Dixon Water Foundation Annual Report - 2022

DIXON WATER FOUNDATION

2022 – ANNUAL REPORT

HEALTHY LAND. HEALTHY WATER. HEALTHY LIVING FOR ALL.

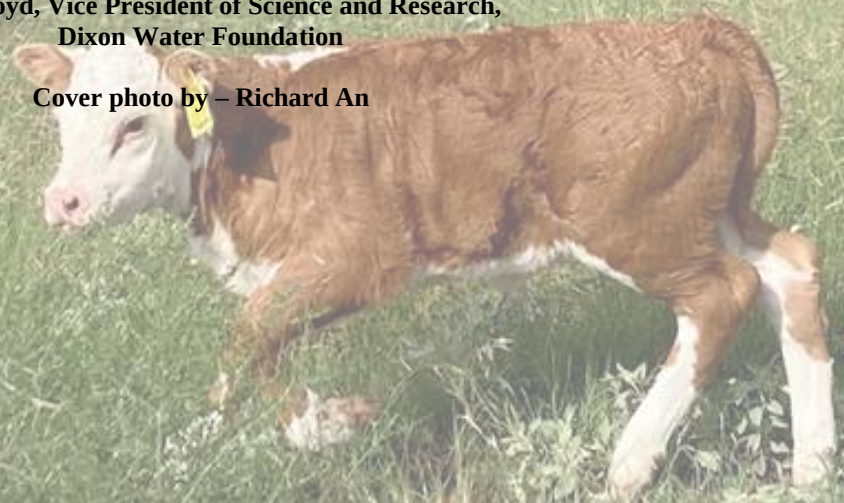
The Dixon Water Foundation's mission is to promote healthy watersheds through regenerative land management, to ensure that present and future generations have the water resources they need.

Through our ranches, grants, education programs, and research partnerships, we hope to help people protect the great environmental resources of our country.

This report summarizes the efforts taken by Dixon Water Foundation to achieve the goals of their mission in the year 2022.

Report written and compiled by-
Philip Boyd, Vice President of Science and Research,
Dixon Water Foundation

Cover photo by – Richard An



Staff and Board of Directors

Staff:

- Robert Potts – President and CEO
- Casey Wade – Vice President of Ranching Operations
- Philip Boyd – Vice President of Science and Research
- Rachel Vasquez – Vice President of Grants
- Hilary Knight – Vice President of Operations
- Richard An – North Texas Education Coordinator

Ranch Managers:

- Jake McNamara – North Texas Ranch Manager
- Zach Vaughn – West Texas Ranch Manager

Board of Directors:

- Clinton W. Josey, Jr.
- Kathy Smyth
- Jerry Addison
- Hugh Aljoe
- Leslie C. Rauscher
- Laura Whiting
- Robert Potts
- Dr. Richard Teague

Advisory Board Members:

- Dr. Bonnie Warnock

2022 changes in Board of Directors and Staff:

Robby Tuggle and Melissa Bookhout retired in 2022. Hilary Knight was hired as Vice President of Operations and Richard An was hired as North Texas Education Coordinator.

Zach Vaughn was hired to manage the Mimms Unit in West Texas.

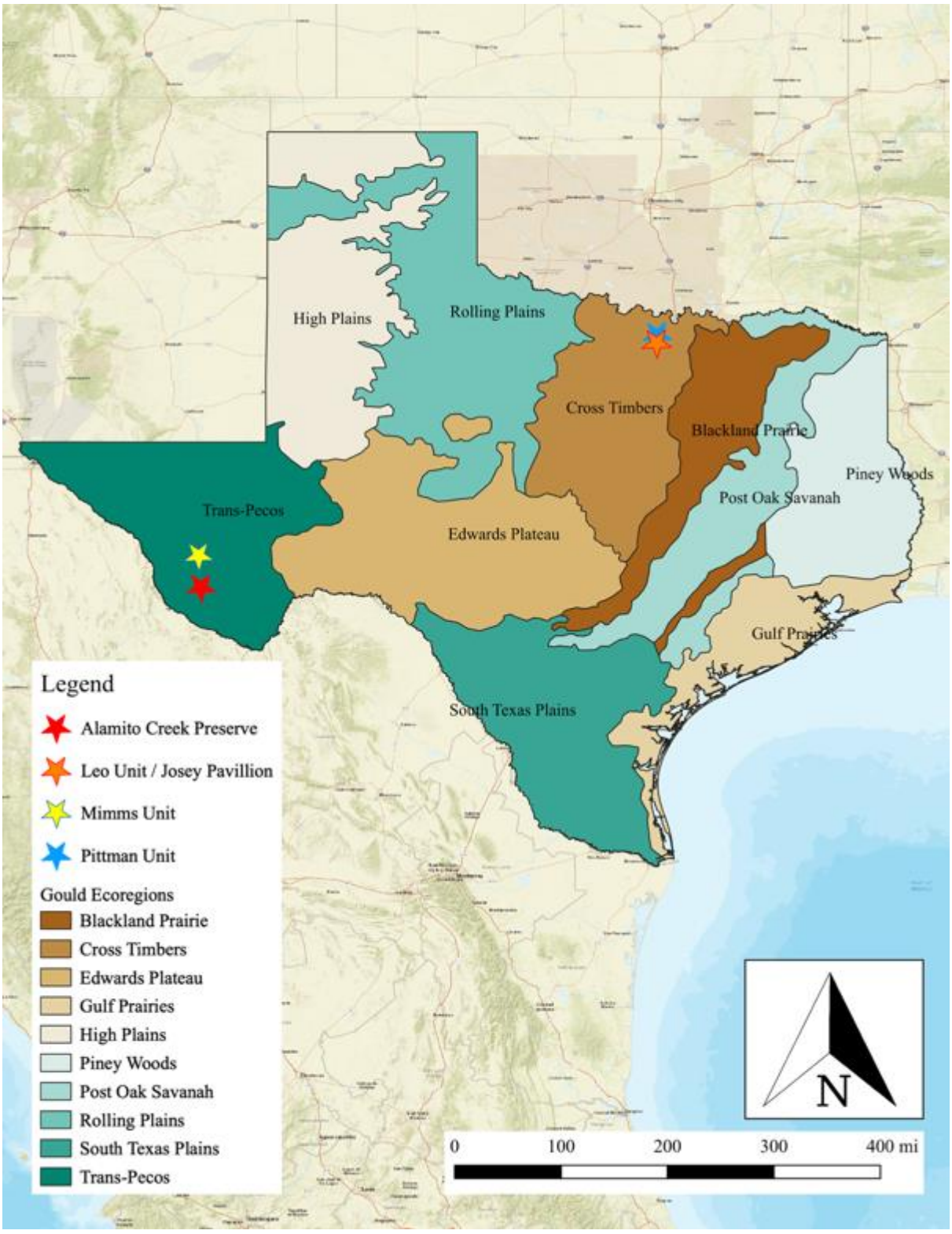


Figure 1. Dixon Water Foundation Ranch locations and Texas Ecoregions created from map in Gould, F. W. 1975, updated by Texas Parks and Wildlife Department (TPWD) GIS Lab 1/09/2004 and downloaded from the TPWD GIS Website

Letter from the President and CEO

Dear Reader,

2022 was a year of generational transition for The Dixon Water Foundation. The year started with the death of our long-time board member, Walt Davis, and ended with the retirement from the board of our founding Chairman, Clint Josey. Walt was instrumental in guiding the foundation's regenerative ranching development. Clint started the Foundation on its present path, recruited and trained me, and oversaw the Foundation's development into the organization that it currently is.

In between those two events, the Foundation saw the retirement of two of its senior staff members, Robby Tuggle and Melissa Bookhout. Robby had implemented the regenerative grazing program of the Foundation and managed our North Texas ranches. Melissa managed the finance and administrative functions for the Foundation and developed our education and outreach programs in North Texas. Both are missed, but, happily, both are still involved with the Foundation. Robby helps from time to time with the ranches and Melissa is now serving on the board of the Foundation.

On top of all this change, the Foundation started the interview process to fill my job as President and CEO upon my retirement in early 2023. I am pleased to report that the board chose Casey Wade, our current VP for Ranching Operations, to be my successor. Casey has over twelve years of experience managing our ranches and speaking at regenerative ranching events. He is an excellent choice and will lead the Foundation to the next level of effectiveness. I will continue to serve as Chairman of the Board. Casey will assume the position of President and CEO on March 15, 2023.

I am happy to report that amidst all this transition, the Foundation continued to improve the ecological condition of its ranches, research and monitor the effects of our ranch management, lead and support educational events on regenerative ranch management, and provide grants to non-profit organizations working in the field of regenerative grazing and watershed health. Many of these efforts you can read about in the pages that follow.

Finally, I want to report that in 2022 the Foundation went through a strategic planning process and adopted a five year strategic plan. I have attached the plan to this letter. Each year we will be establishing objectives to advance the strategic goals under this plan for that year. This plan and the annual objectives developed in accordance with the plan will guide the Foundation's work going forward.

With a new generation of leadership and a new strategic plan, the future is bright for The Dixon Water Foundation.

Robert Potts, President and CEO

5-Year Strategic Plan

MISSION: The Dixon Water Foundation promotes healthy watersheds through sustainable land management to ensure that future generations have the water resources they need.

STRATEGIC GOALS:

1. Operate the Foundation's ranches (Ranches) as model ranches for watershed and grazing land health using adaptive multi-paddock (AMP) grazing.

2. Conduct and host monitoring and research on the Ranches to understand the changing conditions of the Ranches and the role of management in influencing those changes.

3. Share information about the management and changing conditions of the Ranches as well as the benefits of AMP grazing to land managers and the general public through direct communications and through education events with the Foundation's partners at the Ranches.

4. Develop and implement an annual apprenticeship program to train future ranch managers in the techniques and benefits of AMP grazing.

5. Develop and support partnerships with other organizations to encourage the implementation of good watershed and grazing land management practices beyond the Ranches.

Letter from the Vice President of Ranching

The Dixon Water Foundation ranching operation experienced some very significant changes this last year in the form of staff transition. Long time ranch manager and general ranch manager Robby Tuggle retired on June 15th of 2022. He had managed ranches for Clint Josey before the Foundation existed. He was an early adopter of regenerative land management practices, albeit reluctantly at times! Robby was instrumental in building, developing and stocking all of the Foundation's ranches. He initially hired me to manage the Mimms ranch in Marfa and I have learned more from him about livestock and good land management than any other single person. Robby has been a great mentor to me in all things ranching and I am happy to see him enjoying his retirement, working with his son and enjoying his grandchildren. He will be missed but the North Tx ranch at Leo is in good hands with Jacob McNamara, who started in September of 2021. The Mimms ranch in West Tx experienced staff transition as well. Ranch manager Lee Young took a position back at his family's historic ranch near Balmorhea. This made way for former Sul Ross Sustainable Ranch Management intern, Zach Vaughn, to come on board. Zach was able to learn about the Foundation, our mission and the Mimms ranch during his internship. Zach and Jake are both excited to be a part of the Dixon team and the future looks bright with these two taking care of the ranches and livestock.

2022 was not a great year in North Tx in terms of rainfall. Below average precipitation coupled with extreme heat made for a difficult growing season. The decision was made to wean calves early and de-stock by about 15%. By having a drought plan ready we were able to move quickly when conditions called for action. Because of reduced forage production we have needed to continually monitor our grass this dormant season to be sure that we are on track to make it to spring with plenty of organic matter to cover the soil. I am hopeful that we will be able to get our cow numbers back up in 2023, something we should be able to do by adding our replacement heifers to the herd. Overall, in spite of the harsh summer, the Leo ranch is in great shape due to the resiliency we have built into the soils through AMP grazing.

Fortunately, the Mimms ranch in Marfa avoided the drought conditions experienced in North Tx. 2022 was a good year in West Tx especially compared to 2020. We are still recovering from that drought and continue to increase stock numbers by adding heifers from Leo. We are making progress developing the George portion of the ranch. The Mimms continues to set the standard for watershed health in the Chihuahuan desert grasslands. I hope to keep this up with increased stock numbers in 2023.

Both of the Foundation's ranches are now Audubon certified. This opens more marketing opportunities for our livestock and tells the consumer what we already know, that soil health equals ecosystem health, and regenerative agriculture is better for wildlife. Both ranches continue to host educational events with our partners . We had some great events in 2022 and we were able to demonstrate ultra high stock density grazing. The ranches also hosted some interesting research that will inform our management and provide tools to help other ranchers as well. We continue to get closer to our own internship program. The program should be up and running by 2024 with interns spending one year split between both ranches. There continues to be plenty of great work to do. The ranches are positioned to do great in 2023. Jake and Zach are excited to continue learning and share with visitors what they are doing on the ranches. 2022 was a year of transition but the ranching team that is in place now will continue to demonstrate watershed health through excellent land management.

Casey Wade, Vice President of Ranching Operations

2022 Ranching Operations

North Texas

Dixon Water Foundation owns and manages roughly 4,800 acres in Wise and Cooke Counties. The ranches are in the Cross Timbers and Prairies Ecoregion (*Figure 1)* in North-Central Texas, 22 miles northeast of Decatur, Texas, and 32 miles northwest of Denton, Texas. The Foundation ranches sheep (*Figure 2*) and cattle in North Texas.

Figure 2. Sheep at Dixon Water Foundation's North Texas Properties. (photo by Hilary Knight)

Property Updates

Infrastructure updates to the North Texas properties were completed and mapped in 2022. These updates included adding fencing and waters to properties acquired over the last decade in order to support Adaptive Multi-Paddock grazing in accordance with the Foundation's mission and management principles (*Figure 3*).

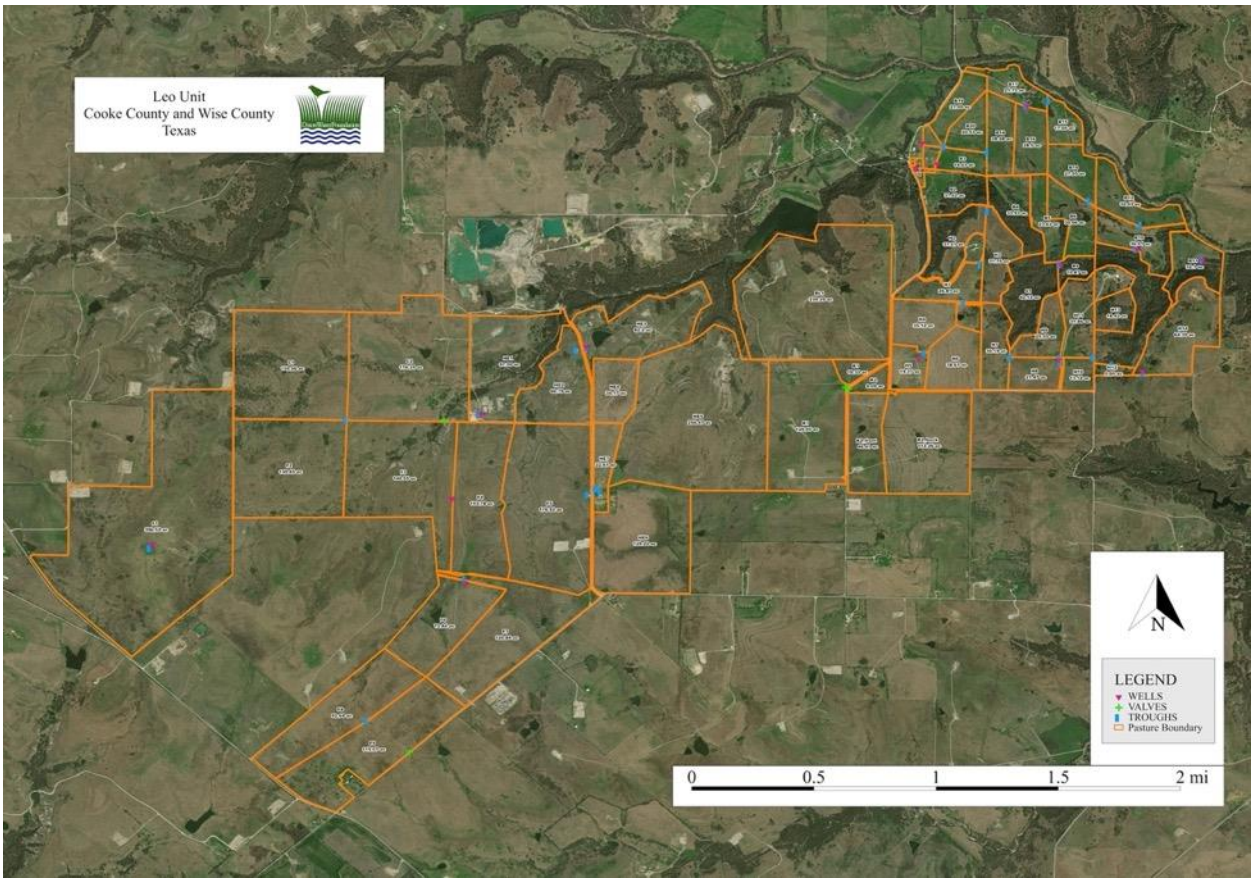


Figure 3. Completed Leo Unit pasture infrastructure and acreage totals map.

Precipitation

Precipitation at the Leo was measured with an analog gauge at the ranch office which is documented on a paper grazing chart until January 2022 when a HOBOlink weather station was installed at the Josey Pavilion (*Figure 4*).

Figure 4. Weather station installed at the Josey Pavilion in January 2022 (Photo by Philip Boyd).

In 2022, the Leo Unit recorded 29.10 in of precipitation. (*Figure 5*). The months of April and May brought the most rainfall, while temperatures rose in June and July and rainfall tapered off. The month of July saw the hottest average temperatures for the year (90.30 °F) while also receiving the least amount of precipitation (0.14”). The first frost came in early November.

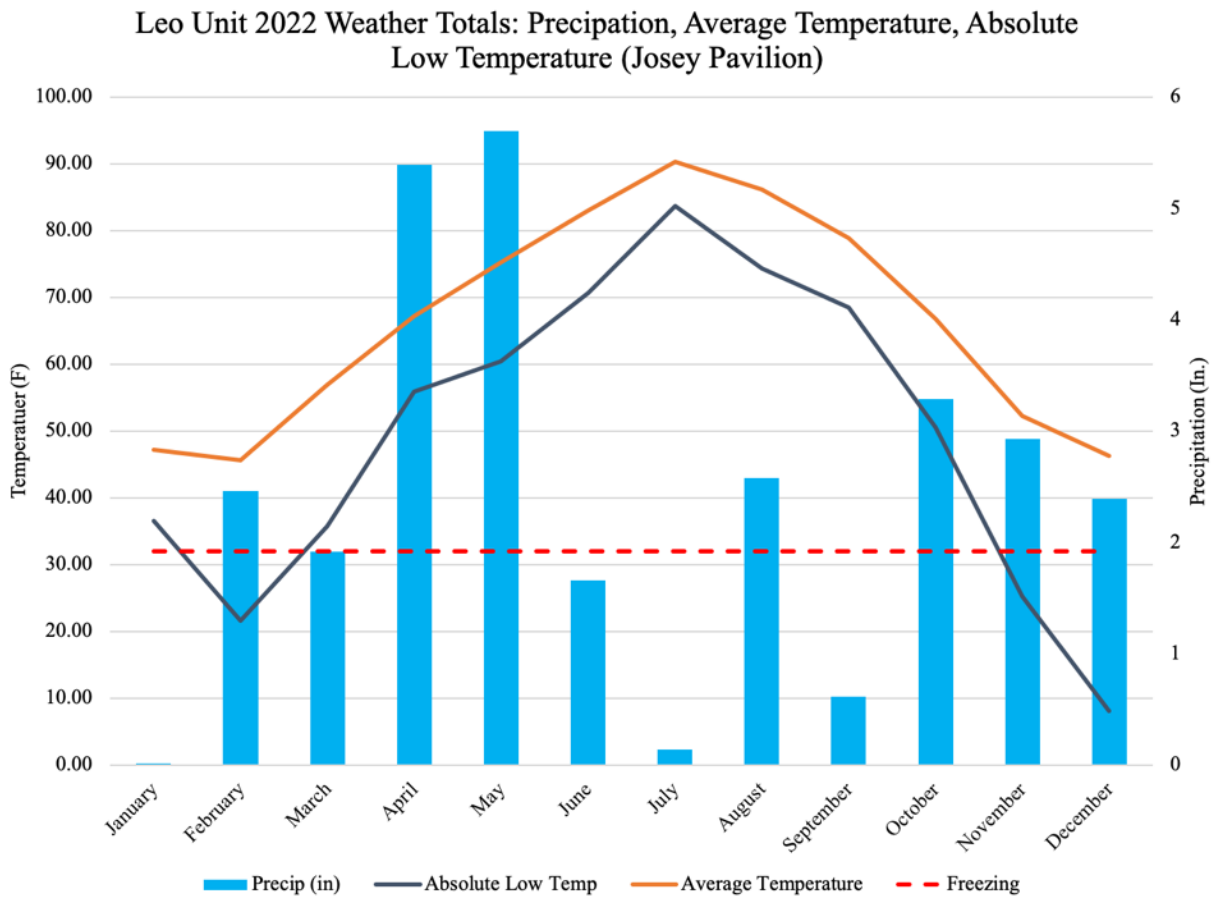


Figure 5. Weather summary for Leo Unit, Decatur, Texas, 2022. Precipitation totals are shown in blue bars with inch measurements on right axis, average temperatures are shown on the orange line with degrees Fahrenheit on left axis. Absolute minimum temperature is marked in black with the freeze threshold marked in red.

Biological Monitoring update

Foundation staff conducted annual biological monitoring at the North Texas ranches in November 2022. The biological monitoring process follows a method developed by Holistic Management International. The process involves traveling to fixed monitoring points each year where staff throw 100 darts into the air around each point. As the darts hit the ground, staff document what type of ground cover the dart landed on: bare ground, litter, or basal plant cover. The staff member also documents the type of plant closest to the dart, based on 10 categories: Prairie complex, Johnson Grass, High Seral Forb, Mid Seral Grass, Mid Seral Forb, Introduced Grass, Sedges, Bermuda Grass, Low Seral Grass, and Low Seral Forbs.

Leo Unit- On the Leo Unit, this type of monitoring has been conducted since 1989. A primary goal of the Foundation has in place is to reduce the amount of bare ground across all Dixon ranches. Through annual monitoring, the Foundation can track any changes in conditions. On the Leo Unit, there are 5 fixed monitoring points. The 2022 biological monitoring efforts reported an average of 24.60% basal plant cover, 70.60% litter, and 4.80% bare ground (*Table*

1). This is a change of 4.00% in bare ground from the 2021 monitoring effort, and a reduction of 17.40% in bare ground since 1989 (*Figure 6*).

Leo Unit Ground Cover Averages			
	Basal Plant	**Litter**	**Bare Ground**
1989	36.60%	41.20%	22.20%
2021	15.40%	83.80%	0.80%
2022	24.60%	70.60%	4.80%

Table 1. Percent cover for each cover type on the Leo Unit between 1989, 2021, and 2022.

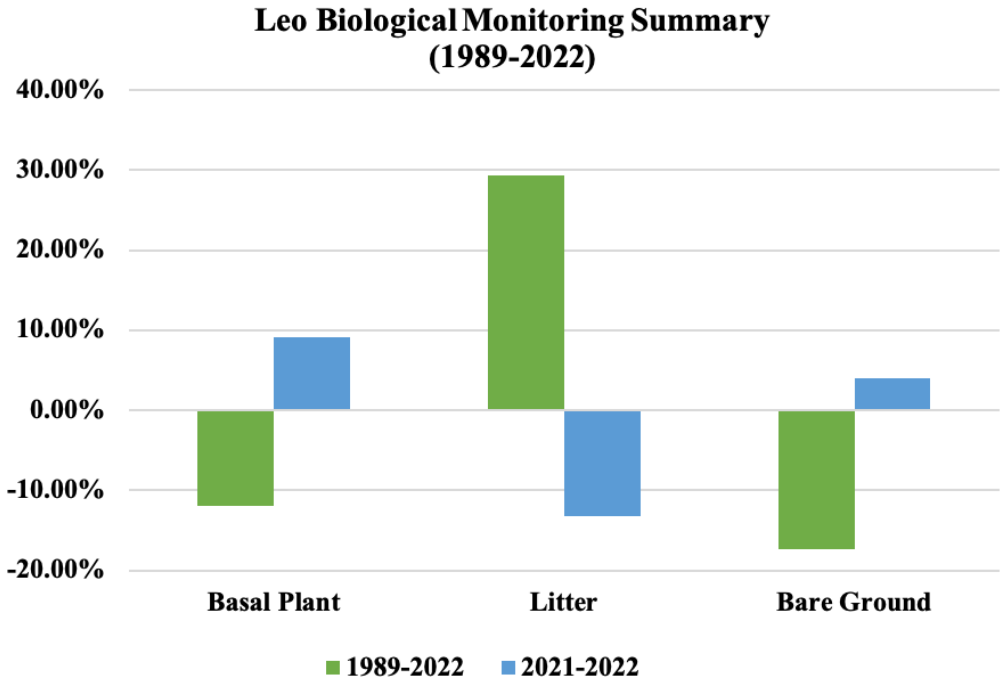


Figure 6. Percent change in ground cover types on the Leo Unit between 1989-2022 (green) and 2021-2022 (blue).

Each individual year and monitoring point may show some variation. When all monitoring point results are averaged and plotted on a chart for each year that has been surveyed, an overall trend in ground cover change can be seen (*Figure 7*). Through consistent monitoring efforts, staff has recorded a decreasing bare ground trend at the Foundation's Leo Unit.

The Leo Unit is comprised of various parcels of varying topography, ecology, and management history. Through decades of multi-paddock grazing, the Foundation has been able to re-establish high plant diversity and the return of many native prairie grasses. However, some pastures are in different successional stages than others due to the state they were in at the time of inclusion into the Foundation's management, or the ecological site in which the pastures are situated, such as the which may support a different plant community by nature.

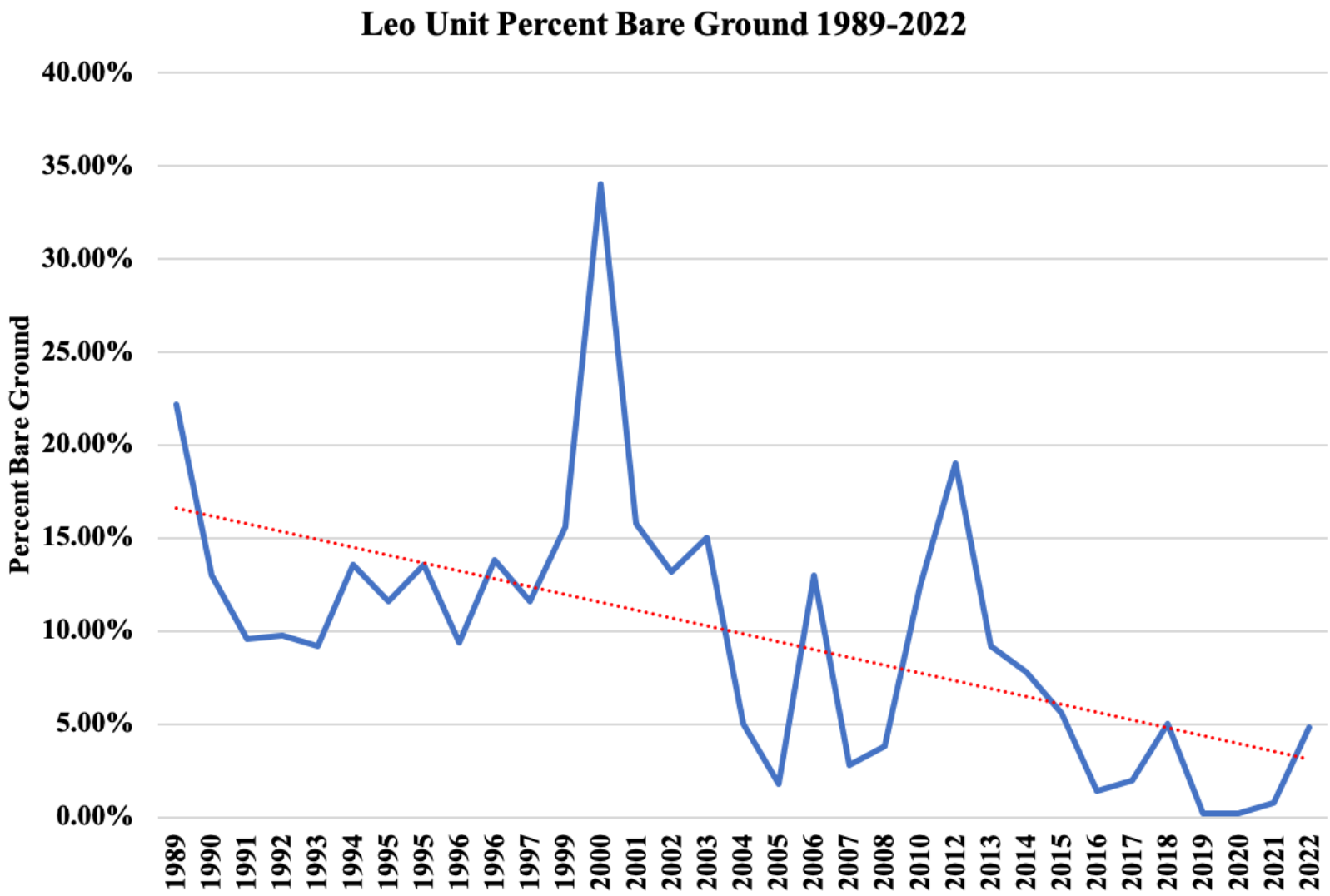


Figure 7. Leo Unit- Percent bare ground recorded 1989-2022 (blue line) and trend of change in bare ground 1989-2022 (red line). Note: The years 1995 and 1996 were monitored in both the Summer (June) and Fall (October) seasons

Heard Unit- The Heard Unit is a property connected to the Leo Unit. The Heard Unit has been surveyed utilizing the same biological monitoring method as the Leo Unit since 2015, when the Foundation bought the land. The infrastructure and management transition have been completed, though it will take some time for management to fully transition the successional states of this property. There are 3 fixed monitoring points on the Heard Unit. One of these points was not surveyed in 2018. All-in-all there is good ground cover at this site, including some high successional grasses. One monitoring point is situated in a pasture of b-dahl grass, which is an introduced grass from previous management. While it provides good ground cover, the Foundation will aim to shift this community towards a native grass community. A slight decreasing trend in bare ground was documented from 2015-2022. (*Figure 8*).

The Foundation ranches feature several areas that have excluded any large-animal grazing pressure from the time purchase of the properties. These sites are meant to serve as points to monitor and observe any differences between the portions of the ranch included in the multi-paddock grazing regime and those excluded from it. While monitoring on the Heard in 2022, one of these exclosures was photographed and illustrates a phenomenon that can happen when grasses are left undisturbed. Left undisturbed, grasses can thrive to the point of growing decadent and dense enough to shade neighboring plants out. This image captures the contrast between dying grasses within the exclosure against active plants outside of the exclosure (*Figure 9*).

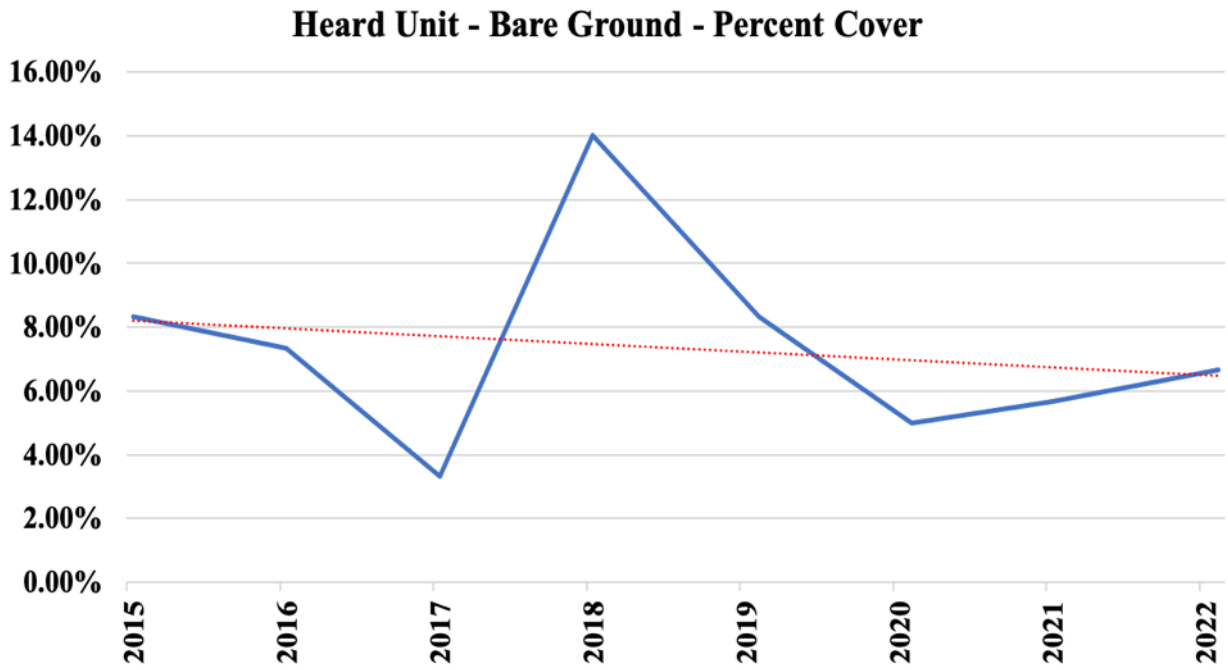


Figure 8. Heard Unit – Percent bare ground recorded 2015-2022 (blue line) and trend of change in bare ground 2015-2022 (red line)

Figure 9. Dying grasses within the un-grazed and undisturbed exclosures on the Heard Property 2022. (Photo by Philip Boyd)

Forman Unit- The Forman Unit is a property connected to the Leo Unit. The Forman Unit has been surveyed utilizing the same biological monitoring method used on the Leo and Heard Units since 2016. There are 3 monitoring points on the Forman and 2022 marked the 7th year of monitoring. Infrastructure updates were completed in 2022. A decreasing trend in bare ground was tracked throughout the monitoring dataset until 2022 when a bare ground percentage of 3% was documented and shifted the trend. Overall, the Forman features good ground cover with varying degrees of successional communities. The property has some history of being plowed and farmed prior to Foundation ownership. (*Figure 10*).

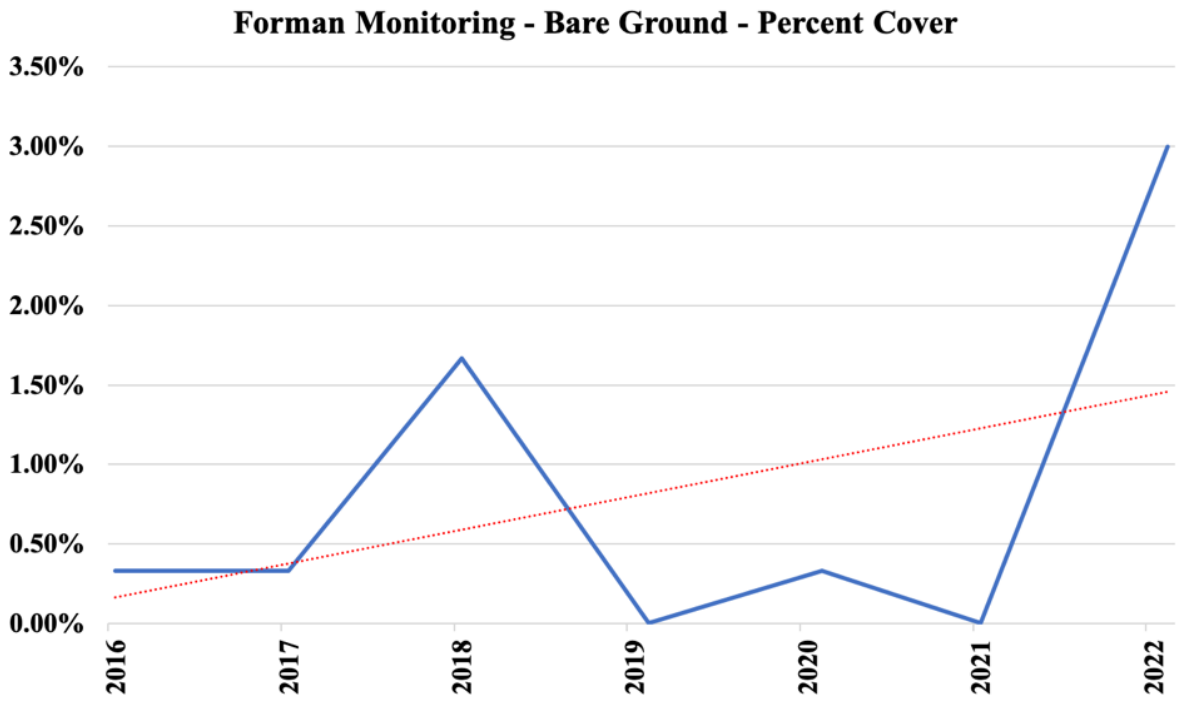


Figure 10. Forman Unit - Percent bare ground recorded 2016-2022 (blue line) and trend of change in bare ground 2016-2022 (red line)

Pittman Unit- The Pittman Unit is a property roughly 7 miles north of the Leo Unit. The Pittman Unit has been surveyed utilizing the same biological monitoring method used on the Leo Unit since 1999. There are 5 monitoring points on the Pittman Unit. The unit was not monitored in 2018 due to wet conditions. As with all ranches managed by the Foundation in North Texas, the Pittman showed signs of stress from climate conditions of a hot summer with no precipitation in 2022. Generally, the site features good ground cover and high successional communities, though some areas are still in a lower successional state transitioning towards a native prairie complex. The site has shown considerable improvement from its purchase in 1999, which was followed by the transition out of continuous grazing to the introduction of adaptive multi-paddock grazing (*Figure 11*). The average amount of bare ground surveyed in 2022 was 3.00%, an increase of 1.80% from 2021. Overall, a decreasing trend in bare ground cover remains throughout the monitoring dataset (*Figure 12*).

Figure 11. Comparison photos of the Pittman Unit at the time of purchase, under continuous grazing (1999, top) and after more than a decade of adaptive multi-paddock grazing management (2020, bottom) (Photos by Melissa Bookhout)

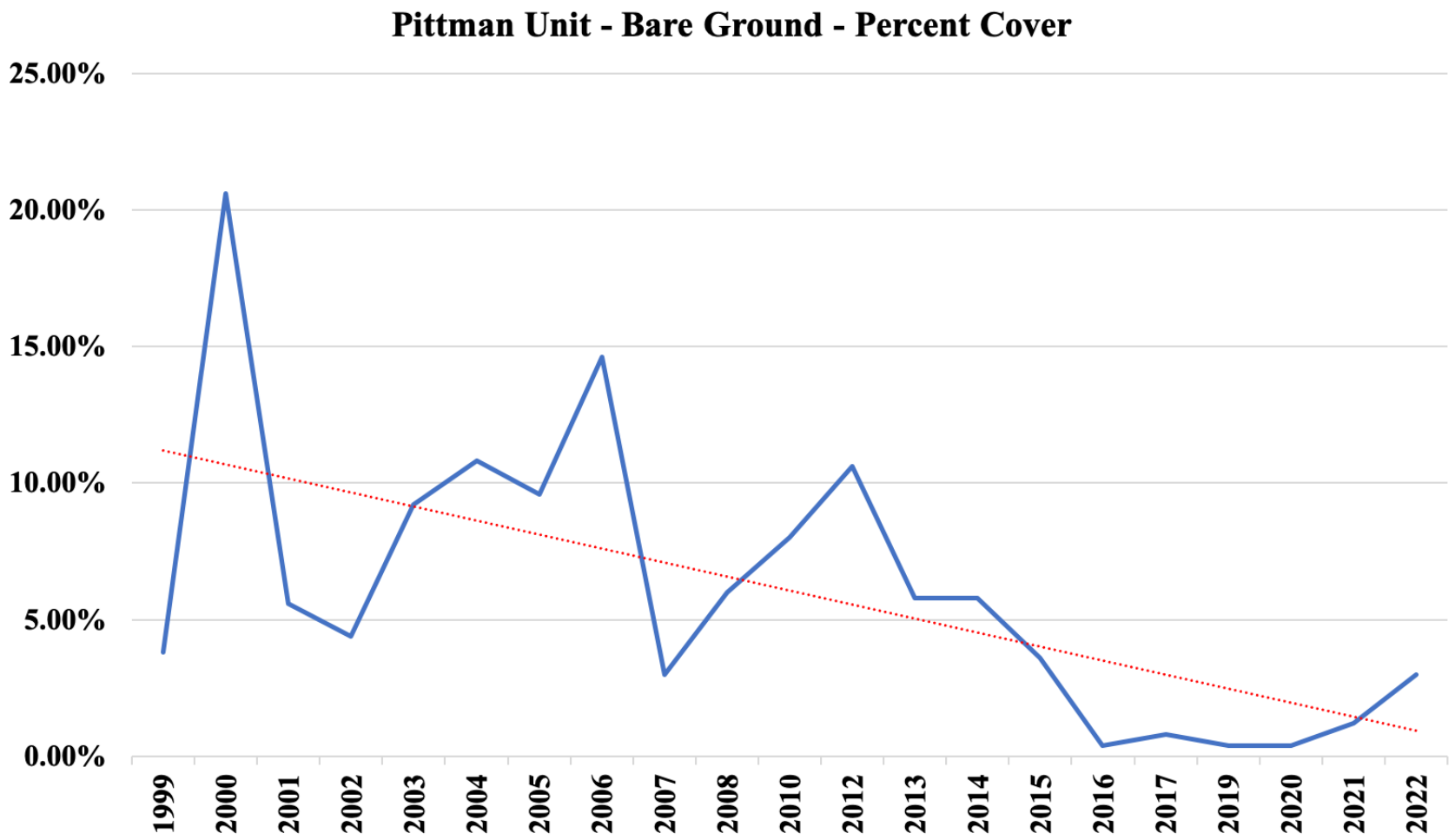


Figure 12. Pittman Unit - Percent bare ground recorded 1999-2022 (blue line) and trend of change in bare ground 1999-2022 (red line)

West Texas

Dixon Water Foundation owns and manages roughly 30,500 acres in Presidio County. The ranches are in the Trans-Pecos Ecoregion (*Figure 1*). The Foundation's ranches are located near the town of Marfa, Texas, and along Alamito Creek, roughly 30 miles south of Marfa, Texas. The Foundation grazes cattle on the Mimms Unit ranch and occasionally grazes on Alamito Creek Preserve depending on annual weather conditions and management objectives.

Figure 13. Casey Wade tagging and taking notes a calf on the Mimms Unit, Marfa, Texas. (photo by Zach Vaughn, August 2022)

Property Updates

Marfa Plateau

The Foundation continued to make updates to the George Property (NW corner of Mimms) in 2022, including 4 new pastures in the southeast as well as new water infrastructure to supply pastures that will be developed in the near future. The Foundation plans to next develop pastures on the north end of the George Property (*Figure 14*)

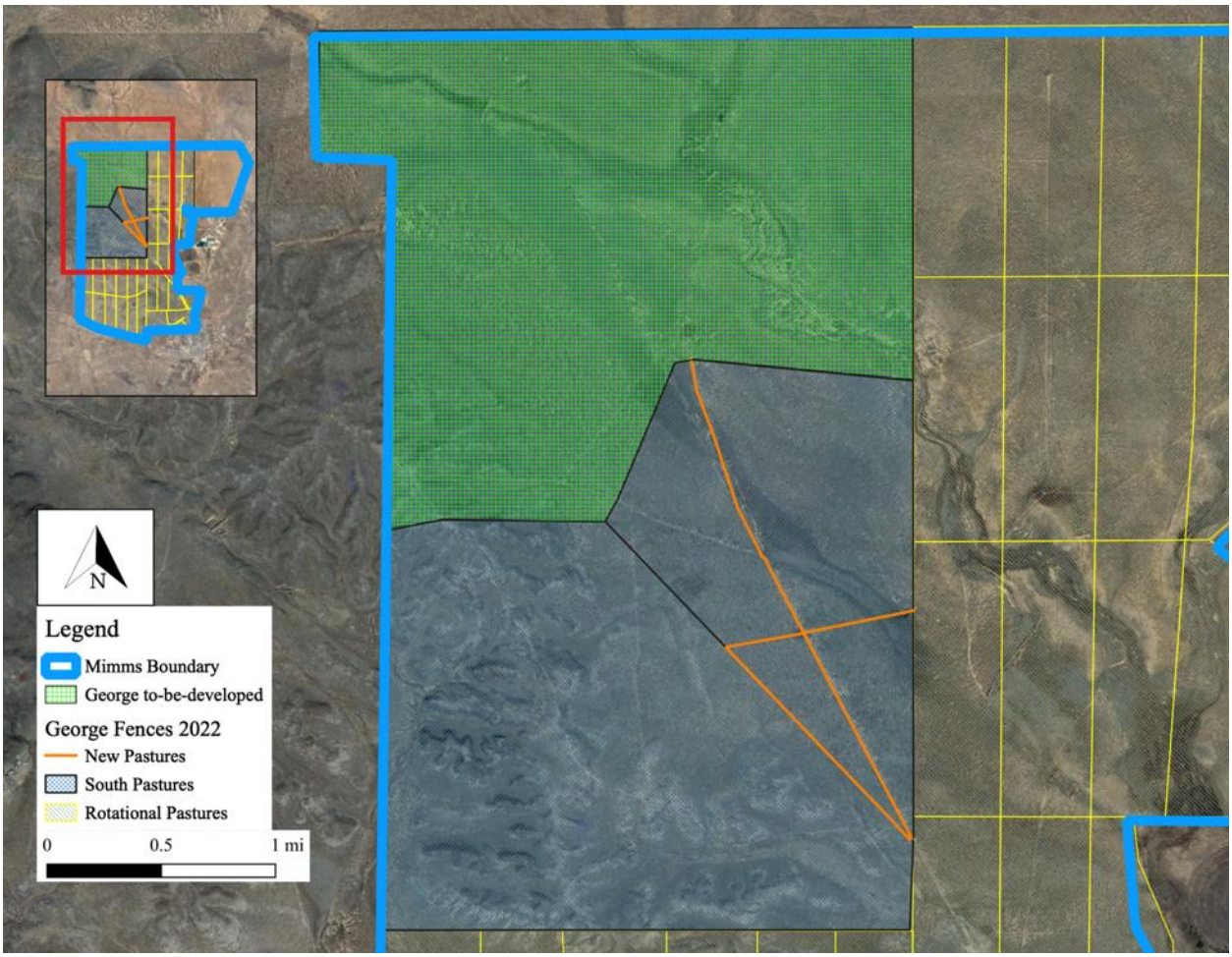


Figure 14 – Map detailing infrastructure improvements and areas under consideration for improvement for the George Property in the Northwest corner of the Mimms Unit, Marfa, Texas..

Precipitation

Alamito Creek Preserve

A HOBOLink weather station had been installed at the Preserve and was replaced by a Ranch Bot tank sensor and rain gauge in spring of 2022 (*Figure 15*). The rain gauges collected a total

of 9.94” for 2022, with the majority (5.67”) falling in August (*Figure 16*) which brought floodwaters through the creek channel.

Figure 15. RanchBot rain gauge (left) and solar-powered tank sensor (right) installed at the Matanoso Pens of Alamito Creek Preserve, spring 2022 (Photo by Philip Boyd)

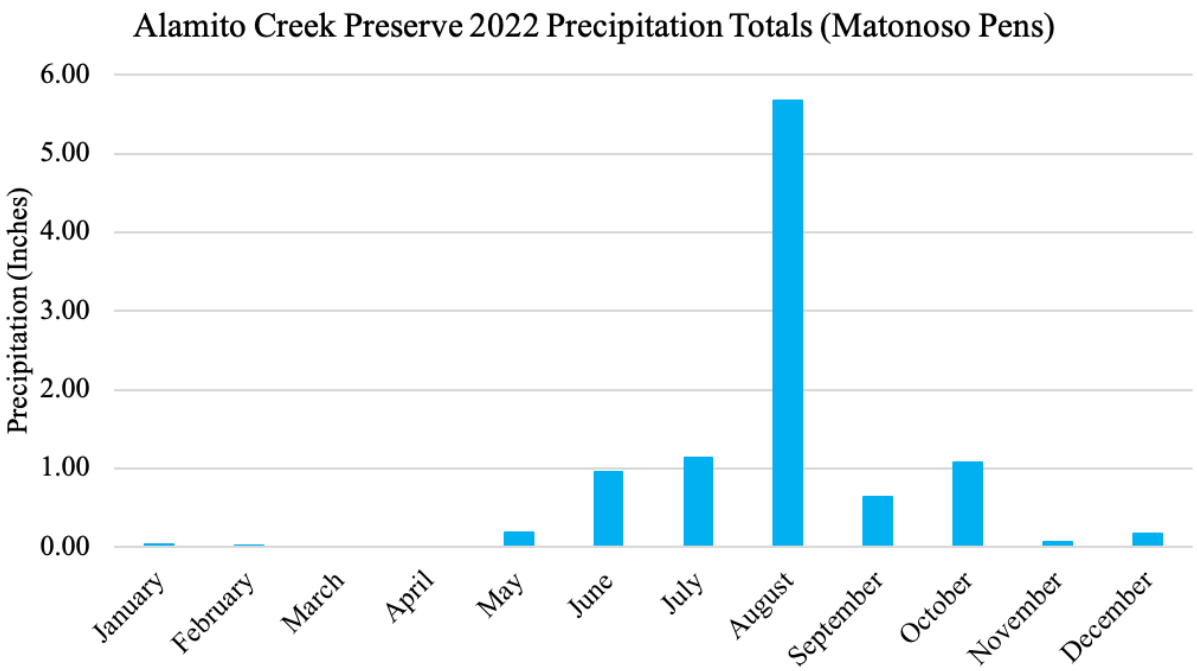


Figure 16. Rainfall totals (inches) per month for Alamito Creek Preserve, 2022.

Marfa Plateau

Precipitation on the Mimms Unit is measured by 3 methods:

1. Weather station data from the Marfa Municipal airport was obtained through the Weather Underground website reported 8.14 in of precipitation in 2022. The airport is located on the eastern side of the middle of the Mimms Unit. Additionally, temperature data was compiled from this source. (*Figure 17*).

2. HOBOLink rain gauges installed in the southwest portion of the ranch and at headquarters at the southern edge of the ranch boundary (*Figure 17*). The southwest rain gauge report 9.43" of rainfall and the headquarters gauge, on the southern end of the ranch, reported 7.72".

3. University of Texas Bureau of Economic Geology has 6 weather and soil moisture monitoring stations on the northern end of the Mimms Unit. These stations recorded 7.23" of rainfall (*Figure 17*).

The foundation estimates that there are roughly 4 rainfall zones on the ranch and utilizes these gauges to account for these zones (*Figure 18*). During 2019 and 2020 the south side of the ranch received more precipitation than the north side. In 2021, this trend reversed as both the airport weather station and the Northern Mimms Unit weather stations recorded more rainfall than the ranch headquarters. In 2022, conditions returned to the trend of the southern end of the ranch receiving more rainfall. It must be noted that some weather stations and gauges were inaccessible for maintenance or timely readouts due to muddy road conditions. This may have affected accuracy of readings.

In West Texas, the 2011 drought is a local benchmark for poor conditions. When comparing 2011 and 2020, the 2020 conditions were worse than the 2011 precipitation totals. Fortunately, according to the Marfa Municipal Airport gauge, 2021 brought more abundant and timely rainfall. Rainfall for 2022 was similar to 2021 (*Figure 19*) and fell in a timely fashion, coinciding with the warmest days of the year, resulting in a productive growing season (*Figure 20*). One difference between 2021 and 2022 rainfall timing was that 2021 received more spring rainfall (May and June) while 2022 received more late summer rainfall (September and October). The majority of the rainfall fell in August (3.45"). The temperature dropped below freezing on October 25th, 2022.

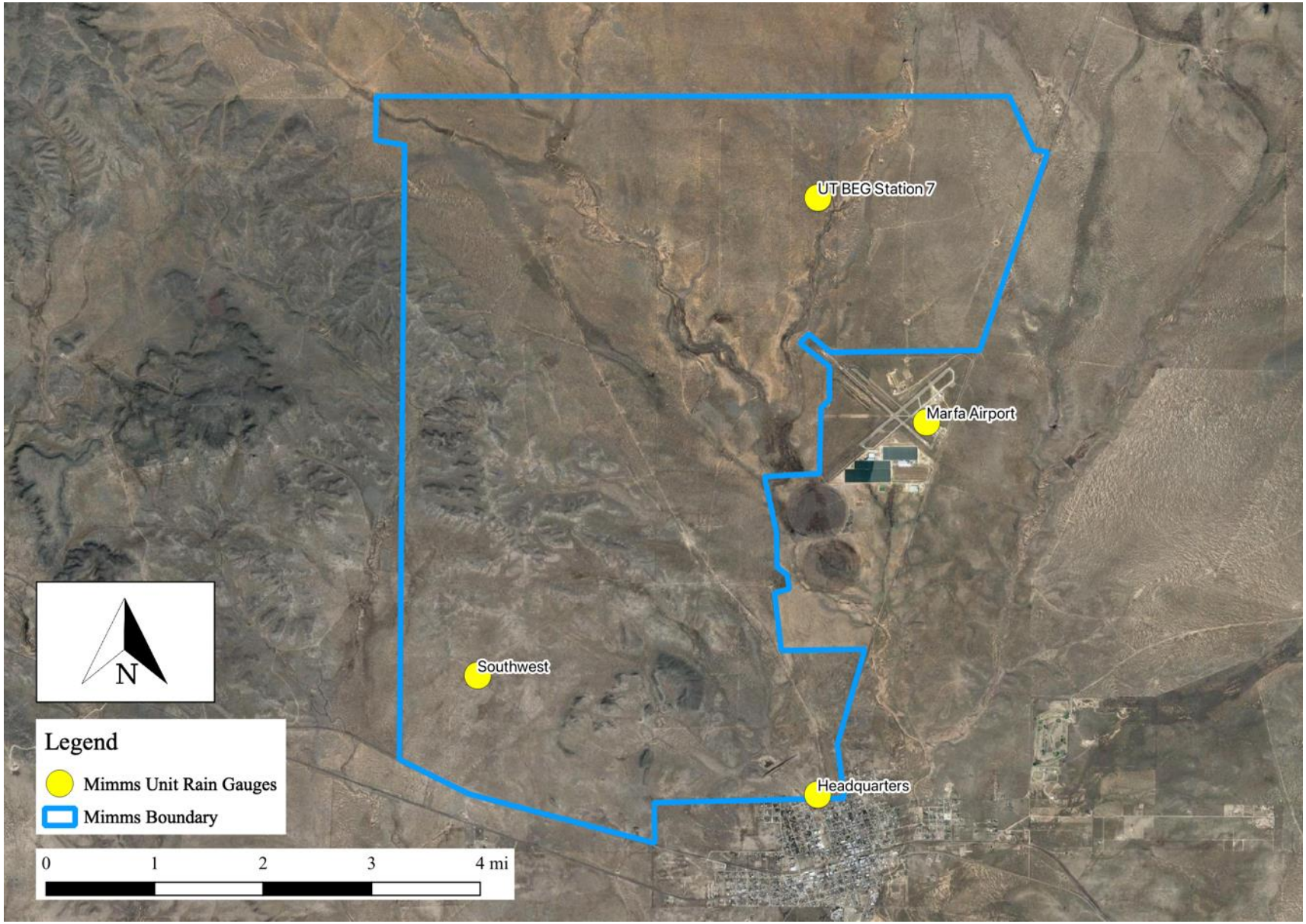


Figure 17. Locations of rain gauges on Mimms Unit, Marfa, Texas

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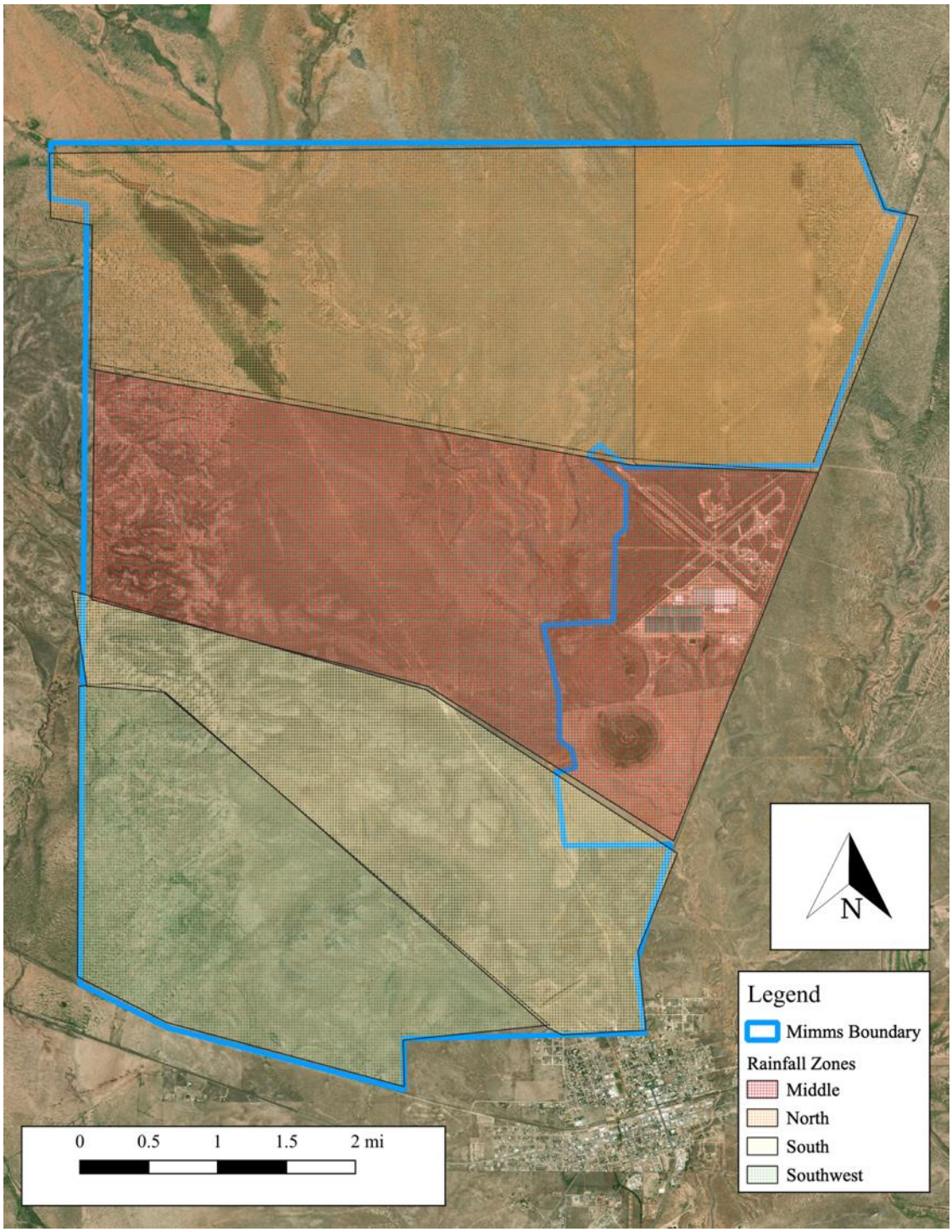

Figure 18. Estimated rainfall zones on Mimms Unit.

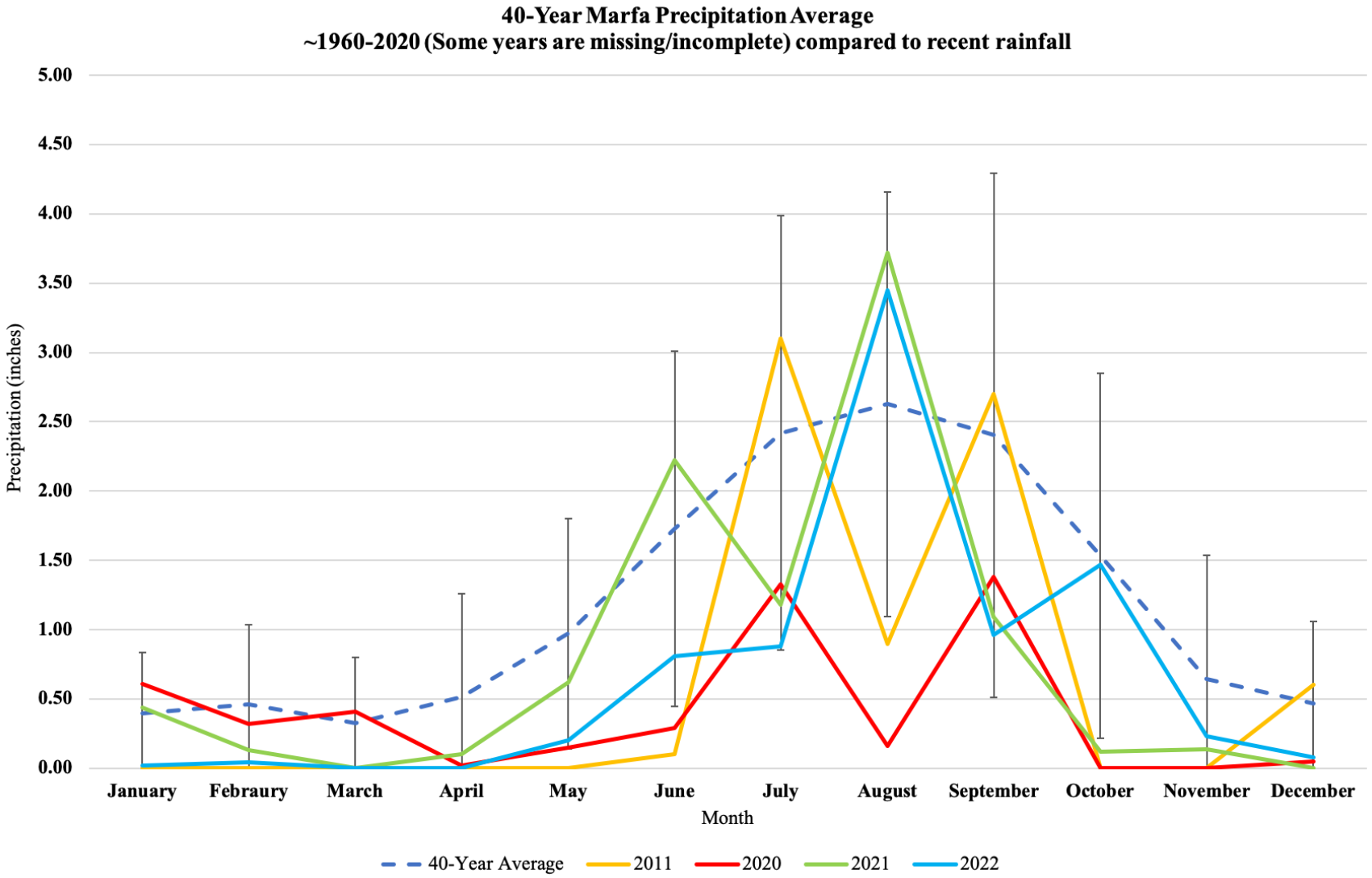

Figure 19. Precipitation data for Marfa, Texas, including a 40-year average (1960-2020, dotted dark-blue line with standard deviation error bars), 2011 (yellow), 2020 (red), 2021 (green), 2022 (light-blue) total. Recent years use airport rainfall records.

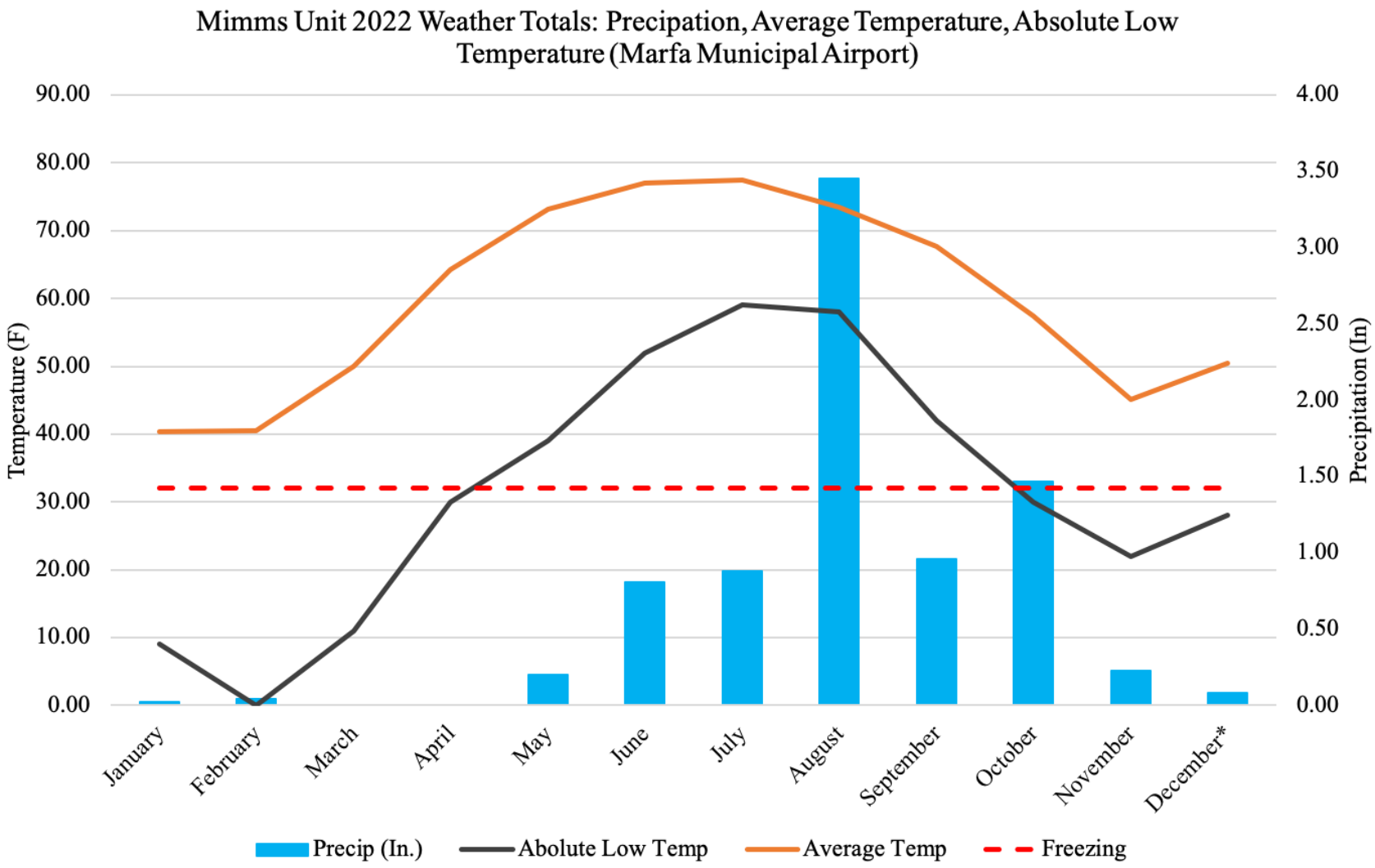

Figure 20. Weather summary for Mimms Unit, Marfa, Texas, 2022. Precipitation totals are show in blue bars with inch measurements on right axis, average temperatures are shown on the orange line with degrees Fahrenheit on left axis. Absolute temperature is marked in black with the freeze threshold marked in red.

Biological Monitoring update

Foundation staff conducted annual biological monitoring at the West Texas ranches in November 2022. Staff monitored the Mimms Unit, the George Property, and Hip-O East, which shares the Mimms Unit's western boundary and is leased by the Dixon Water Foundation and under the Foundation's grazing management. The biological monitoring process employs a method developed by Holistic Management International and is the same as the methodology used at the Foundation's North Texas ranches. The process is the same as that detailed for the Foundation's North Texas biological monitoring with the only difference being 10 categories of plants documented as nearest to each dart. These categories are specific to the West Texas ecoregion: Prairie complex, High Seral Grass, High Seral Forb, Blue & Black Grama, Mid Seral Grass, Mid Seral Forb, Introduced Grass, Sedges, Low Seral Grass, and Low Seral Forbs.

Mimms Unit- Dixon Water Foundation purchased the Mimms Unit in 2008 and began grazing it in 2009. The Mimms Unit has been monitored since 2010. The ranch succumbed to a large fire ("The Rockhouse Fire") in April 2011, and most of the ranch burned (*Figure 21*). A shared goal across all Dixon Ranches is to utilize the grazing plan to reduce the amount of bare ground on the landscape. Another goal of the Mimms Unit is to be able to compare pastures grazed in a low stock density/continuous setting to pastures grazed in a high stock density rest/rotational setting. The Foundation has 4 monitoring points across the larger portion of the ranch which encompasses the rotational grazing pastures, and 2 monitoring points in the continuously grazed pasture. Across the entirety of the ranch, bare ground has decreased while litter has increased (*Figure 22*). Data averaged for all monitoring points in each grazing regime shows a declining trend in bare ground for each management technique (*Figure 23, Figure 24*). The 2022 monitoring efforts recorded that the rotationally grazed pasture showed an average of 19% less bare ground than the continuously-grazed pasture. When all pastures are averaged, the Mimms Unit is showing a reduction in bare ground (*Figure 25*).

The ranch still seems to be in recovery stages from the 2020 drought when the Marfa Municipal Airport recorded 4.72" of rain for the year. During the monitoring process, staff documented good ground cover, though much of it was in the form of low successional, annual grasses. However, recovery from the drought seemed to be further along in the rotational pastures than in the continuous pastures. In the continuously-grazed pasture, bare ground patches displayed less colonization of low successional plants and more hard capping of soils. This may be due to the lack of impact from cattle as one benefit of multi-paddock grazing and higher stock density is a more even disturbance across the pasture, while cattle in the single, large continuously-grazed system have more ability to avoid utilizing portions of the pasture, which can lead to stagnation or decline.

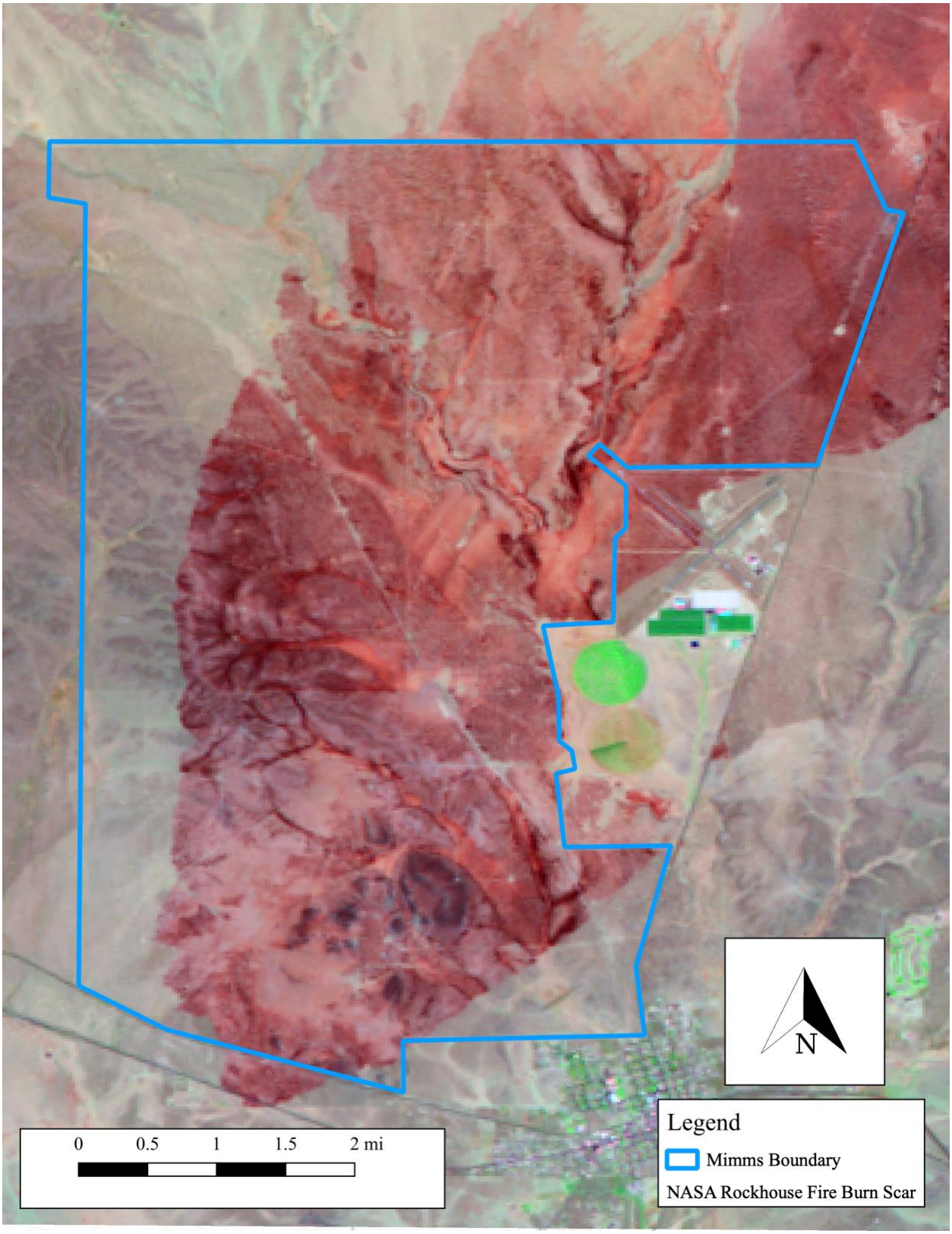

Figure 21. Rockhouse Fire (2011) burn scar on the Mimms Unit (NASA Earth Observatory image created by Jesse Allen and Robert Simmon, using Landsat data provided by the United States Geological Survey)..

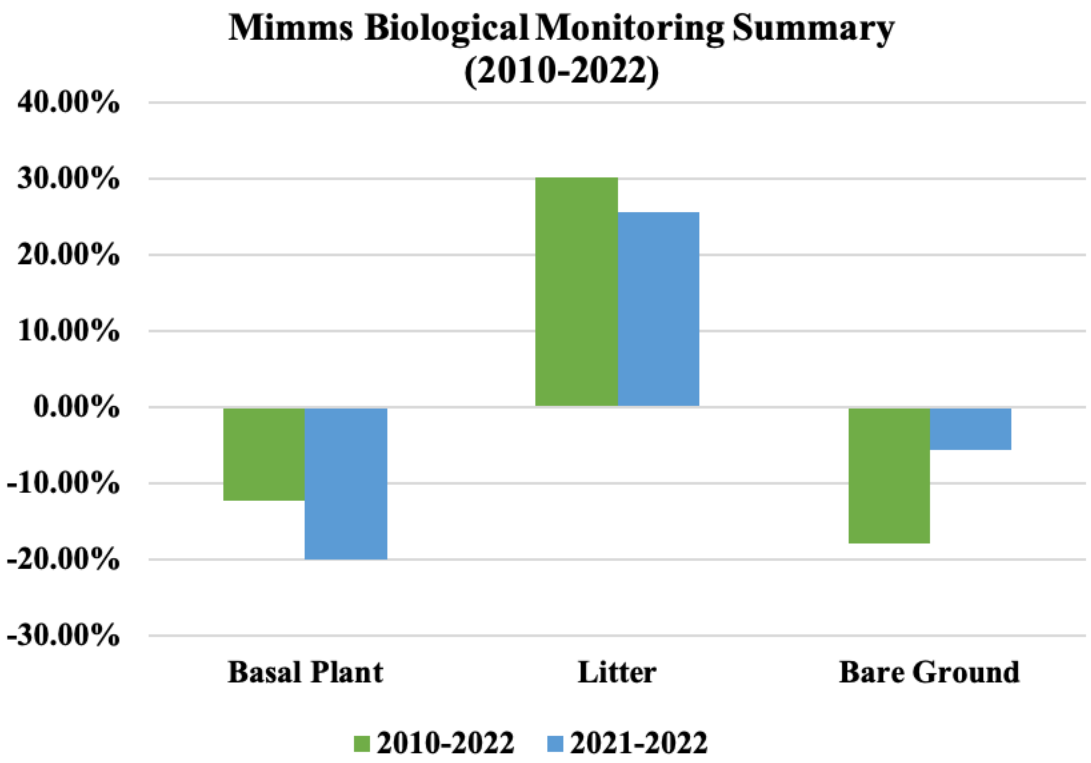

Figure 22. Percent change in ground cover types between 2010-2022 (green) and 2020-2022 (blue).

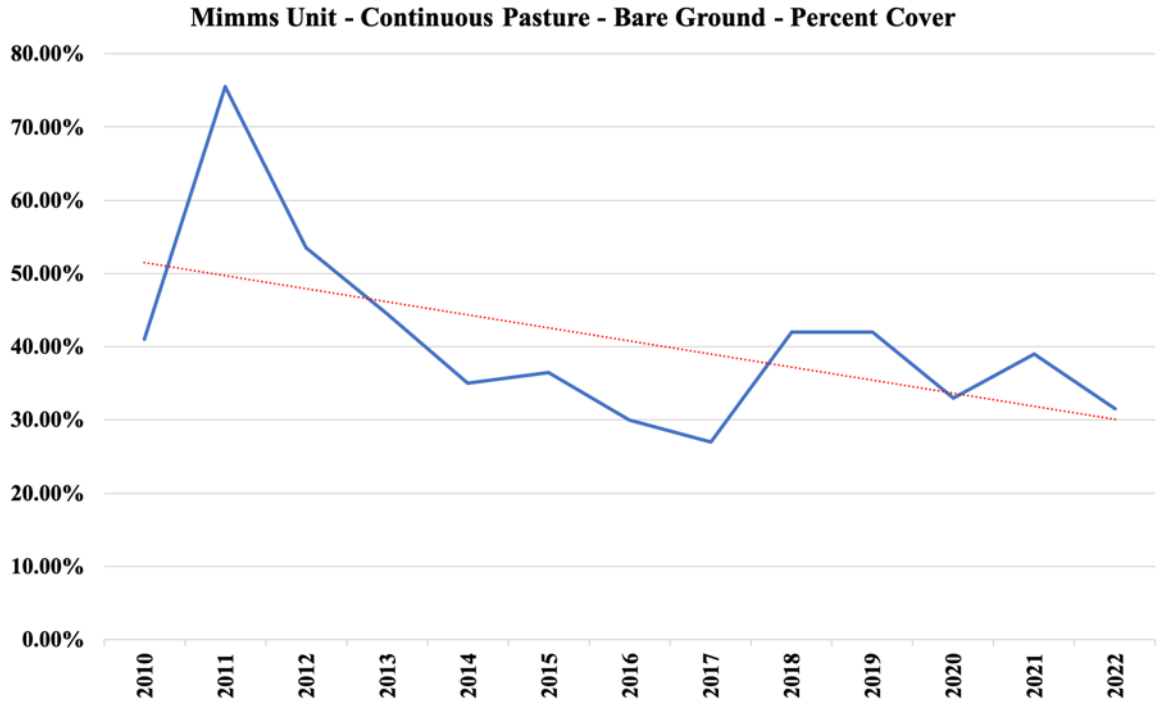

Figure 23. Mimms Unit (Low Stock Density/Continuously Grazed Pasture) - Percent bare ground 2010-2022 (blue line) and trend of change in bare ground 2010-2022 (red line)

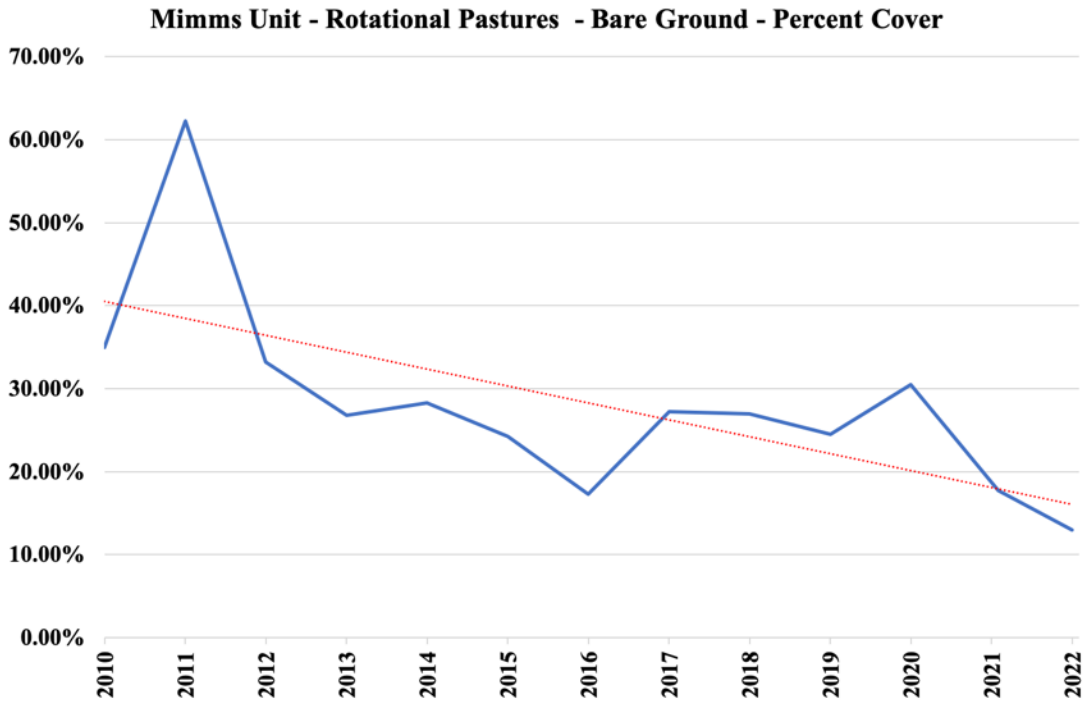

Figure 24. Mimms Unit (Rotationally Grazed Pasture) - Percent bare ground 2010-2022 (blue line) and trend of change in bare ground 2010-2022 (red line)

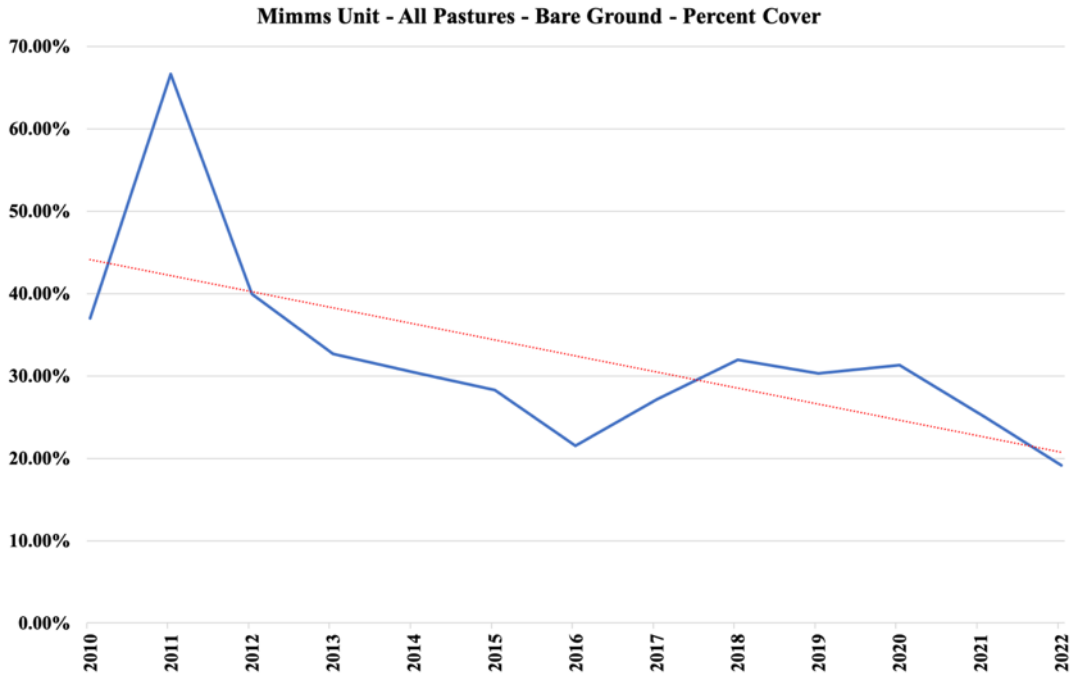

Figure 25. Mimms Unit (Average across all pastures) - Percent bare ground 2010-2022 (blue line) and trend of change in bare ground 2010-2022 (red line)

George Property – The George Property was purchased by the Foundation in 2019. The current year marks the 4th monitoring effort on the George. In 2020, 3 points were monitored, but the Foundation returned to monitoring 2 points in 2021 for the sake of efficiency in the monitoring program. When reducing the number of points on the George to 2, staff can complete the monitoring process for the Mimms and George in 1 day. In 2022, staff monitored the same two points as 2019 and 2021. With a sample size of only 4 years, it is difficult to determine any trends. An average decrease in bare ground has of -19.5% has been documented across the two monitoring points from 2019-2022 (*Table 2, Figure 26*).

Visual assessment of the George monitoring points was similar to 2021 and suggested that there is good diversity and ground cover, with some patches of bare ground that are in recovery stages. Similar to the Mimms Unit, there was an abundance of three-awns and low-successional annual grasses, but good ground cover. Bare patches at G1 appeared to be recovering. Low areas of the property, where G3 is located, catch rain and overland flow, resulting in dense vegetation with virtually no bare ground.

George Property Biological Monitoring			
Point 1			
Date	Basel Plant	Litter	Bare Ground
2019	38.00%	23.00%	39.00%
2020	32.00%	37.00%	31.00%
2021	26.00%	38.00%	36.00%
2022	21.00%	64.00%	15.00%

Point 2			
Date	Basel Plant	Litter	Bare Ground
2019	47.00%	38.00%	15.00%
2020	37.00%	54.00%	9.00%
2021	38.00%	61.00%	1.00%
2022	38.00%	62.00%	0.00%

Average of Points 1 & 2			
Date	Basel Plant	Litter	Bare Ground
2019	42.50%	30.50%	27.00%
2020	34.50%	45.50%	20.00%
2021	32.00%	49.50%	18.50%
2022	29.50%	63.00%	7.50%

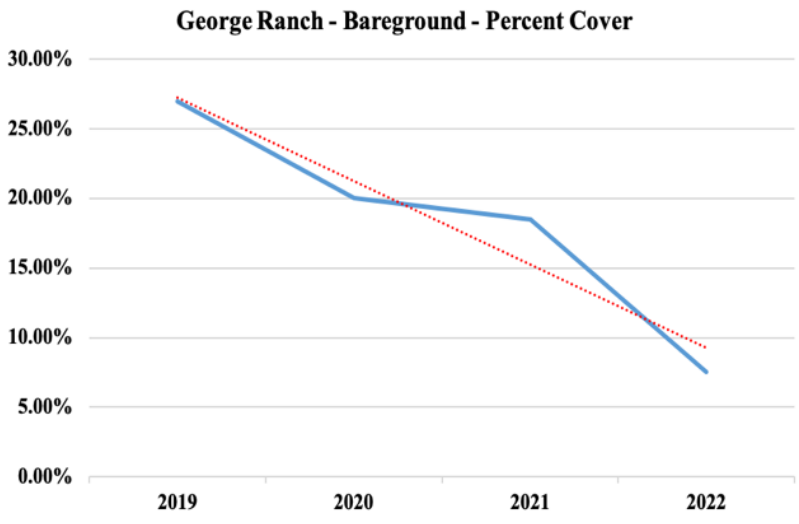

Table 2, Figure 26. Percent of each cover type for monitoring point G2 on the George Property from the initial monitoring effort in 2019 until 2022.

Hip-O East- The Hip-O East is directly west of the Mimms Unit. The ranch is 8,000 acres and is leased by the Dixon Water Foundation. Foundation grazed the Hip-O in early winter 2022.

Staff conduct biological monitoring at 2 fixed points on the Hip-O East property. The methodology is the same as that which is conducted on the Mimms Unit. Biological Monitoring of the Hip-O East began in 2015. On average, there has been a slight increasing trend in bare ground across the 2 monitoring points over the 6-year period, though 2020 recorded the highest amount of bare ground during all sampling years, most likely due to the 2020 drought. The monitoring efforts for 2021 and 2022 returned to similarly documented bare ground amounts as previous years. (*Figure 27*).

Visual assessment of the Hip-O monitoring points recorded good ground cover and diversity, though targeted conditions may not be able to be reached due to lack of ability to graze this leased property with the same management that may be applied to DWF properties. The points appear to be in recovery from the 2020 drought, with more soil capping, but more litter in the southern portion of the ranch than the northern portion, which showed less mature soil capping and good plant diversity. Both points show signs of low successional plants colonizing bare soil patches.

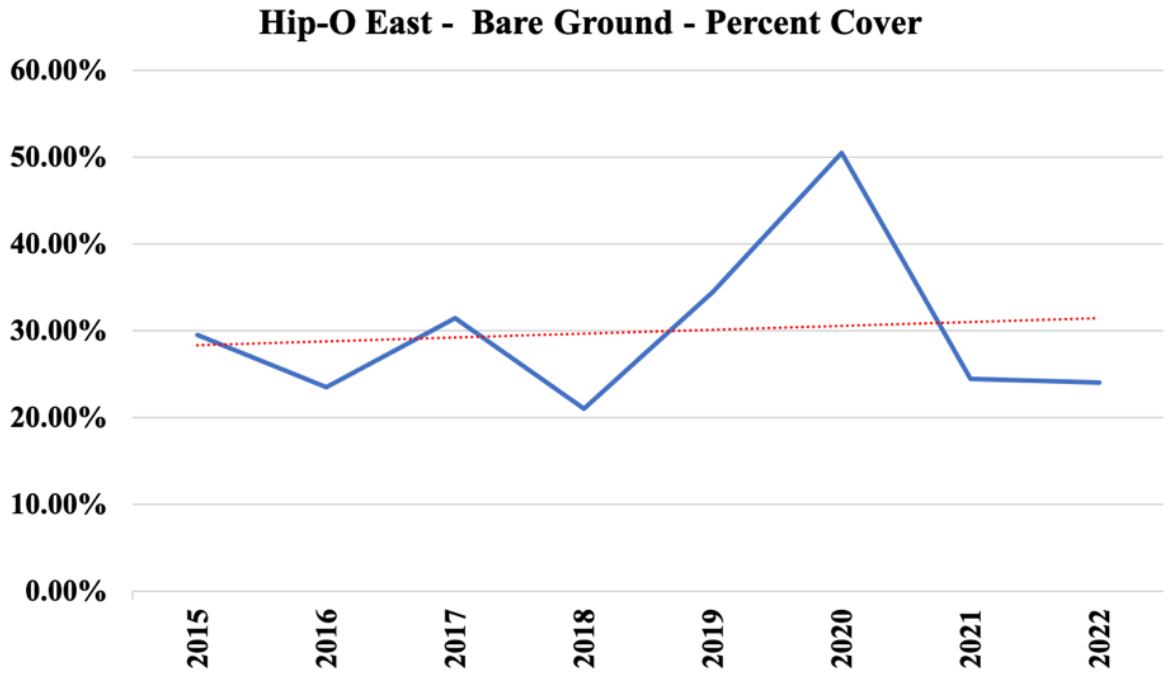

Figure 27. Hip-O East - Percent bare ground 2015-2022 (blue line) and trend of change in bare ground 2015-2022 (red line)

Additional Monitoring Efforts

George Gully Bank Erosion Monitoring: Alamito Creek starts on the northern end of the Mimms Unit, on the George Ranch. There are several small channels that work their way down-slope, eventually joining into a single channel that passes through two historic dirt tanks. Just below the tanks is a large earthen dam which a ranch road passes over. Below the dam the channel has deepened and features steep cut banks. As water sheds off surrounding land and into these deep channels, several arroyos, or steep-sided gullies, have formed. One of these arroyos is located next to George Ranch biological monitoring point 2 (photo point G3). This monitoring point sits atop soil categorized as Marfa soil, which is a high-quality soil for native mixed prairie grasses.

To monitor the rate of erosion of the cut banks along these arroyos, the Foundation set up bank erosion monitoring point east of biological monitoring point 2 in 2020. The bank erosion monitoring point is comprised of 8 rebar stakes. There were 4 stakes on the north side of the

arroyo that are spaced 20 feet apart from one another, moving east to west. Directly south of each stake at 70 feet (840 inches) are 4 more rebar stakes along the southern edge of the arroyo. To monitor any bank erosion, a 100-foot tape measure is stretched south to north from the southern stakes. The distance along these transects from the rebar stakes to any bank edge is documented in a spreadsheet. Annual measurements are be taken to document any changes in the size of the gully and rate of bank erosion. Several rebar stakes were lost in the flood events as banks toppled.

Previous reports have document substantial soil loss due to flooding and sheet flow, primarily in 2021 following the 2020 drought.

Monitoring efforts in 2022 recorded similar dimensions to the gully as were recorded in 2021 (*Figure 28 and Figure 29*). Most of the soil loss appears to have been minimal and contained to the loss of some remnants of previously-collapse banks (*Figure 30 and Figure 31*). Staff will continue annual monitoring efforts and will discuss any potential mitigation techniques. The Foundation did fence the riparian corridor in 2021, which should help reduce some erosion caused by water gathering in cattle trails leading into the creek bed.

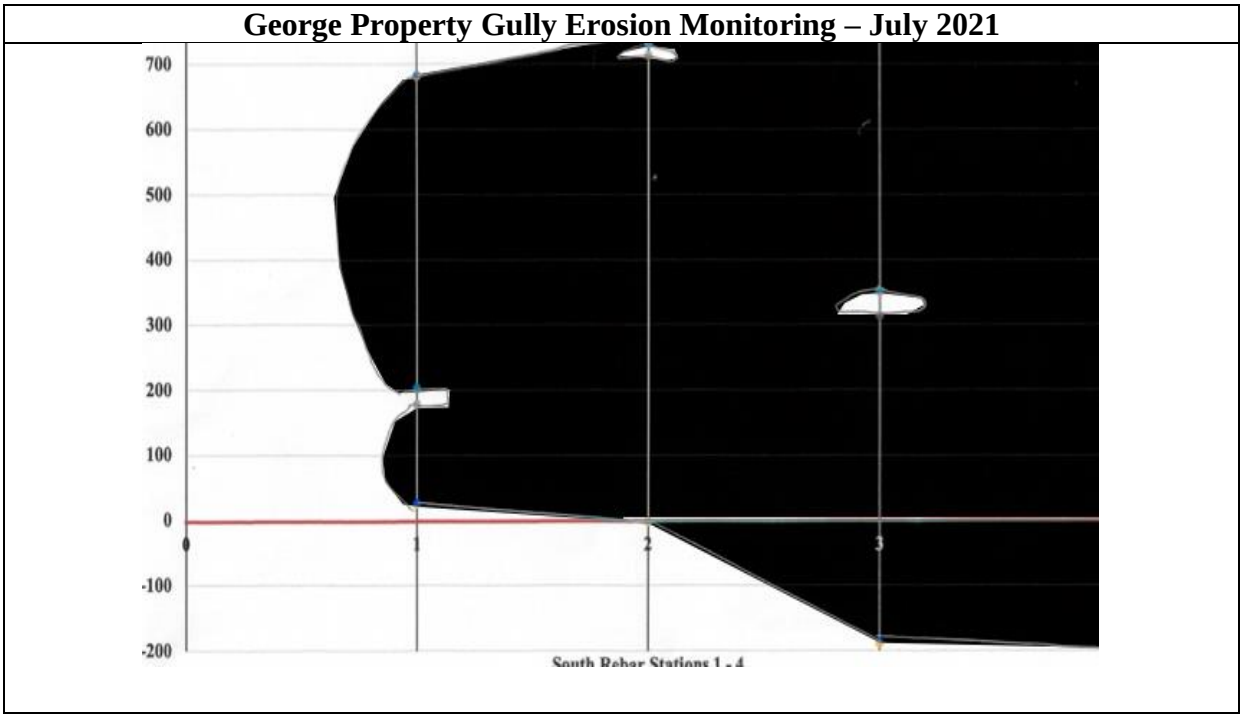

Figure 28. Estimation of George Gully shape, bird's eye view, June 2020 based on erosion station measurements. The white spaces represent the upper level grasslands, while the black spaces represent collapsed areas.

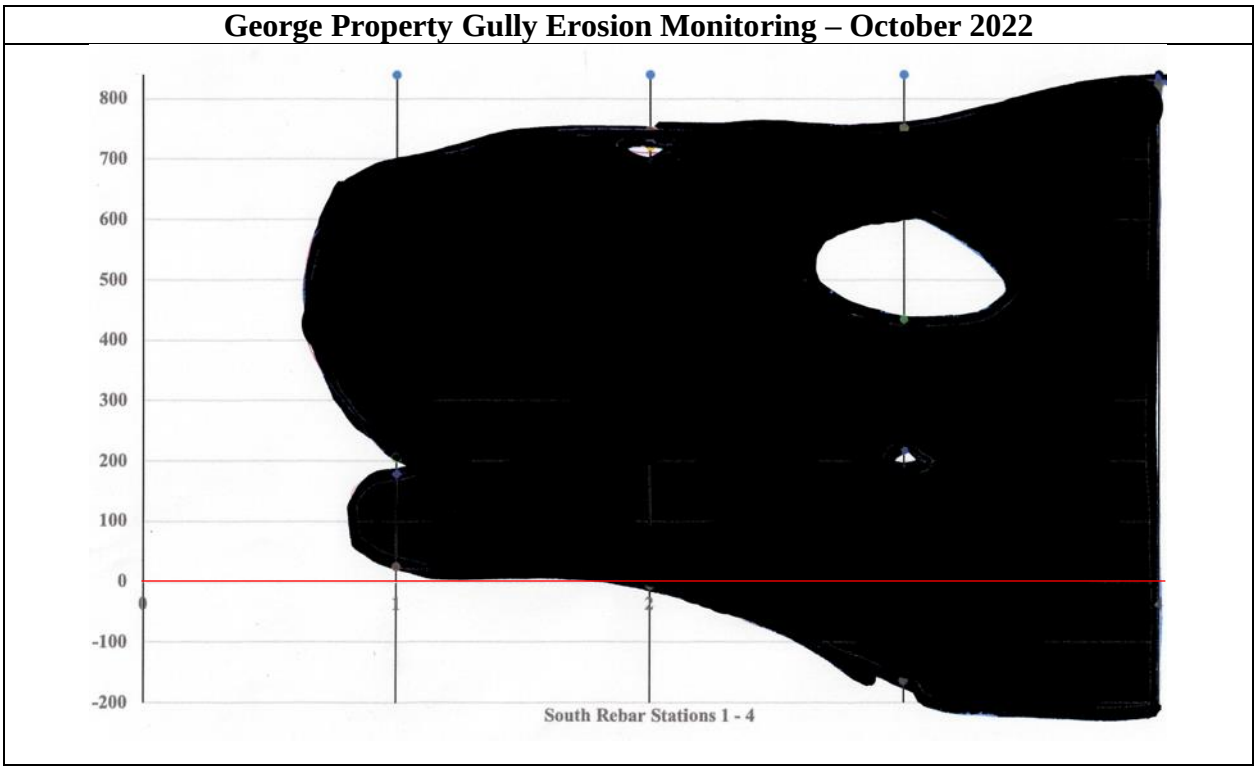

Figure 29. Estimation of George Gully shape, bird's eye view, July 2021 based on erosion station measurements. The white spaces represent the upland grasslands, while the black spaces represent collapsed areas.

Figure 30. Facing east towards George Ranch arroyo/gully as it looked in October, 2021. Photo by Philip Boyd)

Figure 31. Facing east towards George Ranch arroyo/gully as it looked in October, 2022. Photo by Philip Boyd)

Alamito Creek Preserve Monitoring

Trail Camera Monitoring

The Foundation continues to use trail cameras to monitor wildlife and flood activity at the Preserve. Notable wildlife observations in 2022 were the appearance of a mountain lion in May (*Figure 32*), July, and August. Zone-tailed hawks returned to the Preserve for their annual stay during breeding season (*Figure 33*). Additionally, the primary pool at the trail camera site has been consistently holding water for several months and is connected both upstream and downstream to a couple of other pools through a steady trickle of overland creek water (*Figure 34 and Figure 35*). This is the most persistent and substantial flow observed in the creek for several years. Previous groundwater research, documented in the 2021 report, suggested that these small pools are spring fed and connected to a shallow riparian groundwater source that shares characteristics of water associate with more recent precipitation events, as opposed to deeper ancient aquifers. Based on this assumption, it could be that precipitation totals in 2021 and 2022 were enough to replenish some of this ground water body and elevate it enough to turn seeps into overland flowing springs. A second camera was added aimed upstream at the same location as the camera facing downstream to catch two angles of the same stretch of creek bed. One of the pools is hosting yet-to-be-identified fish.

Figure 32. A mountain lion is captured by game cameras walking along Alamito Creek and stopping at a small spring (lower photo) May, 2022.

Figure 33. The first trail camera photos of Alamito Creek Preserve zone-tailed hawks returning to the Preserve for their breeding season were March 25, 2022 (upstream camera, top) and March 30, 2022 (downstream camera, bottom, with gray hawk))

Figure 34. Comparison photos showing the contrast in amount of consistent water in the creek, late December 2021 (top) and late December 2022 (bottom) on the Foundation's Alamito Creek Preserve downstream-facing trail camera.

Figure 35. Upstream-facing trail camera shows overland flow connecting upstream pools to downstream pool. Water has been consistently trickling along this stretch of creek since late summer 2022.

Groundwater Monitoring

Steel pipes driven into the bedrock in the Alamito Creek channel were marked (29°54'44.49"N, 104° 0'25.30"W) in summer 2020. One pipe is topped with a cap which can be removed so that a measuring stick can be dropped into the pipe. A measuring stick can reach 49" into the ground before hitting a solid surface. The tape can be extracted and observed to identify how far the water surface is from the top of the well cap. In 2020 DWF set a goal to quarterly monitor of the water level in these wells, however, the increase of flood deposited gravel and sediment in the creek channel, destroying or burying the wells, making access difficult. The continued monitoring of these wells was in question due to these conditions. There were no monitoring efforts in 2022.

2022 Research Efforts

North Texas

Soil Health, Pasture Health, Ranch Profitability

Grassroots Carbon and BCarbon

Carbon Storage, Leo and Pittman Units- The North Texas DWF ranches are participating in a pilot project to provide payments to ranchers who are actively sequestering carbon in their soil. These payments are provided by corporations that are looking to offset their own carbon emissions. In accordance with a protocol and certification process developed by the BCarbon working group, Grassroots Carbon visited the Leo and Pittman Units in 2021 to collect soils samples and establish baseline carbon measurements. These measurements and management practices were then factored into modeled projections of future carbon drawdown potential for the properties. Grassroots Carbon then provides a payment and estimated future payments based on this potential, the cost of sample collection and analysis, and the market value of carbon. This project is on-going, carbon payments were provided in 2022, and samples will be taken again in 2026.

Texas AgriLife Extension

Pasture Cropping, Leo and Pittman Units- This project looks to combine pasture cropping with Adaptive Multi-Paddock grazing practices to determine if these practices could potentially increase ecosystem health and resilience, improve farm productivity and net income by improving ecosystem services and reducing farming input costs, while preventing degradation of soil and watershed function.

Evaluations will be conducted through field experiments, measurements taken through drone photography, ecosystem modeling, and economic analyses. The projected has an estimated timeline of January 2021 – December 2024 and is on-going.

Surface Water Quality and Biodiversity

University of North Texas

Leo Unit – The University of North Texas (UNT) was given a grant in 2019 to begin looking into how land management impacts vegetation, hydrology, and soil properties and how those may affect water quality and biodiversity in surface water. The 2019 grant funded the first phase of this research, involving surface water surveys, on-site water quality monitoring, and habitat and biodiversity surveys focused on the Leo Unit to establish baseline conditions and inventory.

In 2020, the lab was awarded a grant for Phase 2 of this project. Phase 2 looks at how ecosystem processes may impact conditions in communities surveyed in Phase 1, with a goal of evaluating how land management practices play a role in these processes. This project has a timeline of September 2020 – August 2022. Some updates from the UNT lab in charge of this project follow: Due to COVID, there was some personnel turnover that stalled operations, but the project was able to get back on track.

The disruptions from COVID forced the project to reboot and recruit to fill personnel needs. One undergraduate student who had done some work on the project is not pursuing a master's on this project in an increased role. A second student was hired as well. The project is making progress and, though some adjustments have been made along the way, the team is analyzing linkages between terrestrial and aquatic food webs. Additionally, the project has provided opportunities for a diverse group of 15 undergraduate students to participate.

Pollinator Biodiversity

University of North Texas

Leo and Pittman Units – In the Spring of 2021, University of North Texas faculty member Dr. Elinor Lichtenberg and her lab (*Figure 36 and Figure 37*) established a project investigating impacts of grazing practices on pollinators and the resources they require at 9 sites on the Leo and Pittman Units. Dr. Lichtenberg's lab continued their work in 2022 provided the updated pasted below:

The team included Master's students Shannon Collins and Avery Pearson, technician Laura Taylor, and UNT undergraduates Viktorya Dietrich, Isaac Eastland, Chris Graffam, Alyssa Kinman, John Linogao, Pablo Lopez, Brandon Meadows, Karla Montanez, Marie Muniz, Devin Pedraza, and Brand Richter. The team conducts insect, flower, milkweed, and vegetation cover surveys at each site during the spring, summer, and fall bloom periods, and measures plant biomass during the cool season. We document all flowering plant species that we see through an iNaturalist project (https://www.inaturalist.org/observations?project_id=lichtenberg-lab-rotational-grazing-study). Students have been identifying collected insects in the lab, and we recently took a trip to Texas A&M University to verify our identifications. To date we have documented almost 200 plant species, ~100 beetle species, ~50 fly species, ~100 bee and wasp species, and ~25 butterfly and moth species on the property! Currently, Shannon is finishing up

her project investigating soil habitat for ground-nesting bees. Avery is investigating how habitat affects plant visitation networks, and whether different types of flower visitors (bees, beetles, flies, butterflies) are differentially affected by the local habit.

Figure 36. Dr. Lichtenberg's pollinator research team poses in their lab (above, photo credit Jason Hansen) and work out in the field to collect samples (lower, photo credit Laura Taylor)

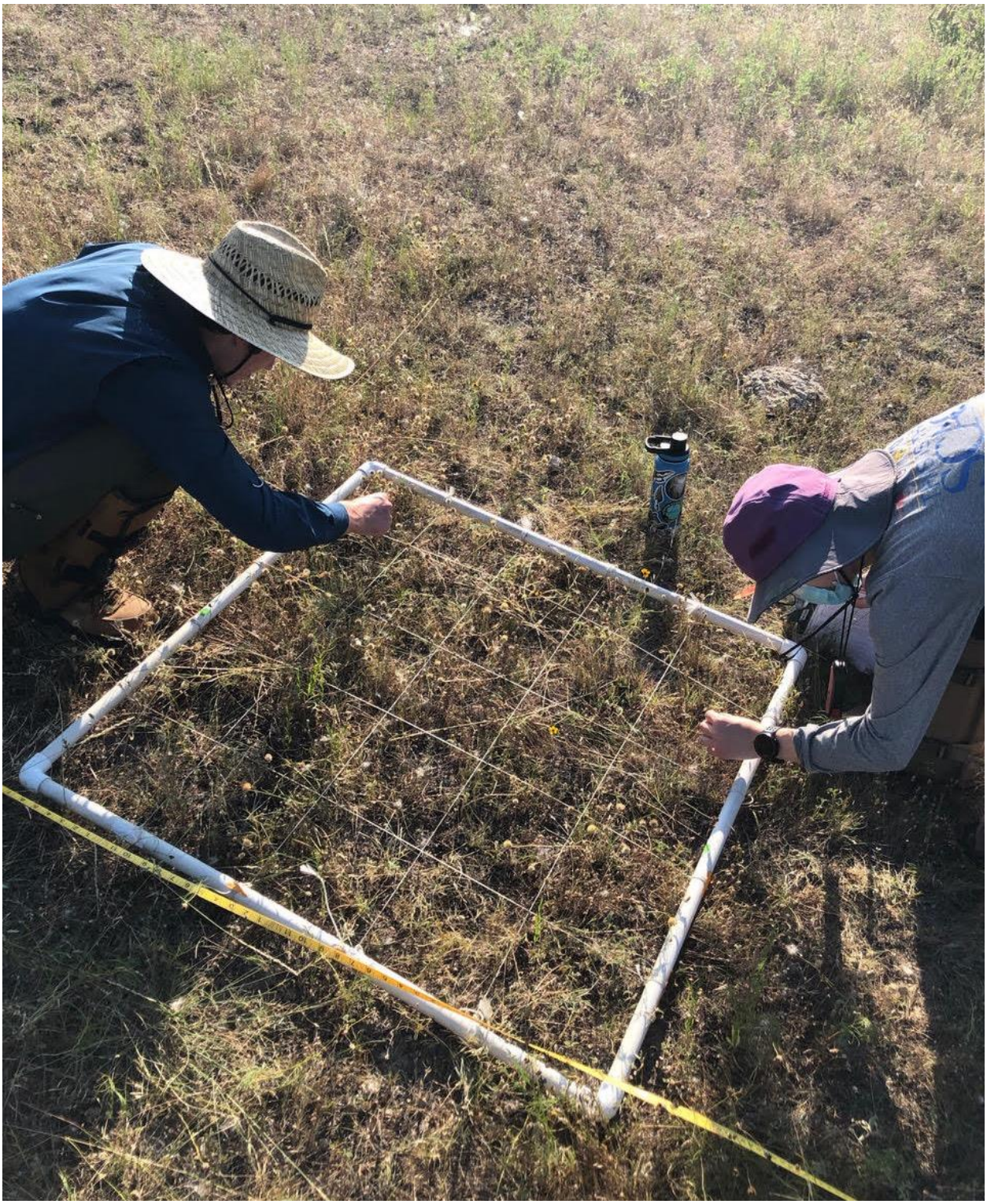

Figure 37. Dr. Lichtenberg's pollinator research team analyze a vegetation quadrat at the Leo (photo credit: Shannon Collins)

Bird Diversity

University of North Texas

Leo and Pittman Units - A graduate researcher from the University of North Texas began working in May 2022 with Audubon Texas on a project to survey 10-12 ranches that employ a range of grazing management practices. These practices include traditionally grazed and managed ranches, ranches in the process of adopting bird friendly management practices, and ranches fully enrolled an accredited in Audubon's Bird-Friendly program. The Foundation's ranches use multi-paddock grazing and are all enrolled in the Audubon certification program. The researcher will measure soil health (pH, Nitrogen/Phosperous/Potassium, and water infiltration), vegetation diversity and forage density, and bird diversity. This data will be used to investigate the degree to which management practices benefit soil quality, vegetation diversity, and bird diversity.

Plants, Pollinators, and Phenological Data Capture Techniques

Botanical Research Institute of Texas

Leo and Pittman Units – This project aims to look at both community and technology as aids in making management decision that result in more resilient working land prairies. A pilot study began on Dixon Water Foundation's ranch units in 2022 to test remote phenological cameras as a tool that can help ranchers optimize their prescribed grazing practices for the conservation of native species. These cameras are self-powered, weatherproof and upload daily images to cloud data storage via mobile networks where they can be viewed remotely on smart phones and laptops. Native and forage plant phenological data can be collected from these images, partnered with climate and community ecology data, and compiled into comprehensive, long-term datasets to elucidate patterns over time and inform real time decision making. One objective of the researchers is to make these tools as feasible and useful to managers. The researcher has constructed a data dashboard, run analysis on camera photos, calculated diversity and abundance of flowering plants and pollinators around camera sites, and is in the process of composing a report and determining the best ways to communicate their findings. This phase of the pilot project should conclude in early 2023 with next steps to be determined.

West Texas

Stock Density and Animal Impact

Dixon Water Foundation and Holistic Management International

Mimms Unit- In September 2022, Holistic Management International (HMI) hosted a "Turning Desert into Grassland in West Texas" workshop in Marfa, Texas, with field visits to the Mimms

Unit. The goals of the workshop were "for ranchers and those who want to learn how livestock grazing management strategies benefit rangeland and businesses with a focus on land literacy." (From the HMI website). The field visits incorporated a "Safe-to-Fail" experiment in a pasture adjacent to the George working pens. The "Safe-to-Fail" concept is one shared by Australian rancher Graeme Hand and is considered a "low-risk" experiment with ultra-high stock density. In the experiment, a small paddock is packed with a much higher density than the paddocks around it. The livestock are in the trial paddock for long enough to trample the vegetation and then are moved out. The resulting paddock conditions and subsequent recovery can be monitored for infiltration rates and vegetation density and composition and compared to other paddocks under the normal management regime. This trial is meant to allow the producer to learn the effects of animal impact on their property.

During the September workshop, staff moved 1,000,000 lbs./ac into a trial paddock for about 3 hours. The trial was conducted on a warm afternoon and yearling heifers and steers were used. They were kept in the working pens and then, after guests attending the workshop could view the trial area before the experiment (*Figure 38*), the yearlings were moved into the paddock. Attendees left to view other parts of the ranch before returning to the trial site where the yearlings were removed. The vegetation was sufficiently trampled, but not much was consumed and there was not much manure left behind, most likely to the stress of the new conditions and the heat of the afternoon (*Figure 39*). The trial area will be monitored over the next year (*Figure 40*).

Figure 38. Safe-to-fail trial area in the George Property, pre-treatment, September 2022, (Photo by Philip Boyd)

Figure 39. Safe-to-fail trial area in the George Property, post-treatment of 1,000,000 lbs/ac of livestock impact for 3 hours, September 2022, (Photo by Philip Boyd)

Figure 40. Safe-to-fail trial area in the George Property, 6-weeks post-treatment of 1,000,000 lbs./ac of livestock impact for 3 hours, November 2022, (Photo by Philip Boyd)

Texas Tech University

Mimms Unit- Former Mimms Unit ranch manager invented and produced some experimental ear tags that use radio frequencies and electric pulses intended to encourage cattle to remain in herds. Dixon Water Foundation supported this work financially with the purchase of a patent for the technology. The potential benefits are a reduced need in physical infrastructure to maintain animal impact desired by dense herd grazing.

In July 2022, ear tags were deployed amongst the yearling herd on the George Property and testing began with researchers from Texas Tech University. This trial will continue in 2023.

Range Inventory

Sul Ross State University

Mimms Unit- Dr. Robert Kinucan brought the range inventory class to the Mimms Unit to conduct vegetation surveys in fall 2022 (*Figure 41*). These surveys were part of an annual inventory that takes place across 35 points that include all of the grazing regimes on the ranch. For the past two sampling seasons, the class has focused on sampling half of the total inventory points. The 2022 efforts focused on the southern portion of the ranch.

Figure 41. Students from Sul Ross State University stretch a measuring tape to mark a transect for ranch inventory monitoring, Mimms Unit, October 2022 (Photo by Philip Boyd)

Grassland Bird Research

Bird Conservancy of the Rockies

Mimms Unit Surveys – The Bird Conservancy of the Rockies returned to Marfa for the winter season. The team of winter technicians utilized the Mimms Unit and Alamito Creek Preserve as training sites for survey techniques and plant ID before dispersing to their various study areas. Technicians stationed in West Texas remained for the winter and conducted surveys with plans to band grassland birds in early 2023.

Mimms Unit Motus Station – In December 2021, Bird Conservancy of the Rockies visited the Mimms Unit to install the first Motus station in the Chihuahuan Desert (*Figure 42*). The placement of the station gives researchers an opportunity to detect migrating birds that may pass within roughly 10 – 12 miles of the station.

Researchers control the level of privacy attached to their data, though all detections are uploaded to a centralized database. The entire network of Motus stations can be viewed on a map hosted on the Motus website (motus.org). The Mimms Motus station remains the only station in the Chihuahuan Desert as of late 2022.

In November and December 2022, the station recorded its first successful tag detections. There was a record of a Sprague's Pipit and a Thick-billed Longspur. Both birds were originally tagged in May and July in the norther great plains, before making their way south to the Chihuahuan Desert in the winter.

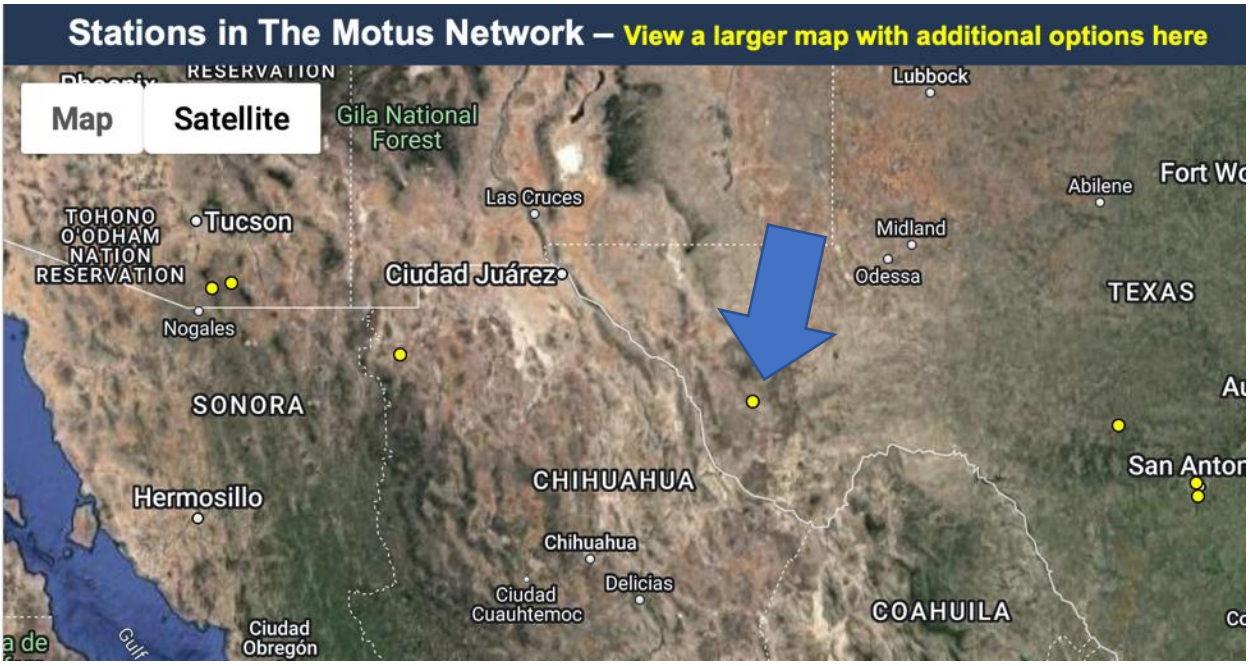

Figure 42. Screenshot from the Motus.org website of Motus station locations. The blue arrow indicates the location of the station on the Mimms Unit.

Figure 43. Bird Conservancy of the Rockies field technicians Julie Sheildcastle and Josh Lefever examine a grasshopper sparrow on the Mimms Unit, winter 2023 (Photo by Will Britton)

Sul Ross State University - Borderlands Research Institute

Mimms Unit- Emily Card conducted winter bird surveys in February 2022 as part of an on-going project to look at grassland bird response to brush removal. The Mimms Unit was not treated but was surveyed as a reference grassland habitat where population estimates are compared to treated plots on other ranches in the area. She also tested mist netting and line-transect survey techniques to determine which were more effective at detecting target species.

Card's research supported the species heterogeneity theory which suggests that species diversity increases with habitat diversity across the landscape. If grassland the conservation of grassland specialty species is a management concern, grasslands must be preserved or restored to a condition supportive of this suite of birds. Furthermore, chemical treatment of brushlands should be coupled with mechanical treatment, as even standing, dead shrubs deter grassland specialists. Her research also suggested that survey techniques should be chosen based on the characteristics of the targeted survey species. More elusive species may be better surveyed by mist netting, while line transect surveys may be more appropriate for conspicuous species. Emily Card successfully defended her thesis in winter 2022 and graduated.

Grassland Mammal Research

Sul Ross State University – Borderlands Research Institute

Pronghorn, Mimms Unit- Jacob Locke successfully defended his thesis and graduated from Sul Ross State University in 2020. The research for his thesis focused on pronghorn habitat carrying capacity. He conducted vegetation surveys, some of which occur on the Mimms, throughout several seasons. He sampled for nutritional value in available forbs, which are the primary component in pronghorn diet.

Previous research conducted by Jacob Locke looked at the differences between pronghorn nutritional content among the various grazing management areas on the Mimms Unit. Sampling was conducted in September, after the usual monsoon and growing season in the Marfa grasslands. This period was selected with the expectation that the largest forb biomass would be present at this time. Pronghorn diet is primarily comprised of forbs. Among the three grazing areas: rotationally grazed, continuously grazed, and grazing exclusion, rotationally grazed pastures produced the highest nutritional forb content in wet years while areas that excluded grazing produced the highest nutritional content in dry years. This portion of his thesis was published in 2021 to the Rangeland Ecology and Management Journal.

Graduate student Leanna "Lilly" Morin arrived in 2020 to continue researching pronghorn nutrition on the Mimms Unit across all grazing regimes. Morin's work continued through 2022. Morin's research examines pronghorn are selecting for across the nutritional content available on the ranch. Her work builds on Locke's work by sampling in January and May to expand the understanding of forb availability through seasons outside of the summer growing season. Morin plans to defend her thesis work in Spring of 2023.

Prairie Soil Water-Holding Capacity

Natural Resource Conservation Service

Mimms Unit- The Marfa Soil Survey Office along with retired NRCS Soil Surveyor and current Soils professor at Sul Ross State University, Dr. Lynn Loomis, began work that looks to utilize evaluation of physical characteristics of soil and nearby UT BEG soil moisture monitoring stations to determine water-holding capacities of the soils. The project will evaluate 6 sites adjacent to grazing exclosures that contain UT BEG weather stations and aims to provide:

1. Real-time measurements of soil moisture, soil temperature, and precipitation over a range of spatial scales.
2. A focal point for hydrologic monitoring in a vital area for Texas water resources.
3. An important first step in building a monitoring network across Texas, one of the most under-monitored areas in the country
4. Collaboration and outreach to enrich educational resources and promote conservation

The project began in winter 2022.

Carbon Sequestration

BCarbon, ExxonMobil Research and Engineering, Earth Optics

Mimms Unit- In Fall of 2022, sampling began on the Mimms Unit as part of a new 3-year research project that will measure variation in carbon sequestration rates between tallgrass, shortgrass, and Texas coastal prairie ecosystems across a variety of climate and soil conditions as well as quantify range management impacts on water and biodiversity. Other key capacity and cost issues will be studied, including new measurement technologies and regional soil carbon analysis infrastructure including data analytics, laboratories, education, and training. The first year of sampling and analysis was completed and the team has provided a report on inaugural activities and lessons learned and plans to return for sampling in September 2023.

Riparian Avian Habitat Research

Southern Sierra Research Station and Texas Parks and Wildlife Department

In 2022, biologists hiked the Alamito Creek Preserve creek bed to survey for Yellow-billed Cuckoos. Foundation staff accompanied one of the efforts and an estimated 2 nests were detected. The project is detailed in this passage from shared by the TPWD diversity biologist for Presidio County:

TPWD and 11 partnering western states have received CSWG funding to conduct a Range-wide Occupancy Assessment for the Western Yellow-billed Cuckoo. There are three primary

*objectives to this effort: 1) the creation, deployment and subsequent refinement of a western *DPS-wide Species Distribution Model; 2) model-based range-wide occupancy surveys; and 3) an assessment of Autonomous Recording Unit Methods (passive acoustic recording) as an alternative survey method.*

(*distinct population segment)

According to the US Fish and Wildlife Service website, the Eastern Yellow-billed Cuckoo has seen some declines in population, but not as severe as the Western Yellow-billed Cuckoo. The Western species has seen a major contraction in range remaining populations are mostly "found in isolated patches of riparian habitat along rivers in Arizona, California, and New Mexico." This has resulted in the species either being listed as endangered (California), as a candidate for endangered status (USFWS), or as a threatened species of conservation concern for many states.

Erosion Control/Low Tech Process-Based Restoration

Rio Grande Joint Venture

Alamito Creek Preserve- In April 2021, students from the Steamboat Mountain School in Steamboat Springs, Colorado, were visiting the Big Bend region of Texas and looking for a service project to work on during their visit. The Rio Grande Joint Venture (RGJV) had been working with DWF staff to evaluate sites at the Alamito Creek Preserve for implementation of Low-Tech Process-Based Restoration techniques within eroded sites along the creek. The Steamboat Mountain School group agreed to visit the Preserve and work for 2 days to install structures in degraded tributaries to catch sediment and slow the flow of water to rebuild degraded sites.

The students work with RGJV and DWF staff to transport exposed rocks, turned up when fences were installed, to incised tributaries. Within the tributaries, rocks were piled to create "leaky rock dams", "gully plugs", or "one rock dams". These dams are designed to serve as barriers that allow water to pass through while functionally slowing the water and allowing larger grained sediment to drop out upstream from the structure. While water is being filtered through the dams, it is also slowing the velocity of the water and reducing its erosive force, while increasing soil moisture on the upstream portion of the structure (*Figure 44*).

The group installed 12 rock structures in floodplains adjacent to Alamito Creek and 8 log jams on a side channel of Alamito Creek. Several of these structures are now buried by sediment and vegetation, showing that they are functioning as intended, though to create landscape-scale change, many more of these structures would need to be built as they currently exist in a limited number of tributaries. The principles are useful to know and could be applied to other areas such as dirt ranch roads damaged by flood events.

In winter 2022, DWF staff and RGJV staff started installing brush weirs, or beaver dam analogs, into the Matonoso Creek channel of Alamito Creek Preserve (*Figure 45*). These structures utilize the same principles as the loose rock filter dams but are made with wood materials. The structures are built by driving 6' wooden posts into the creek bed using a hydraulic post pounder

and then weaving brush trimmings into the posts (*Figure 46 and Figure 47*). A series of these structures will be built in the channel to slow flood water and increase residence time of water in the channel. Increased residence of water can create potential aquatic habitat and increase potential ground water recharge time by allowing the water more opportunity to soak into the gravel creek bed. Additionally, the reduced velocity of water decreases erosive forces that further disconnect the creek channel itself from floodplains.

Figure 44. Grass grows behind a leaky-rock dam that was built in an incised tributary at Alamtio Creek Preserve, April 2022. The structure of loose rocks was built in April 2021 and allows water to filter through while also slowing the water, dropping sediment on the upstream side of the structure. This sediment also retains moisture for longer periods of time than a channel in which water passes through quickly during a flashing event. This photo shows the lifted channel resulting from this sediment capture and the resulting vegetation that grew from these conditions in what was formerly an incised and bare channel. (Photo by Philip Boyd)

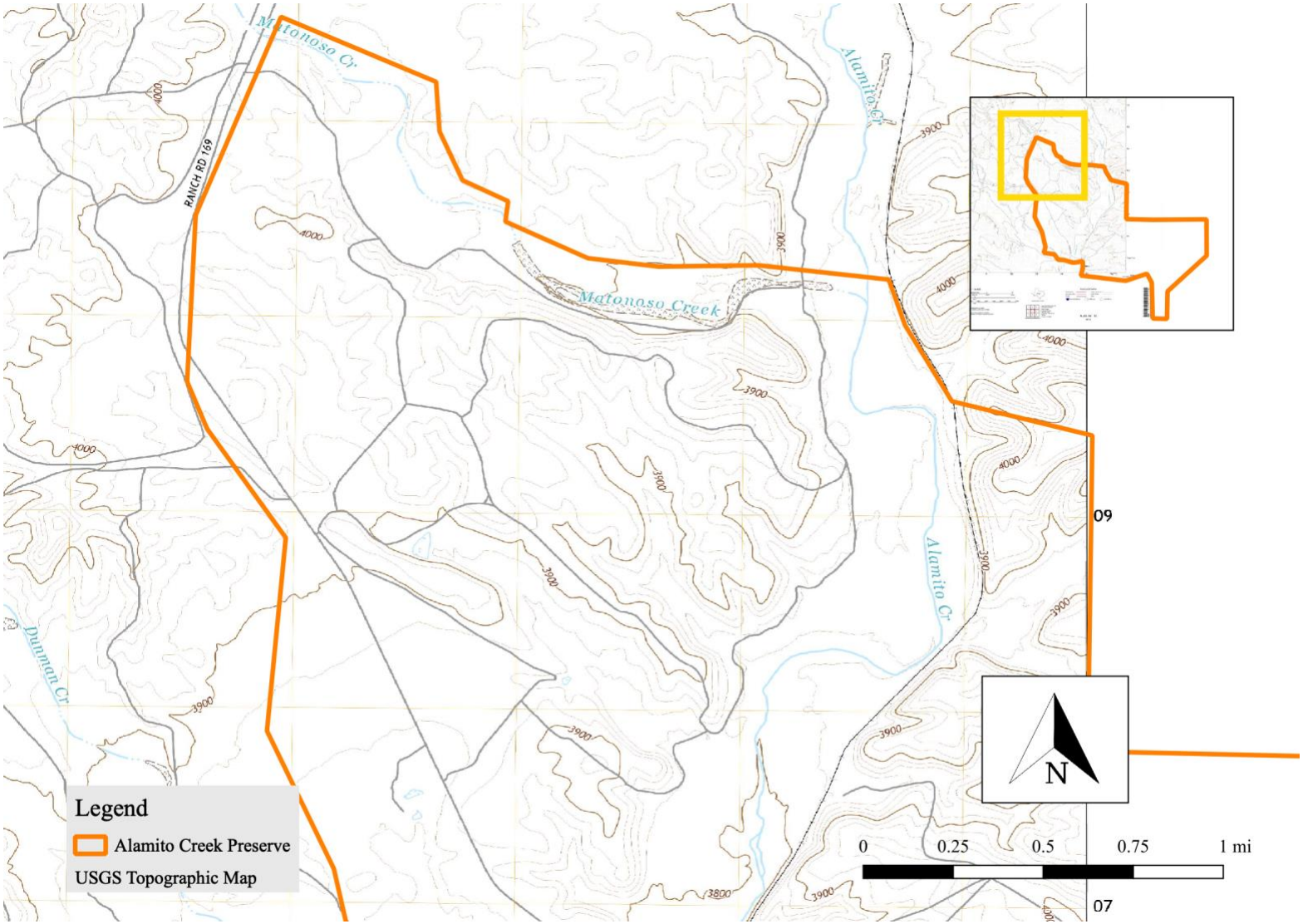

Figure 45. Northwest corner of Alamito Creek Preserve showing Matonoso Creek running from west to east, and the confluence with Alamito Creek, which runs roughly North to South. Base map layer from United States Geological Survey, 2022

Figure 46. Rio Grande Joint Venture hydrologist Jeff Bennett using a hydraulic post pounder to install brush weirs in Matonoso Creek on Alamito Creek Preserve, October 2022. (Photo by Philip Boyd)

Figure 47. A completed brush weir structure composed of 6' pine posts woven with brush trimmings, in Matanoso Creek on Alamito Creek Preserve, December 2022. (Photo by Philip Boyd)

Outreach Efforts

North Texas

Leo and Pittman Units, Josey Pavilion- In 2022 , the Foundation's North Texas ranches hosted over 560 people from 20 event field visits, meetings, and workshops including the Grassfed Exchange, Grassroots Carbon Adaptive Multi-Paddock Grazing and Brush Management Workshop, NRCS New Members Meeting, and the Texas Land Conservancy's 40th Anniversary.

West Texas

Mimms Unit – In 2022, the Foundation's Mimms Unit ranches hosted 268 visitors through 31 events, field visits, workshops, research visits, and meetings including Marfa ISD Middle School, The Autonomous University of Chihuahua, and Holistic Management International's "Turning Desert into Grassland in West Texas" workshop.

Alamito Creek Preserve – The Preserve hosted over 77 visitors through 16 events, field visits, restoration workshops, birding visits, and meetings including the Native Plant Society of Texas, Rio Grande Joint Venture, and the Bird Conservancy of the Rockies.

State-wide

In November, 2022, Philip Boyd, VP of Science and Research presented about the Foundation's work to the Society for Ecological Restoration conference in Austin, TX, held at St. Edwards University. In spring 2022, the Foundation was interviewed for Marfa Public Radio's Nature Notes series and for World Wildlife Fund's magazine for an article titled "Common Ground" about conservation and ranching.

Social Media

In the summer of 2019, the Foundation launched its first Instagram account (@dixonwaterfoundation). In 2022 there were 31 posts made to the account, covering various topics that included: grazing operations, research on Foundation ranches, grants, workshops, and wildlife, in order to stimulate engagement with the Foundation's activities and management. The account has 749 followers, an increase of 218 since the 2022 report.

Figure 48. Marfa ISD Middle School visits the Mimms Unit for a field day, November 2022, with Foundation staff, TPWD biologists, and Bird Conservancy of the Rockies technicians. (Photo by Marfa ISD)

2022 Grants

In 2022, Dixon Water Foundation awarded $378,198 in grants to 12 organizations. Recipients of 2022 Dixon Water Foundation grants were:

Audubon Texas - Conservation Ranching
Botanical Research Institute of Texas
Hill Country Alliance
Holistic Management International
Kids on the Land
Native Prairie Association of Texas
Ogallala Commons
Presidio County Underground Water Conservation District
Sand County Foundation
Texas Agricultural Land Trust
Texas Land Conservancy
The Nature Conservancy

2022 Sponsorships

In 2022, Dixon Water Foundation awarded $27,560 in event sponsorships to 13 organizations. Recipients of 2022 Dixon Water Foundation event sponsorships were:

Big Bend Ranch Rodeo
FARFA
Grassfed Exchange
Marfa Chamber of Commerce
Native Prairies Association of Texas
Natural Resource Conservation Service
Texas Land Conservation
Texas Parks and Wildlife Foundation
Texas Society for Ecological Restoration
The Devils River Conservancy
TomKat Ranch Education Foundation

Figure 49. Vice President of Ranching Operations Casey Wade conducting biological monitoring on the Mimms Unit, October 2022. (Photo by Philip Boyd)