the Plumtaw, especially in relation to protecting important values and resources in that drainage" said Dana Guinn, Director of Forest Programs at Mountain Studies Institute. Dr. Tony Cheng, from Colorado Forest Restoration Institute added, "I love seeing examples where work on the ground that came out of a collaborative process made a difference."







Bringing stakeholders together to work in our forests for over 10 years

## MISSION

The SJHFHP develops science-based, collaborative priorities for the sustainable management of forests, watersheds, and essential community resources.

## BACKGROUND

Wildfire is part of life in Southwest Colorado. It plays an integral role in forest health and heavily influences ecological community processes. At the same time, wildfire threatens human communities, infrastructure, resources, lives, and economies. Growing populations and past forest management practices have interrupted patterns of periodic fire in the region, while a lack of local wood products industry has made it challenging to use industry as one of many tools available for actively managing forest health. These realities generate ecosystem responses that make our forests more susceptible to disease, insects, and high severity wildfire.

The San Juan Headwaters Forest Health Partnership (Partnership) recognizes that addressing forest health concerns using a collaborative, science-based approach helps our communities to be resilient in the face of wildfire. In addition to physically protecting our community and enhancing ecosystem function, the work the Partnership prioritizes, plans, and enacts aims to protect key features of natural and engineered watersheds. Our forests host the headwaters of invaluable water resources that serve downstream communities across the southwest. By initiating collaborative approaches and proactive forest management to address wildfire risk, the Partnership builds local management capacity, engages and educates the public, and directly addresses community needs.

## OUR APPROACH

PRIORITIZE AND WORK AT A  
LANDSCAPE-SCALE ACROSS  
JURISDICTIONAL BOUNDARIES

IMPLEMENT ON-THE-GROUND  
PROJECTS THAT ADDRESS  
VALUES AT RISK

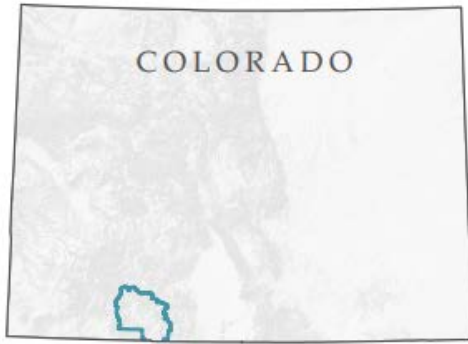
ENHANCE LOCAL FOREST  
PRODUCTS INDUSTRY

UTILIZE DIVERSE FOREST  
MANAGEMENT TOOLS WHEN  
AND WHERE APPROPRIATE

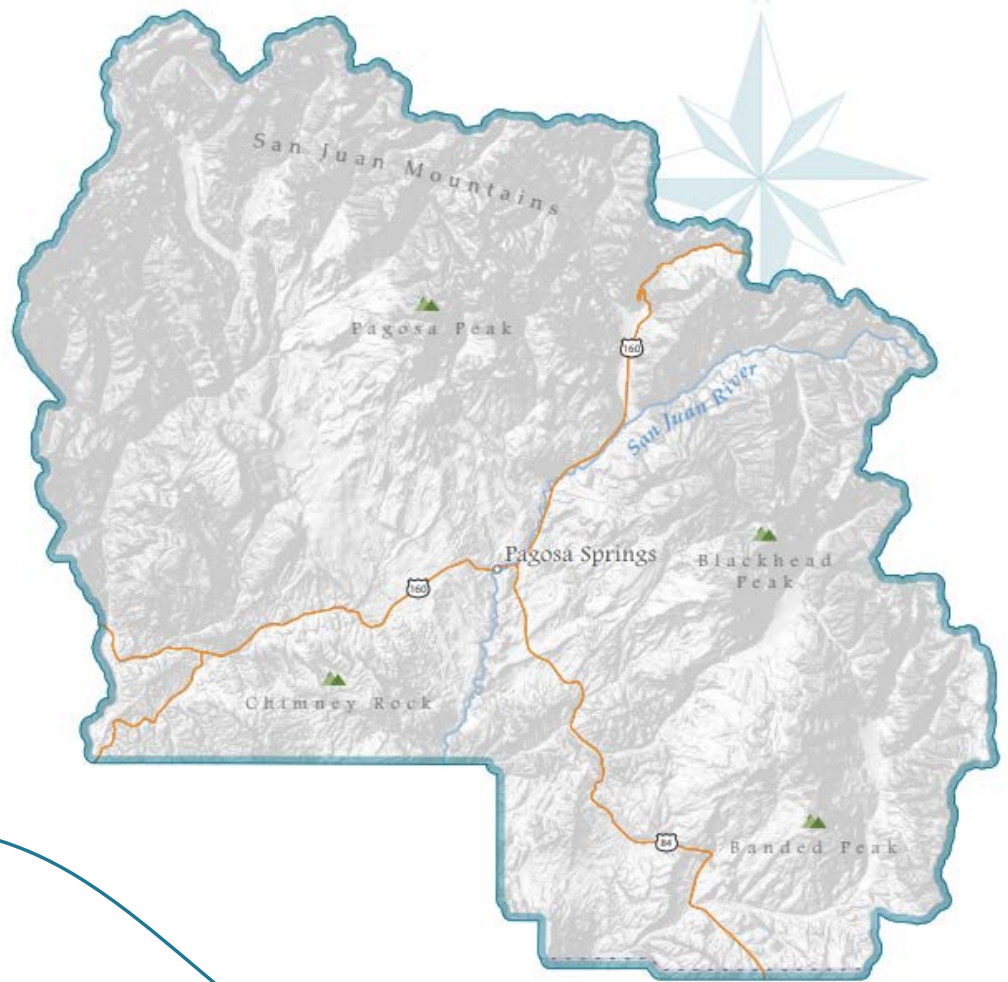
CONSENSUS-BASED DECISION  
MAKING AND MULTI  
STAKEHOLDER INPUT

EDUCATE AND INVOLVE THE  
COMMUNITY






# OUR GEOGRAPHY



Government of Canada; Natural Resources Canada; Strategic Policy and Results; Canada Centre for Mapping and Earth Observation



## KEY ACCOMPLISHMENTS

-  Secured two 10-year Collaborative Forest Landscape Restoration Program projects (Southwest Colorado and Rio Chama) along with partners
-  Connected with the Pagosa Area Water and Sanitation District (PAWSD) and the USFS to design and complete a hazardous fuels break that supported Plumtaw Fire response operations
-  Built a community science bird monitoring program in partnership with the Weminuche Audubon Society
-  Partnered to complete the first ever TRES (Prescribed Fire Training Exchange) in Region 2 on the San Juan National Forest
-  Secured Joint Chiefs Landscape Restoration Partnership funding to mitigate wildfire risk, protect water sources and improve forest ecosystems
-  Supported defensible space work for low-income housing through CAFA programming

-  Helped promote and secure the Pagosa Area Long Term Stewardship Contract
-  Collaborated with researchers and land managers to design the ASCC longitudinal climate study
-  Partnered with the San Juan Water Conservancy District (SJWCD) and PAWSD to prioritize work to protect community resources
-  Engaged local youth and adult learners in forest health and wildlife monitoring, data collection and reporting
-  Built relationships that enable landscape management planning and coordination across jurisdictional boundaries
-  Partnered with scientists researching forest dynamics at Middle Mountain, in the Piedra Area, and on Jackson Mountain





# San Juan Headwaters

## FOREST HEALTH PARTNERSHIP

## Plumtaw Fire Area Tour

September 30, 2022

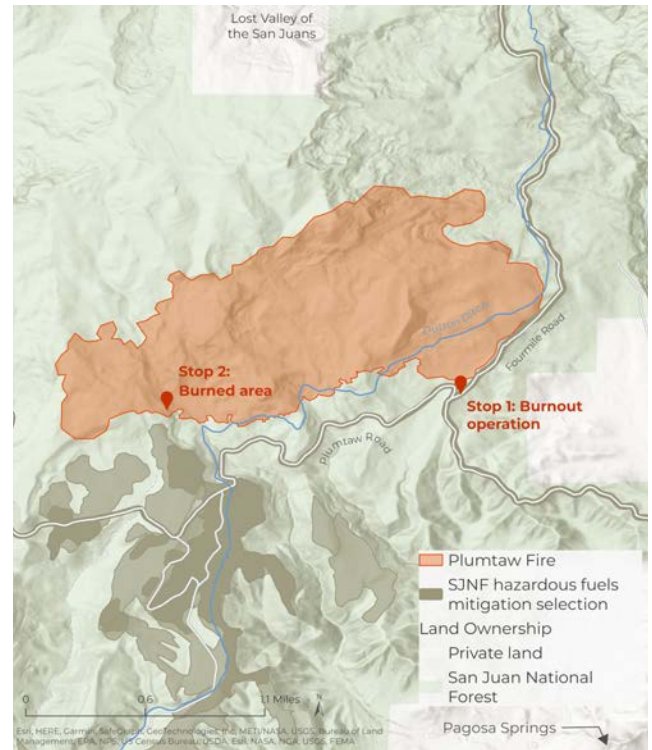
### Context

The winter of 2021-2022 was a good snow year, but the spring was exceptionally dry. By the time the **Plumtaw Fire started on May 17th, 2022**, much of the San Juan Mountains hadn't seen moisture for three weeks, and the whole landscape was in a fire deficit. Due to fuel conditions, the objective was to suppress the Plumtaw Fire. Existing partnerships between the Archuleta County Office of Emergency Management, Pagosa Fire, and the USFS helped respond to the fire and manage it from multiple angles.

The ignition source remains unknown, but a natural start is unlikely. Engines and air resources were assigned quickly because of the fire's potential to spread and the minimal hold locations beyond the Fourmile Road. The fire burned **721 acres** in Ponderosa Pine, mixed conifer, and aspen stands. Gambel Oak exists in the understory but was mostly dormant at the time of the fire. White Fir acted as a ladder fuel and the fire quickly became a crown fire that was driven by prevailing westerly winds.

### Tour Stop 1: Management and Infrastructure

The Fourmile area was identified as a Potential Operational Delineation (POD) because of natural and man-made holding features that can be used to manage fires. Since 2009, **the SJHFHP has identified the Fourmile Watershed as a priority area for forest management and treatment**. In 2021, after a SJHFHP tour in the Fourmile Drainage with partners at the Pagosa Area Water and Sanitation District (PAWSD), the SJNF completed a fuels reduction treatment along the Fourmile Road. This strategic treatment created decision space for fire managers during the Plumtaw fire; a burnout operation from the Fourmile Road played an important role in fire management. Additional forest management work, conducted via the Joint Chiefs program in the area south and southwest of the fire, could have provided more options for management if the fire moved in that direction. **The recent and layered history of strategic forest management in this area increased the decision space for fire managers.**



Tour participants gather for discussion. Photo: Alec McKeand

Although previous management contributed to the outcome of the Plumtaw Fire, **weather was the ultimate decision maker**. Beginning on the evening of May 17th, clouds and increased relative humidity presented operational advantages. Had fire weather been more extreme, the Plumtaw fire could have been a long-lasting event.

Significant **values at risk** in this area include Fourmile diversion, which delivers water to Stevens and Hatcher Reservoirs via the Dutton pipeline. Although PAWSD diversifies their water sources, this diversion typically provides 2/3 of Pagosa's municipal water. The Lost Valley of the San Juans subdivision sits just north of the fire area and was also a primary focus of operational protections. In addition to creating operational decision space, pre-planning for post fire impacts on watersheds including debris flows and changes in water chemistry is critically important.



# San Juan Headwaters

## FOREST HEALTH PARTNERSHIP



Partners discuss forest and fire ecology at tour stop 2. Photo: Alec McKeand.

### Tour Stop 2: Forest and Fire Ecology

Historically, fires burn every 7-15 years in Ponderosa Pine forests, and every 20-50 years in mixed-conifer forests, including Aspen, Douglas Fir and shrubs. After decades of fire exclusion across this landscape, fire is long overdue in this area and in other areas of the same forest type. Because of the fuel conditions and the proximity to homes and critical community infrastructure, the Plumtaw Fire was suppressed. In places like this, where uncharacteristically large and hot fires threaten values at risk, active forest management using a variety of tools can allow for more decision space when fires eventually ignite, and improve fire outcomes.

The Plumtaw fire unfolded as a mixed severity burn typical of mixed-conifer forest types. Fire, along with other mechanisms, is an important landscape management tool in fire adapted ecosystems. Similarly, these tools must be applied across jurisdictional boundaries in key locations for communities and ecosystems to realize the potential benefits of landscape management.



Partners discuss management at tour stop 1. Photo by Alec McKeand.

### VALUES

- CRITICAL WATER INFRASTRUCTURE AND RESOURCES
  - FOURMILE DIVERISON
- NEIGHBORING SUBDIVISIONS
- SECONDARY FINANCIAL IMPACTS

### FUTURE OPPORTUNITIES

- SUPPORT WORK ON PRIVATE LAND
- IDENTIFY CROSS-BOUNDARY OPPORTUNITIES USING MAPPING EXERCISES
- REPLICATE FUELS TREATMENTS IN SIMILAR KEY LOCATIONS
- MANAGE IGNITIONS IN LANDSCAPES WITH FIRE DEFICITS
- LEARN ABOUT THE EFFECTS OF MIXED SEVERITY FIRE, MIMIC WITH TIMBER AND ECOLOGICAL RESTORATION ACTIVITIES

Interested in participating in the next SJHFHP tour or meeting? Email Julia to get involved or learn more:  
[julia@mountainstudies.org](mailto:julia@mountainstudies.org)



## **Proposal for San Juan Snowtopography Network Expansion and Regional Analysis**

### **Background and Project Need**

Decreased water quantity and increased wildfire in the Southwest has led to conversations between land managers and collaborative groups to answer questions related to how forest canopy influences snow accumulation and ablation at low, middle, and high elevations; and how changes in snow dynamics influence soil moisture content and the implications for water yields and forest resilience. Current water availability is forecasted based off SNOTEL and remote sensing, which presents significant gaps in our understanding. SNOTEL sites are unrepresentative of complex forest structure and remote sensing has very low temporal resolution. To fill this knowledge gap and to address these questions, a partnership formed between the Mountain Studies Institute, United States Department of Agriculture, The Nature Conservancy, Dolores Watershed Resilient Forest Collaborative, and Dolores Water Conservancy District, and Fort Lewis College. To date, this group has installed three snowtopography sites in the San Juan Mountains. Snowtopography is a simple, yet effective way to quantify the impacts of forest structure on water resources and forest resilience. As this relationship is regionally variable, the goal is to create a strong network of sites across the San Juan's to better inform resource managers on the most effective way to create climate resilient forest and water supplies.

To better understand how forest structure impacts water yields in our backyard, the Mountain Studies Institute (MSI) and Center for Snow and Avalanche Studies (CSAS), in partnership with the above listed collaborators propose to install two snowtopography sites. The first would be in the Pagosa Springs area, and will target burned forests, a disturbance type underrepresented in our current network. The second snowtopography site will be close to Red Mountain Pass at CSAS's long term research site, Swamp Angel. Swamp Angel provides an excellent addition to the existing network for a number of reasons including filling in the data gap of high alpine ecosystems, long term meteorological data sets are available and no additional meteorological equipment is needed, remote sensing data of snow water equivalent (SWE) exists from the Airborne Snow Observatory, and the availability of local staff reduces travel times to the monitoring site.

MSI and CSAS have received funding commitments from Northern Arizona University and the Town of Silverton to partially support this project and is looking to the Southwest Basin Roundtable, Southwestern Water Conservation District, and The Nature Conservancy for the remainder of the funding needed for equipment and labor. In addition, we are applying to the USDA National Needs Graduate Fellowship to support a local master's student to manage the sites as well as work on regional analysis across established sites to better inform management of our local watersheds.

## Objectives

1. Establish a study site in Senator Beck Basin at the Swamp Angel Study Plot, a long-term study area monitored by the Center for Snow & Avalanche Studies.
2. Select and establish a site in the Pagosa Springs area to fill the data gap of burned systems.
3. Implement a monitoring program to collect snow density measurements and download instrumentation data twice monthly.
4. Provide mentorship to a Silverton local pursuing a master's degree with hopes of returning to continue to support the ecosystems of San Juan County.
5. Produce a published article on the regional interaction of climate and forest structure and their influence on water storage and availability.
6. Continue studies for longer-term data collection and continue partnerships to produce peer-reviewed literature and inform local management decisions.

## Additional Scientific Background Information

There are two interconnected issues that western US resource managers are facing. The first is a significant decline in snowpack (Kirchner et al., 2020; Mote et al., 2018; Sun et al., 2018), while the precipitation regime is switching from snow to rain dominated (Gascoin et al., 2020; Kostadinov et al., 2019). As the snowpack represents upwards of 80% of in-stream flows (Li et al., 2017), this can have profound consequences for water resource managers in Southwest Colorado. Impacts of a declining snowpack can include decreased water availability, possible flooding due to rain on snow events, reduced storage capacity due to a decreased snowpack, issues of timing and availability, as well as an increased ecological demand for water and increased drought conditions.

Our snowpack is largely declining due to increased atmospheric temperature, changes in jet streams, as well as increased dust on snow events. These climatological impacts are not only impacting our snowpack, but also our forested ecosystems that typically serve as our winter storage for water while demand is low, releasing snowmelt in the spring and summer when water demands are higher. With increased temperatures, and shifts in wind intensity, we are seeing larger and larger wildfires (Abatzoglou & Williams, 2016; Steel et al., 2015). This forms a positive feedback loop, where a decreased snowpack reduces soil and fuel moisture, increasing the likelihood of a wildfire. Once a wildfire has occurred, there is limited vegetation to provide cover from incoming solar radiation and wind, decreasing the snowpack even further. Historically, the San Juan Mountains has seen logging, grazing, tree regeneration, and over a century of fire exclusion, leading to a homogenized forest structure with dense canopy cover in dry forests (Brown et al., 2005; Romme et al., 2009). These conditions create an opportunity for management-based interventions to drought resistance, including prescribed fire and mechanical treatments, but these types of treatment may influence near-surface soil water content or temperature, having a greater impact on seedlings and re-growth potential (Korb & Stoddard, 2020) (Belmonte et al., 2022; Botero et al., 2017; Flathers et al., 2016; Kolb et al., 2020; Kolb & Dixit, 2016; Simonin et al., 2007).



## Budget and Funding Sources

Table 1. Cost by task and site

	Task 1 - Install	Task 2 - Monitoring	Task 3 - Analysis Support	Grad Student
Swamp Angel	\$31,870	\$15,760	\$7,800	\$64,000
Pagosa Springs	\$31,420	\$15,760	\$7,600	
Total	\$63,290	\$31,520	\$15,400	
Project Total	\$174,210			

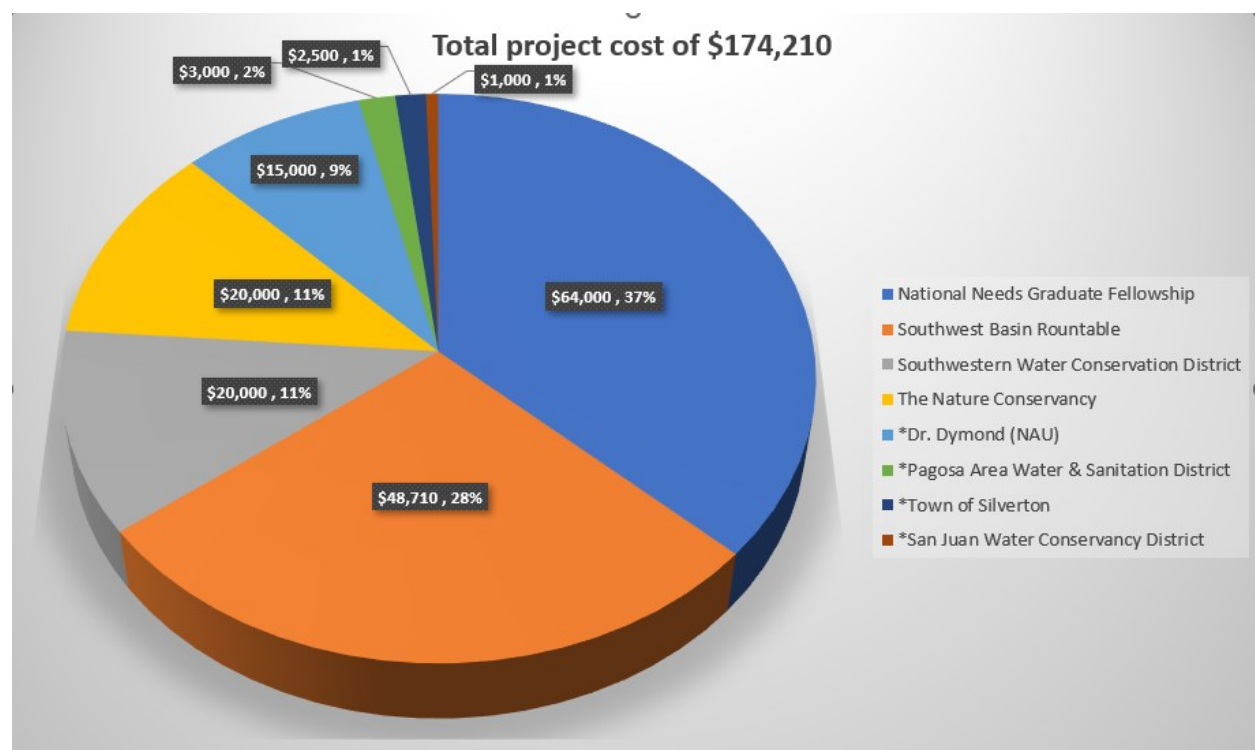


Figure 1. Funding Sources and anticipated asks. \*Notes committed funds.

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