WESTERN PLAYA WETLANDS
CIBOLA AND CATRON COUNTIES, NEW MEXICO
Technical Report

NEW MEXICO ENVIRONMENT DEPARTMENT

SURFACE WATER QUALITY BUREAU

WETLANDS PROGRAM

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Cover: SWQB Wetlands Program Project Officers, Tiffany Anders, Codie Vileno, and Dustin Nelson view and discuss playa wetland. Page 1. Playa wetland # 357. Cover photos by Maryann McGraw.

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EXECUTIVE SUMMARY

The SWQB Wetlands Program Team visited 18 playas in Cibola and Catron Counties over 3 days in June 2023 to characterize these depressions based on preliminary hydrology, soils and vegetation data. The sites were located principally on Bureau of Land Management (BLM), National Park Service (NPS), and National Forest Lands (USFS). The site visits were preliminary using a simplified version of the US Dept Army Corps of Engineers wetland delineation protocol, along with photos, soil pits, and general observations of disturbance. Of those 18 sites, four showed no wetland indicators of any type, suggesting that they are likely not wetlands as defined by the State. The remaining 14 wetlands all had at least one wetland indicator, either vegetation, soils or hydrology.

The Playa wetlands of the Eastern Plains of New Mexico are known to have shrink-swell clay soils and often support multiple concentric rings of vegetation. The Western Playas visited in June 2023 also had concentric rings of vegetation, however most playas displayed vegetation that was highly disturbed by grazing activities. All 14 of the wetlands had either surface or near surface clay layers with surface soil cracks. Four of the wetlands did not have hydric vegetation prevalence or dominance but were dominated by bare soil or annual vegetation, similar to Eastern Plains playas that were at one time inundated and encroached by annual vegetation. In addition, upland plants can occur in wetlands when the wetland is dry and persist in the seedbank when the wetland is flooded. But wetland plants do not persist in upland because their life history requirements are never met – the upland is seldom flooded for a long enough period of time. Even where wetland plants are not prevalent or dominant, it does not mean the playa is not a wetland since it provides habitat for wetland plants and their seedbank to persist (Smith 2003).

A large unanswered question is the potential differences in the mineralogy of the clays lining the bottom of playas in the volcanic regions of western New Mexico. A discussion with New Mexico NRCS staff about a recent unpublished study on playas formed in Cretaceous rocks between Las Vegas and Raton, New Mexico, showed that minerology of the clays in playa basins can have a relatively large impact on the ability of the clays to shrink and swell. Some clays in their research are more expansive, meaning they swell to a greater extent, causing larger cracks that allow for greater infiltration and soil mixing with other sediment inputs, than other clays (D. Nelson, Personal Communication).

The geology and thus the potential parent material for formation of the clays in playas in western New Mexico is very different from those of the Eastern Plains. In fact, the geology varies greatly across different geologic units in western New Mexico. This remains an open question as to whether the clay minerology of playas in volcanic regions affects the hydrodynamics of the soils in the western playas in the study area.

The preliminary data from playa wetlands of Western New Mexico indicate that there are similarities to Eastern Plans playas to apply the NMRAM for Playa Wetlands. A future study of hydrodynamics, vegetation and soils in the region will allow for determining whether metrics for the Western Playas will need to be adjusted to playa differences or whether supplemental metrics are indicated to accurately determine wetland condition.

INTRODUCTION

FIGURE 1 JUNE 2023 SITE VISIT TO PLAYAS IN VOLCANIC GEOLOGY, CATRON COUNTY, NM. NMED PHOTO.

Since 2003, the Wetlands Program of the New Mexico Environment Department's Surface Water Quality Bureau (SWQB) and its collaborators have achieved significant progress in the development of a robust program that focuses on measures that will restore and protect New Mexico wetlands. This includes a strong focus on mapping and classifying wetlands across the state along with the development and use of a rapid assessment framework to evaluate the ecological condition New Mexico's wetlands. Numerous New Mexico Rapid Assessment Methods (NMRAM) modules, including versions for Montane Riverine Wetlands, Lowland Riverine Wetlands, Spring Ecosystems, Confined Valley Riverine wetlands, and Playa Wetlands, have been created to better conserve and protect the State's valuable wetlands resources. These NMRAMs aim to be a rapid, cost-effective, and consistent evidence-based tool created to allow a small group of trained individuals the ability to assess the ecological condition of the wetlands.

The Wetlands Program continues to develop new NMRAMs, while actively revising existing NMRAM modules as needed. The NMRAM for Playa Wetlands for example, was created through comprehensive surveys of a particular type of depressional wetland, known as playas, throughout the Southern High Plains in eastern New Mexico. Playas are found in many areas across the state, including western and central New Mexico, where environmental conditions differ significantly from those in the Eastern Plains in terms of climate, geology, soils, and vegetation. To better understand if these western playas can be assessed using the current NMRAM Playa methodologies NMED has secured funding through a Clean Water Act Section 104(3)(b) Wetland Program Development Grant to assess depressional wetlands in two watersheds in Cibola and Catron Counties in New Mexico. This project seeks to gain a deeper understanding of the ecological functions, hydrological roles, and unique attributes of these volcanic playas, with the ultimate goal of assessing their suitability for evaluation using the NMRAM for Playa Wetlands.

Depressional Wetlands

Depressional wetlands are distinguished by their concave topography, which facilitates the retention of water from surrounding uplands. Formed through diverse geomorphic processes like glacial activity, subsidence, or fluvial deposition, these wetlands exhibit dynamic hydrological patterns influenced primarily by precipitation and surface water inputs, with water flowing from uplands towards the center of the depression. Due to their topographic positioning, water loss occurs mainly through intermittent or perennial drainage via outlets, evapotranspiration, gradual groundwater replenishment. Vertical fluctuations dominate hydrodynamics, often exhibiting seasonal variability (Evenson et all, 2018; Brinson 2009). Depressional wetlands encompass various ecosystems such as freshwater marshes, prairie potholes, vernal pools, and playa wetlands, each contributing uniquely to watershed-scale dynamics. These wetlands can support a high diversity of flora and fauna, adapted to these wetland environments, and often serve as critical habitat for specialized species. Furthermore, depressional wetlands provide essential ecosystem services, including water purification, flood regulation, and carbon sequestration, contributing to the overall health and functioning of landscapes.

Playa Wetlands

Playa wetlands, also known as playas or playa lakes, are subclass of depressional wetlands and are the most numerous wetlands in the Great Plains of the central United States (Figure 2), with recent estimates of as many as 75,000 (Bartuszevige et al 2012). These geographically isolated ephemeral freshwater wetlands are found at the bottom of closed basins and are fed largely by falling precipitation and runoff from the surrounding uplands, while drying through evaporation, transpiration, and infiltration. Playas are formed through a combination of wind, wave, and dissolution processes, leaving circular, ellipsoid, or teardrop shaped depressions that are often formed along geologic fracture zones and often less than two meters deep and typically between one and ten acres in size. A defining feature of playas is their clay-lined basin floor, or pan, composed of shrink-swell clay soils. These clays can form deep cracks as they dry, allowing rapid infiltration of precipitation initially, but as the soil becomes saturated, it swells, sealing the cracks, forming a nearly impermeable layer that retains water far longer than the surrounding uplands (Smith, 2003). This water holding capacity means that with sufficient precipitation, the soils can remain saturated long enough to support concentric rings of vegetation, including obligate (found in wetlands) to facultative (equally likely to be found in wetlands and non-wetlands) dominant wetlands plants.

Playas serve vital ecological and societal roles (Haukos and Smith 1994). These functions include water retention during floods, serving as the main source of recharge of the Ogallala aquifer (Zartman et al 1994, Wood 2000), supplying up to 25 percent of the annual irrigation water for crops in some New Mexico counties, and providing water for livestock (Ostercamp and Wood 1987). From an ecological standpoint, playas act as diverse oases, offering crucial habitats for a broad range of wildlife and plant species. This includes over 250 bird species, 13 amphibian species, 37 mammal species, and 124 aquatic invertebrate species (Haukos and Smith 2003). Playas are critically important regional aquatic habitat and stop over points for millions of migrating and resident birds. In New Mexico, playas have been identified by the New Mexico Department of Game and Fish (2016) as one of ten key aquatic habitats, and they provide habitat for several threatened and endangered species and species of concern in New Mexico. Furthermore, playas are acknowledged for playing a pivotal role as essential components of the habitat mosaic utilized by shorebirds during their migration between the Arctic and South America (Skagen and Knopf 1993, Davis and Smith 1998).

Alterations in land use, primarily driven by agricultural practices and urban development, have resulted in extensive losses and degradation of playa wetlands (Haukos and Smith, 1994; Hall et al., 2004). The largest threat to playas has been poor farming and grazing practices that have led to increased sedimentation. A once common practice of excavating pits in playas to increase water storage capacity for irrigation and livestock watering has impacted an estimated 70% of playas over 10 acres (Sallenave and Ganguli 2021). Historically, farmers often cropped the playa bottoms in the dry season, altering the hydrology of the playas. Additionally, intensive livestock use can result in soil erosion, sedimentation, and compaction, while also contributing to decline in the grass buffers around playas and a shift from perennial and more intact plant communities to annual species. These modifications disrupt the clay soils at the bottom of natural playas and remove grassy buffers along their perimeters, leading to increased sedimentation and erosion. Though sedimentation is a natural phenomenon, sediments accumulate in playas in agricultural settings at higher rates than those in grasslands (Johnson 2011; Luo 1994; Burris and Skagen 2013). In the Southern High Plains, up to 60% of playas do not fulfill their full suite of ecological functions (Tsai et. al 2007). This heightened sedimentation, combined with the disruption of the clay layer, hinders crack formation in the playas' bottoms, limiting water infiltration and aquifer recharge. Protecting these transient wetlands is further complicated by their predominantly private ownership, leading to a lack of consistent management strategies across playas.

While the majority of playas (>98%) in the region occur in private land, the density of these wetlands and their ecological importance has led to numerous studies, as well as a growing interest in restoration and conservation efforts, is helping to create a larger knowledge base with stakeholder and community buy-in towards the conservation of playas in the Eastern Plains. However, one only has to drive along Highway 117 south of El Malpais National Monument, Highway 60 west of Quemado, or explore the northern sections of the Gila National Forest to know that there are countless playas in West Central New Mexico as well. Furthermore, causal observation of these playas can point to a few major differences between these playas and those more well-known playas of the Eastern Plains. Firstly, playas in western New Mexico differ from those in the more agricultural Eastern Plains in that they are largely situated in rangeland seeing more uniform grazing and rangeland conservation. Secondly, a high percentage of playas in western New Mexico occur in very different geological conditions, often found in volcanic settings, and many can be seen with volcanic rocks throughout the playa basins. There is a notable lack of information about these playas, however, leaving the ecological significance and hydrological functions of these playas relatively unexplored. Volcanic soils can have distinct chemical and physical properties that may influence the hydrology and ecology of playas in unique ways. Understanding these interactions is crucial for comprehensive playa conservation and management in New Mexico.

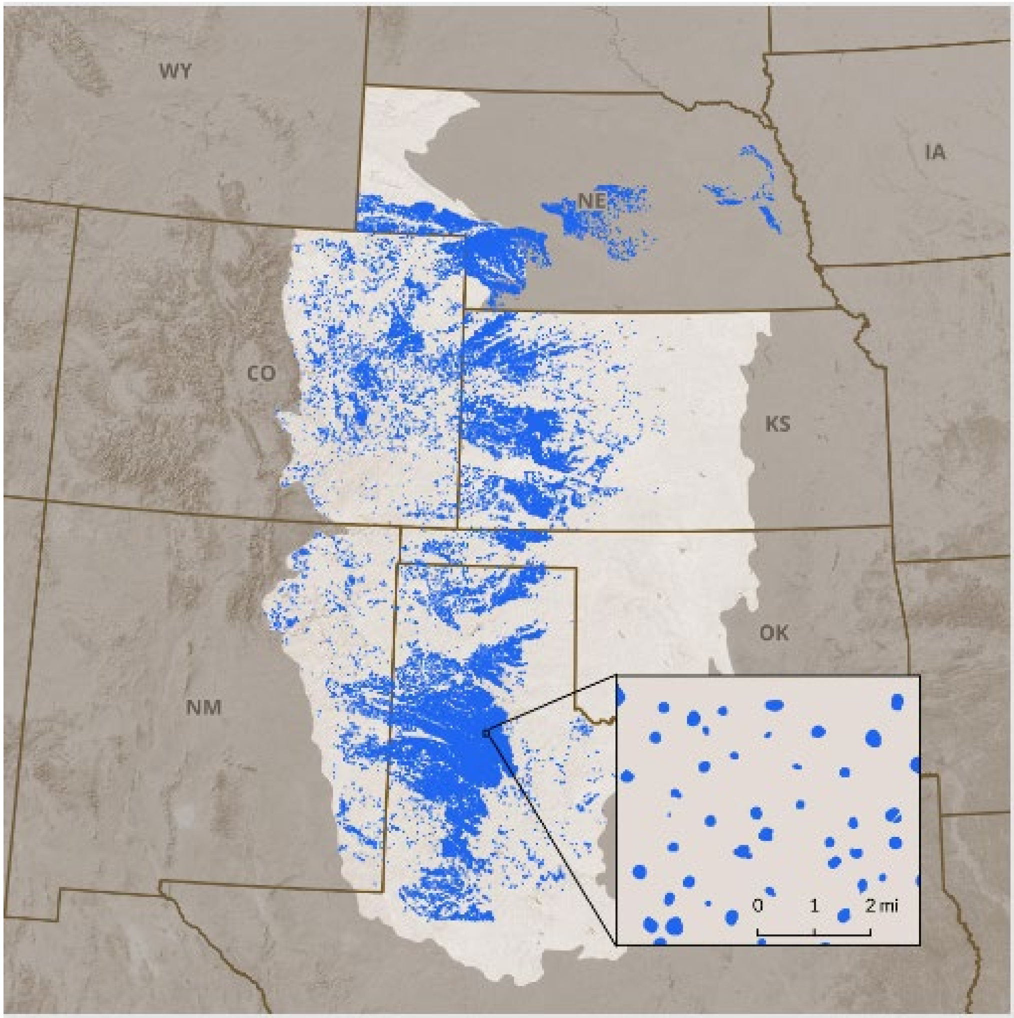


FIGURE 2 PLAYA LAKES JOINT VENTURE PROBABLE PLAYAS DATABASE. PLJV

Project Description

Depressional wetlands have been mapped across the state through NMED Wetlands Program efforts. In western New Mexico, there is a region of thousands of depressional wetlands that occur in similar volcanic terrain, yet almost no data about these wetlands exists. The goal of this project is to characterize depressional wetlands in volcanic geology in western New Mexico's Cibola and Catron Counties, across two watersheds, by working with landowners, Gila National Forest, El Malpais National Monument, State Land Office, BLM, local tribes and other stakeholders.

Secondarily, the NMED Wetlands Program seeks to characterizing these depressional wetlands, specifically the playa wetlands, to determine if the playas in this area can be accurately assessed using the New Mexico Rapid Assessment Method for Playa Wetlands that was developed for use in the playa wetlands of the Eastern Plains of New Mexico. By characterizing the hydrology, soils, and vegetation in these playas, understanding of depressional wetlands will be improved, and the differences in these wetlands and Eastern Plains wetlands will allow us to improve, adjust, and expand the range in which the New Mexico Rapid Assessment Method for Playa Wetlands can be used. Sharing the variety of useful information that this project will generate with other states, tribes, local governments, research institutions and the public, has the capacity to improve protection and restoration, and increase quality and quantity of wetlands regionally and nationwide.

This report documents the first step of the process in which NMED staff has conducted preliminary remote sensing and analysis, followed by a field visit in June 2023 of 18 depressional wetlands across various geologic units in the region. A future step will be a more in-depth characterization of a suite of these depressional wetlands including vegetation, soils, geology, hydroperiod and hydrology. This report details the initial research, remote sensing, and initial field visit by NMED Wetlands Program staff.

STUDY AREA DESCRIPTION

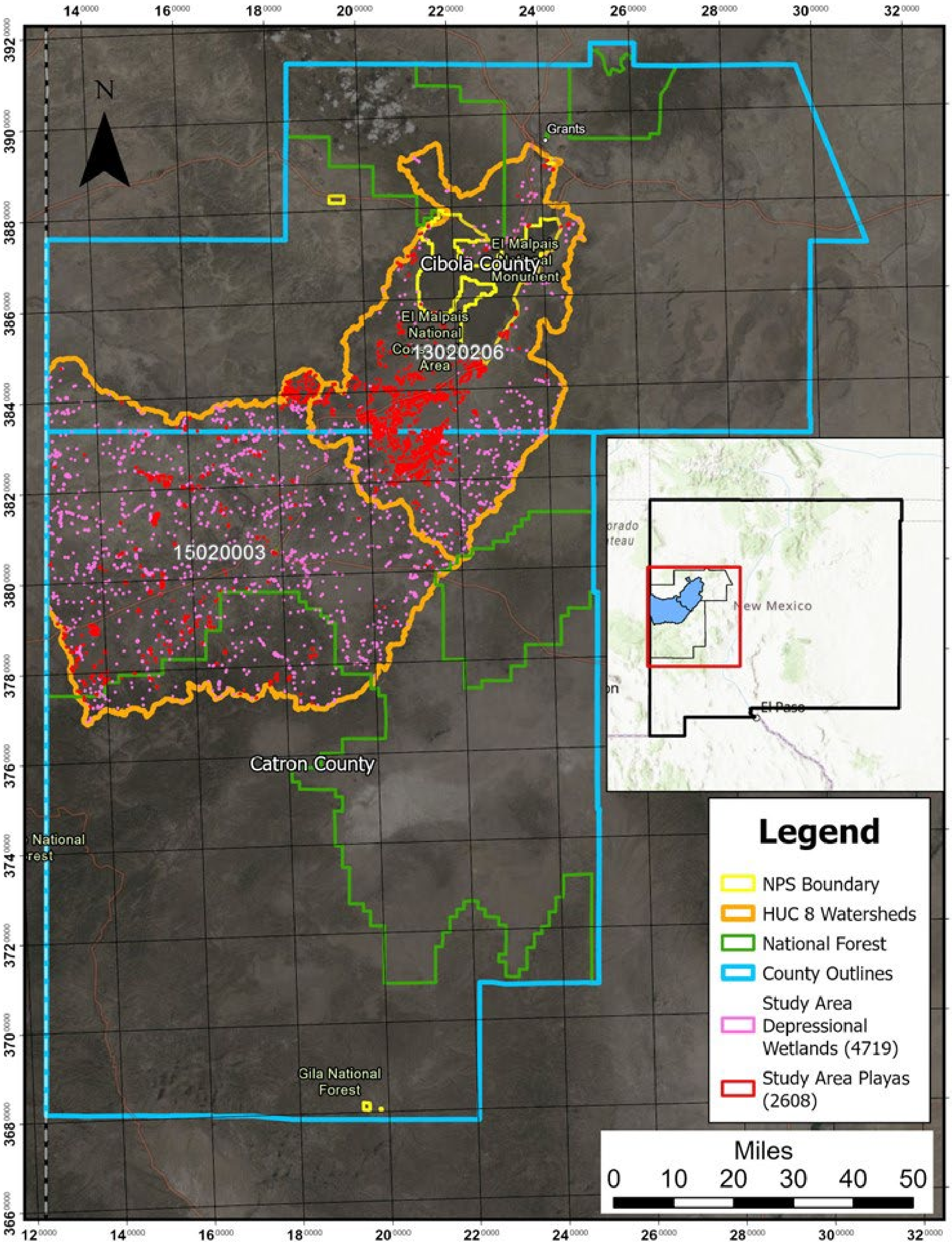


FIGURE 3 STUDY AREA IN WESTERN NEW MEXICO. HUC-8 WATERSHEDS 15020003 AND 13020206 IN CATRON AND CIBOLA COUNTIES.

Cibola and Catron counties lie in west-central New Mexico along the Arizona border (Figure 3). The two watersheds of interest, HUCs 13020206, 15020003, fall in the center of the two counties. Through mapping efforts by the Wetlands Program and partners, there is known to be approximately 4,700 depressional wetlands across the two watersheds. Of those there are a potential 2,600 playas. Much of these fall in private lands, however, these two counties contain over 800 playas on public lands, including those managed by the U.S. Forest Service (USFS), the National Park Service (NPS), the Bureau of Land Management (BLM), and state lands. For this project, sites were specifically chosen in public lands managed by the BLM and USFS.

Western NM Volcanic Geology

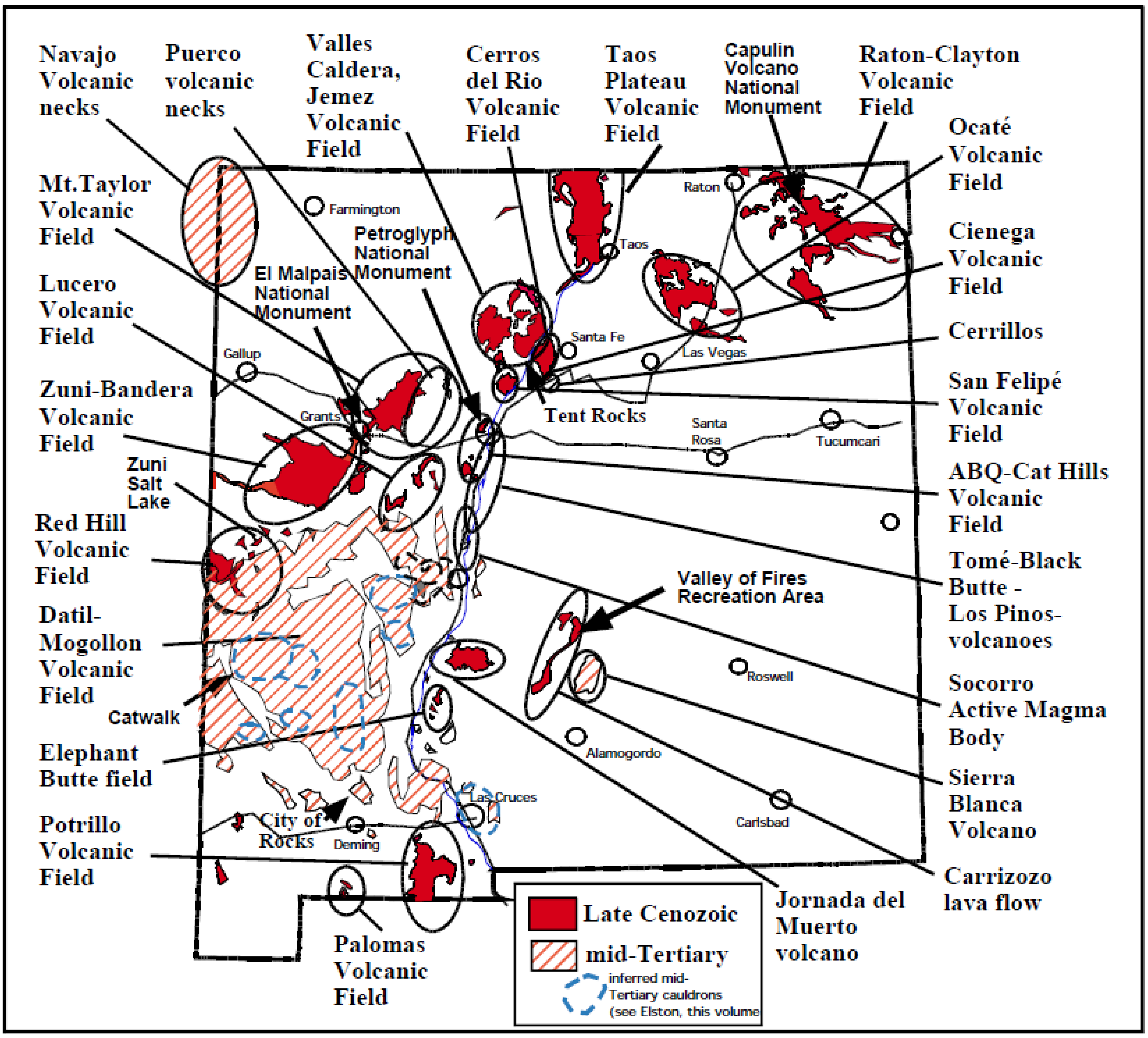


FIGURE 4 LOCATION OF PRINCIPAL VOLCANIC FIELDS AND VOLCANIC AREAS IN NEW MEXICO. FROM CRUMPLER AND AUBELE, 2001.

The dramatic landscapes of New Mexico have been largely formed by the past activity of abundant geologically recent volcanic activity. This is especially noticeable in western New Mexico and can be easily seen in the black, almost lunar landscape of young basalt lava flows and striking cinder cones dotting the landscapes of El Malpais National Monument and surrounding areas, near Grants. Many of New Mexico's most iconic landforms, such as the volcanic mesas west of Albuquerque, Mount Taylor, the Jemez Mountains, Capulin Peak, Shiprock, and Cabezon Peak are all either active volcanoes or remnants of volcanic activity (Dunbar et al 2005).

Cibola County's landscape is dominated by the volcanic geology of the Quaternary period, 2.8 million years ago (Mya) to present. This can be seen in Zuni-Bandera volcanic field present around Grants, New Mexico and protected in El Malpais National Monument. With over 100 vents, this volcanic field spans an area of 2,460 km^2 and features a sequence of mafic (dark ferromagnetic minerals) lava flows and cinder cones erupted over the past 0.7 million years. Some areas have combined flow thicknesses of up to 145 meters. Much of the volcanic rock in the area is either basalt, a fine grained, extruded igneous rock formed as low-viscosity lava rich in magnesium and iron, rapidly cooled (Le Bas and Streckeison 1991) or andesites, course-grained igneous rock that has silicate levels between the silica-poor basalt and high silicate rhyolite (Streckeisen 1978). The landscape of El Malpais is comprised mainly of very young basaltic lava with very little soil development and typically shallow soils (KellerLynn 2012), while west of El Malpais, the area is dominated by older basalt to andesitic flows from ~700,000 to 150,000 years ago.

Within Catron County lie two large Volcanic fields, the younger Red Hill – Quemado volcanic field and the Datil - Mogollon volcanic field. The Red Hill – Quemado volcanic field, near the Arizona Border is part of the Jemez Lineament, a zone of young (Quaternary period) volcanic fields reaching from central Arizona to northeastern New Mexico. Argon dating of the Red Hill volcanic field reveals that it erupted in two periods, from 7.9-5.2 Mya and from 2.5 to 0.071 Mya, with the most recent activity being the formation of the Zuni Salt Lake, approximately 86,000 years ago (Dunbar et al. 2005).

The Datil - Mogollon volcanic field, is both a much larger field, stretching nearly 40,000 sq miles, and much older. The volcanic activity began around 34mya in the Tertiary Period (66Mya to 2.6Mya). The volcanic eruptions produced vast amounts of volcanic tuffs, rock made from volcanic ash, that blanketed the region. These silica rich eruptions were accompanied by eruptions of andesites, volcanic rocks that are intermediate type between silica-poor basalt and silica-rich rhyolites (Elston 2008).

Geologic Unit Descriptions

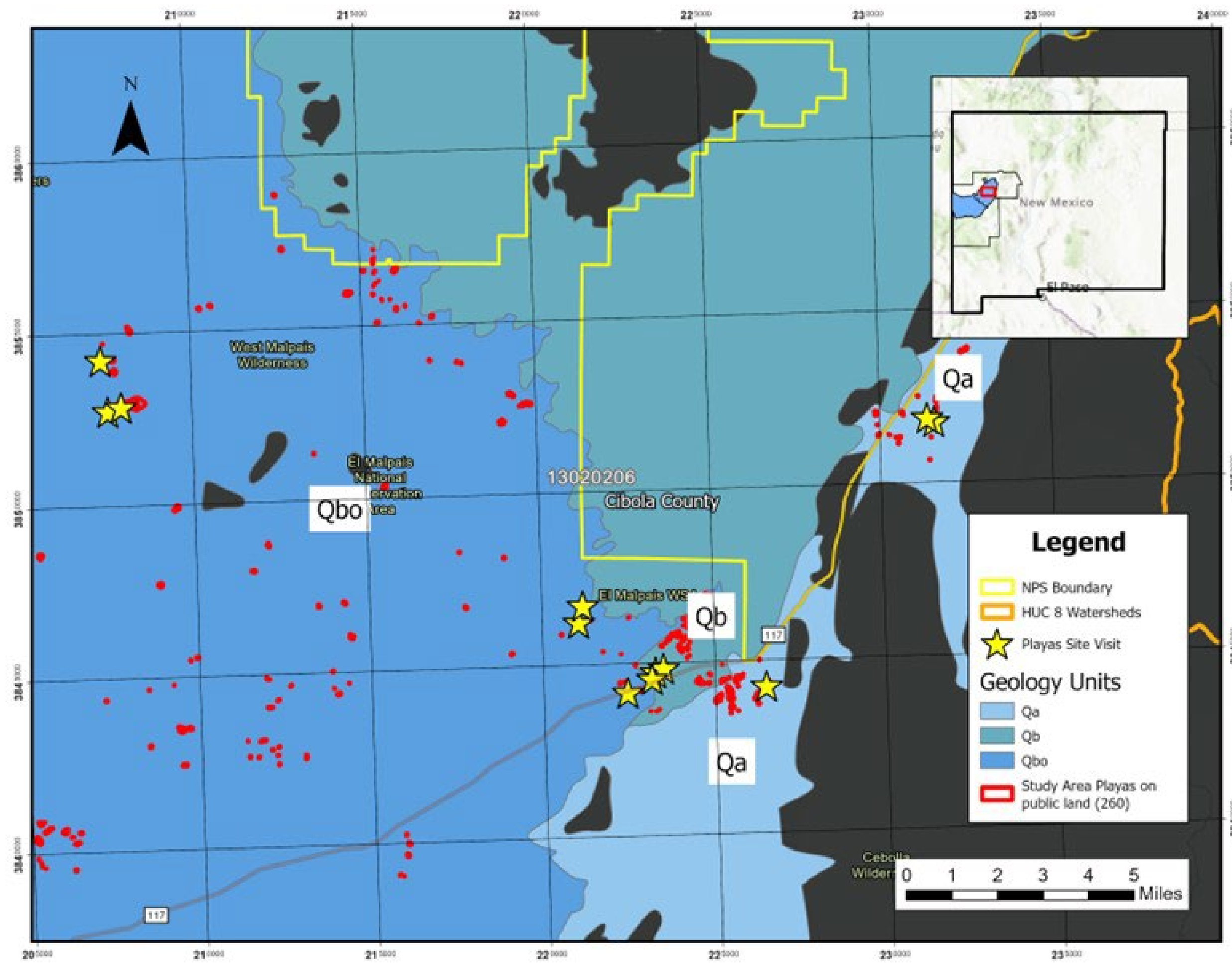


FIGURE 5 VOLCANIC GEOLOGIC UNITS IN THE CIBOLA COUNTY. QUATERNARY ALLUVIUM (QA), QUATERNARY BASALTIC OLDER (QBO), AND QUATERNARY BASALTIC (QB).

QUATERNARY ALLUVIUM – QA

FIGURE 6 LOOKING NORTH TOWARDS EL MALPAIS NATIONAL MONUMENT FROM THE SANDSTONE BLUFFS OVERLOOK, THE SANDSTONE BLUFFS CONSIST OF JURASSIC AND CRETACEOUS SANDSTONE THAT CROPS OUT ALONG THE EASTERN BORDER OF THE NATIONAL MONUMENT, DIRECTLY ADJACENT TO QUATERNARY BASALTIC FLOWS. U.S. GEOLOGICAL SURVEY IMAGE.

Quaternary Alluvium, denoted as Qa, are geologically young sedimentary deposits that have accumulated during the Quaternary Period, from 2.588 million years ago to present day. This alluvium is a mixture of gravel, sand, silt, and clay, often derived from the erosion of older rock formations produced by mechanical means, such as rockslides and erosion. The El Malpais region’s post-volcanic geological history is marked by the deposition of these sediment types, including alluvium (Qal), a mix of alluvium, colluvium, and soil (Qac), and landslide deposits (Ql). These are mostly fine-grained, stream-deposited silt and sand. A few local areas contain coarse sand or pebbles. As much as 15 m (50 ft) exposed in recent gullies. These deposits predominantly formed during a wetter period in the Pleistocene Epoch (2.6 million–11,700 years ago), followed by a transition to the current arid climate. During wetter periods, water infiltration through porous basalt and sandstones weakened underlying rock, leading to the detachment, and sliding of large blocks from mesa edges. As precipitation decreased, landslides became less frequent, resulting in reduced transportation of alluvial material. Eventually, the slides stabilized, and valleys filled with alluvium, forming expansive flat floors (Maxwell 1986).

QUATERNARY BASALT OLDER – QBO

FIGURE 7 CHAIN OF CRATERS WILDERNESS STUDY AREA WEST OF EL MALPAIS. BLM PHOTO.

The Zuni-Bandera volcanic field is a remarkable example of basaltic volcanism in New Mexico. Occurring in a transition zone between the Colorado Plateau where the earth's crust can be over 40km thick, and the much thinner Rio Grande Rift. In this region lies the Jemez lineament that trends north-northeast and has been a long-lasting tectonic feature that penetrates deep into the lithosphere, allowing the mantle-derived lavas to reach the surface over the last 700,000 years (Laughlin et al. 1993). Generally, the area has experienced three distinct pulses of activity: the first occurring between 0.7 and 0.6 million years ago, the second between 0.2 and 0.11 million years ago, and the most recent pulse within the past 50,000 years, with the most recent flows around 3,900 years old (KellerLynn 2012). The Quaternary Basalt older (Qbo) geologic units are described as basaltic to andesitic lava flows from the middle Pleistocene epoch (approximately 1.8 million years ago) to the Holocene (11,700 years ago) that includes vent deposits. In the Zuni-Bandera field the older basaltic flows (Qbo) occurred around 700,000 years ago and the more recent events (~150,000 years ago) that created the chain of craters.

Quaternary Basalt – Qb

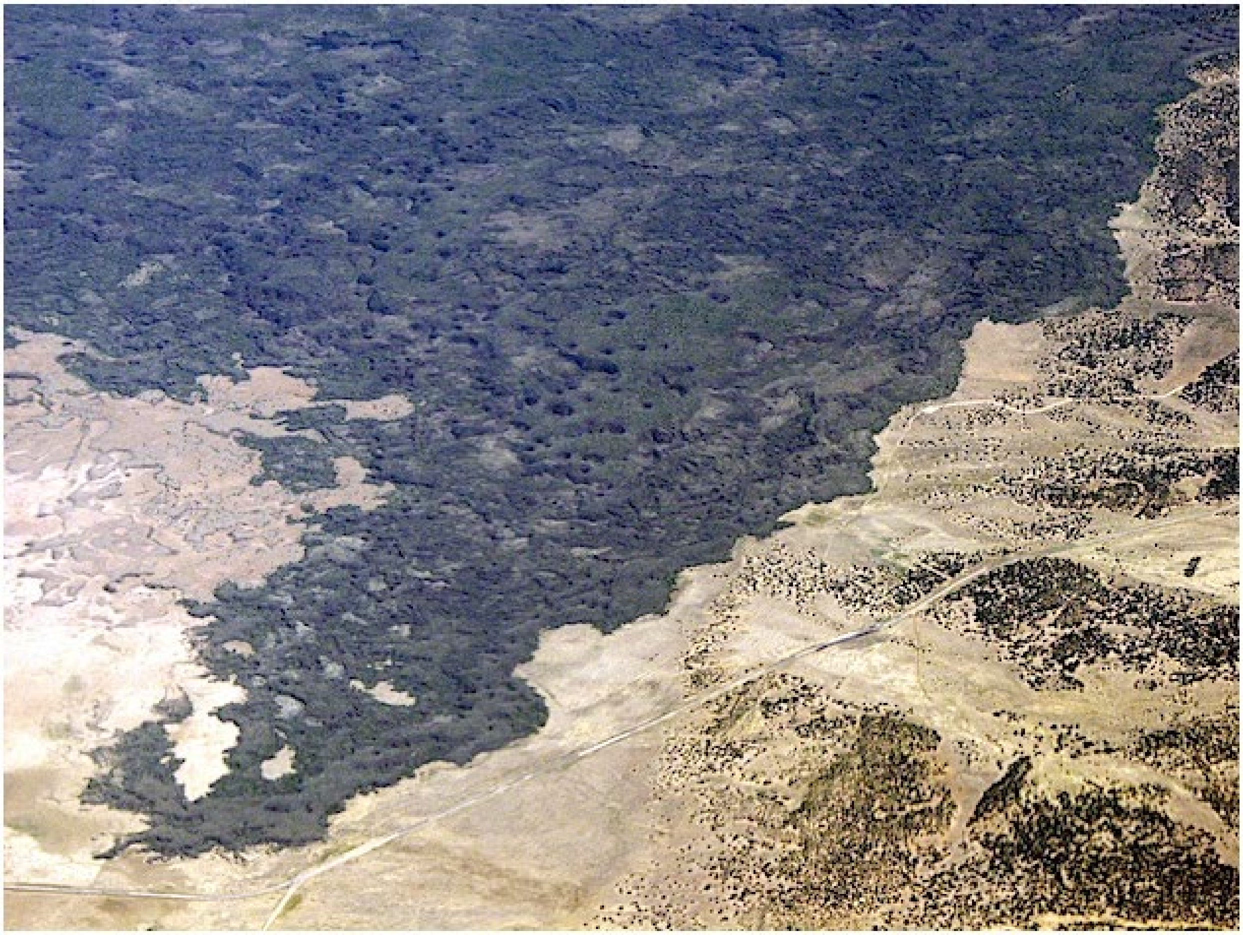


FIGURE 8 MACARTHY LAVA FLOW, A QUATERNARY BASALT (QB) GEOLOGIC UNIT, ALONG NM 117. PHOTO L. CRUMPLER 2001.

The Zuni-Bandera volcanic field contains some of the youngest basaltic volcanism in New Mexico, including the Bandera Crater flow and McCartys flow, dated at approximately 11,00 and 3,900 and years ago, respectively. The El Malpais landscape is predominantly shaped by five young basaltic lava flows: El Calderon, Twin Craters, Hoya de Cibola, Bandera, and McCartys flows (Dunbar et al. 2005). These all fall in the Quaternary Basalt (Qb) geologic unit, which are described as Basaltic to andesitic lava flows from the middle Pleistocene epoch around 126,000 years ago to the most recent flows, with flows south of Grants and west of Carrizozo mainly the more recent (NMBGMR 2003).

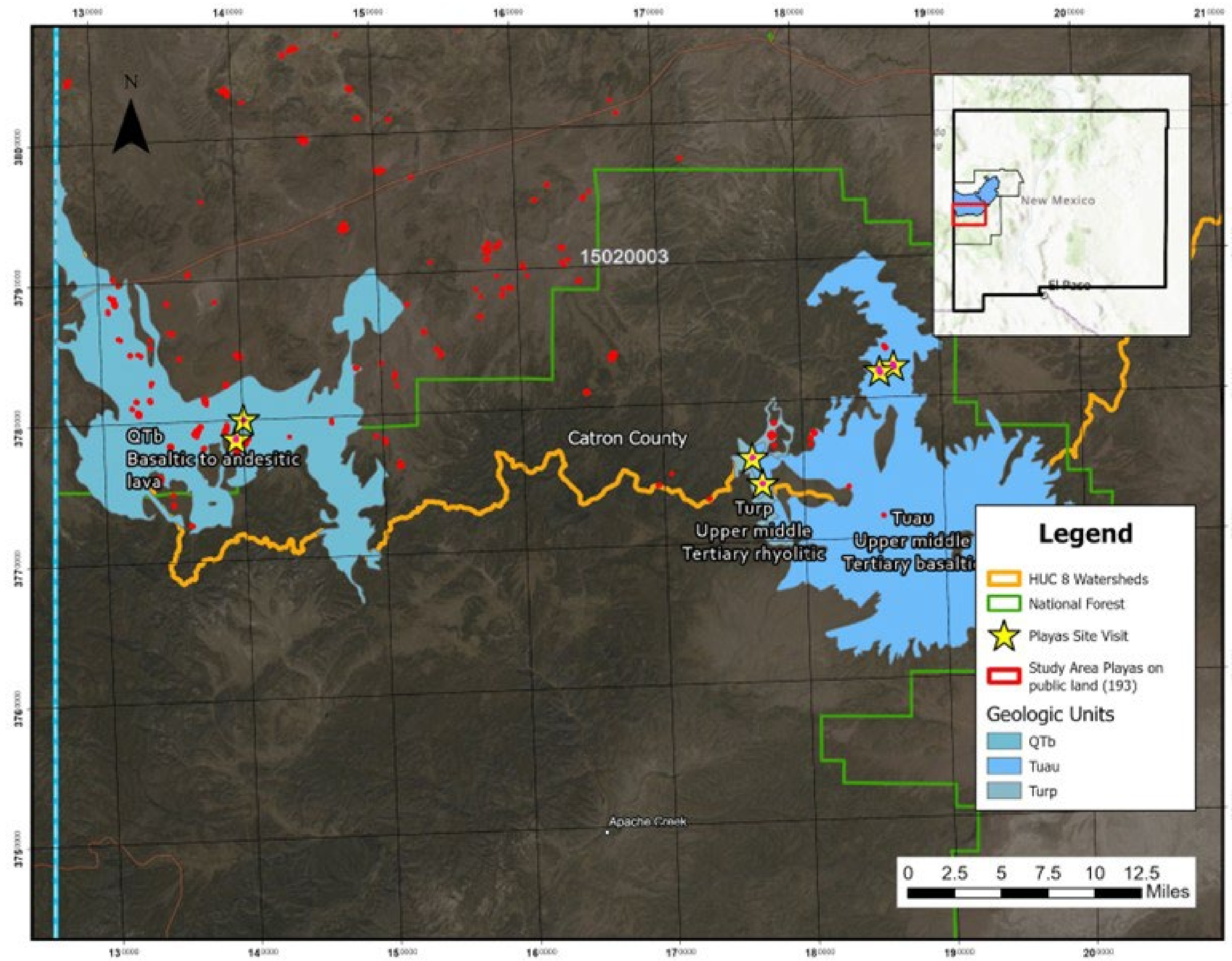


FIGURE 9 GEOLOGIC UNITS IN CIBOLA COUNTY SITES. QUATERNARY–TERTIARY BASALTIC TO ANDESITIC FLOWS (QTB), UPPER MIDDLE TERTIARY RHYOLITIC (TURP), AND UPPER MIDDLE TERTIARY BASALTIC (TUAU).

QUATERNARY–TERTIARY BASALTIC FLOWS (QTB)

FIGURE 10 RED HILL CONE JUST NORTH OF THE CATRON COUNTY SITES ALONG NM 60. PHOTO BY CRUMPLER 2001.

Located near the boundaries of the Quaternary Period Red-Hill Volcanic Field, and the much older Tertiary Period derived Datil-Mogollon Volcanic field along the New Mexico – Arizona Border is a large area of mixed Quaternary and Tertiary basaltic lava flows. The New Mexico 500K Geologic Map (NMBGMR 2003) describes this geologic unit as "Basaltic to andesitic lava flows (upper Pleistocene to lower Pliocene)— Includes minor vent deposits." Willard (1959) provides more detail, describing this area as having dark-colored basaltic lava, with some areas being young enough to still show some volcanic landforms with little erosion, though aged between the Middle Pliocene and the Holocene.

UPPER MIDDLE TERTIARY BASALTIC – TUAU

West and south of the Red-Hill Volcanic Field lies the much older Datil-Mogollon Volcanic field. This field includes older volcanoes and volcanic rock that is greater than 5 million years old. This includes the Upper middle Tertiary basaltic andesites and andesites (Tuau) geologic unit of the Mogollon Group (lower Miocene and uppermost Oligocene, 22–26 million years ago), that lies on the norther end of the Gila national Forest. These basalts and basaltic andesites range from dark to medium gray; they are for the most part extremely fine grained and course. Flows of these can be seen across many places in Catron County but never formed a contiguous area, rather they erupted from geographically isolated volcanic centers (Willard 1959).

UPPER MIDDLE TERTIARY RHYOLITIC - TURP

Generally formed in the latter portion of the middle part of the Tertiary period, roughly from around 15 to 11 million years ago, the Upper middle Tertiary rhyolitic geologic unit consists of ash-flow tuffs, or relatively soft, porous rock typically formed by compactions and cementation of greater than 75 percent of volcanic ash. These units represent the deposition and solidification of rhyolitic lava flows, volcanic ash, and pyroclastic materials in the region. The rhyolite tuff in the area is composed largely of light-colored, pink to light gray, containing both pumice and crystal tuffs often welded together. In the region, the rhyolite beds are best seen in the Gallinas and Datil Mountains, where it may be as much as 2,000 feet thick, while in the east and west of these mountains, it can much thinner (Willard 1959).

VOLCANIC SOILS

It is largely believed that clay soils that line playa bottoms are a result of wind action. Soils formed from volcanic parent materials could have an impact on the minerology of the clays in playas in the volcanic regions. For example, volcanic activity near El Malpais is very recent, geologically, and these parent materials likely have not had enough time to break down and thus, may not contribute greatly to playas. Further west in older volcanic regions, this may not be the case, as the volcanic activity can be millions of years older and the minerology of the clays in those playas may be different.

One large unanswered question is the potential differences in the mineralogy of the clays lining the bottom of playas in the volcanic regions of western New Mexico. A discussion with New Mexico NRCS staff about a recent unpublished study on playas formed in Cretaceous rocks between Las Vegas, New Mexico and Raton showed that minerology of the clays in playa basins can have a relatively large impact on the ability of the clays to shrink and swell. Some clays in their research are more expansive, meaning they swell to a greater extent, causing larger cracks that allow for greater infiltration and soil mixing with other sediment inputs, than other clays (D. Nelson, Personal Communication).

The geology and thus the potential parent material for formation of the clays in playas in western New Mexico is very different from those of the Eastern Plains. In fact, geology varies greatly across different geologic units in western New Mexico. This is wholly unstudied in this region and remains an open question as to whether the clay minerology of playas in volcanic regions affects the hydrodynamics of the soils in the western playas.

CLIMACTIC FEATURES

Both the Cibola County and Catron County sites have an arid climate, with rainfall occurring during the summer months with the Cibola County sites having an average of 14” of precipitation, with 25” of snowfall and 169 frost free days. The Catron County region gets an average of 12” of precipitation, 28” inches of snowfall and has around 152 frost free days. One note for the Catron County locations is that the weather stations are all at approximately 7,000ft elevation or lower, while the sites are above 8,000ft.

General Climate data Cibola County area

TABLE 1 GENERAL CLIMATE DATA CIBOLA REGION

	Minimum	Maximum
Frost-free period (days)	157	183
Mean annual precipitation (inches)	10.23	14.13

TABLE 2 MONTHLY CLIMATE SUMMARY CIBOLA REGION

Month	Average Precipitation (in.)	Average Snowfall (in)	Average Minimum Temperature (F)	Average Maximum Temperature (F)
January	0.87	6.3	14.0	44.5
February	0.77	5.075	17.7	48.4
March	0.83	3.95	22.6	55.1
April	0.58	1.25	27.9	64.1
May	0.49	0.2	35.3	73.6
June	0.60	0	44.0	83.7
July	2.50	0	52.0	85.8
August	2.90	0	50.4	82.6
September	1.76	0	43.2	77.2
October	1.24	0.275	31.9	67.1
November	0.70	2.375	21.6	54.6
December	1.00	5.7	16.9	46.0
Annual	14.21	25.13		

General Climate information Catron County sites

TABLE 3 GENERAL CLIMATE DATA CATRON REGION

	Minimum	Maximum
Frost-free period (days)	131	168
Mean annual precipitation (inches)	10.85	16.5

TABLE 4 MONTHLY CLIMATE SUMMARY CATRON REGION

Month	Average Precipitation (in.)	Average Snowfall (in)	Average Minimum Temperature (F)	Average Maximum Temperature (F)
January	0.79	6.675	13.5	48.3
February	0.74	5.25	16.5	51.4
March	0.87	5.025	20.1	57.4
April	0.58	1.7	25.4	66.5
May	0.50	0.225	31.6	74.7
June	0.53	0	40.0	84.4
July	2.07	0	49.6	85.3
August	2.47	0	48.2	82.3

September	1.39	0	40.6	78.7
October	1.05	0.75	29.6	69.7
November	0.69	2.6	19.2	57.9
December	0.83	6.025	13.4	50.1
Annual	12.48	28.25		

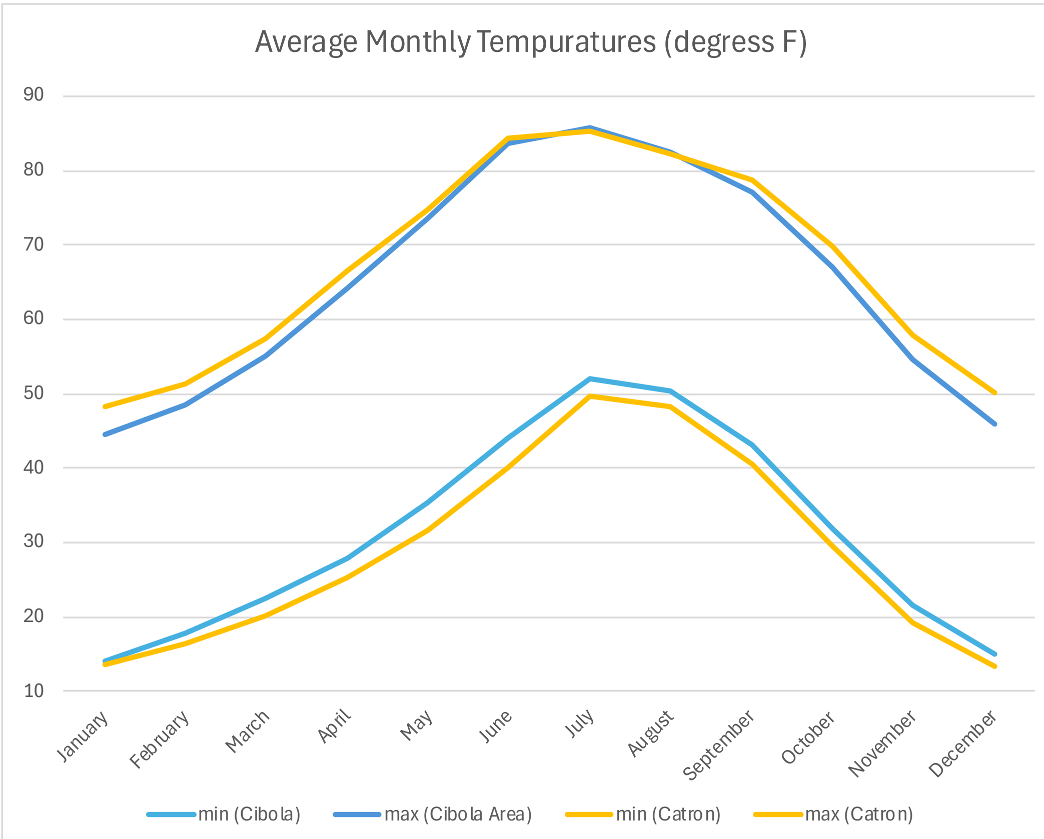


FIGURE 11 AVERAGE MINIMUM AND MAXIMUM TEMPERATURES BY REGION.

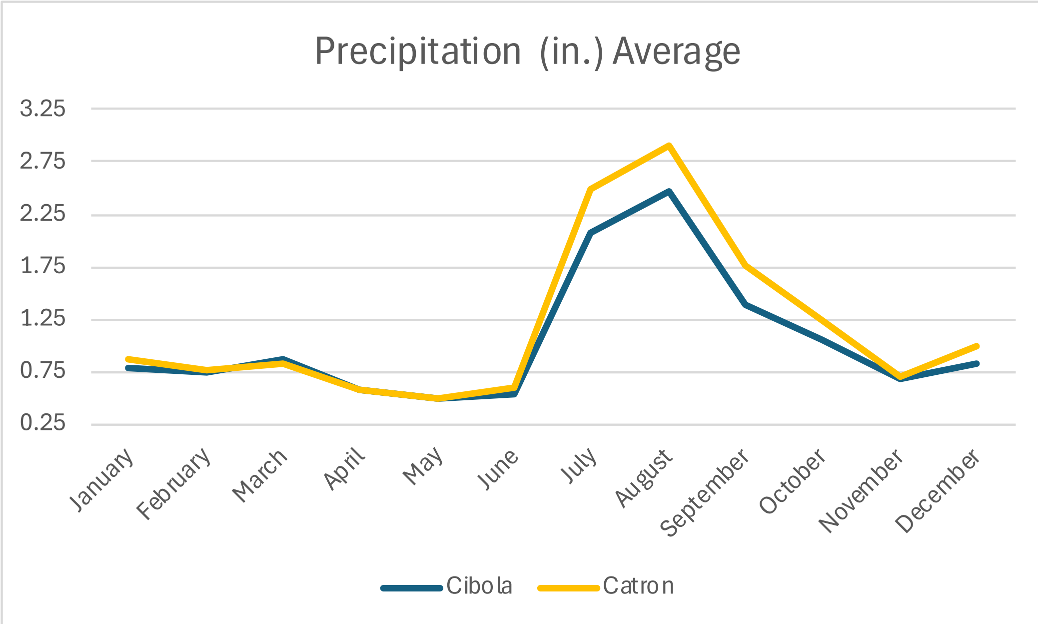


FIGURE 12 AVERAGE MONTHLY PRECIPITATION.

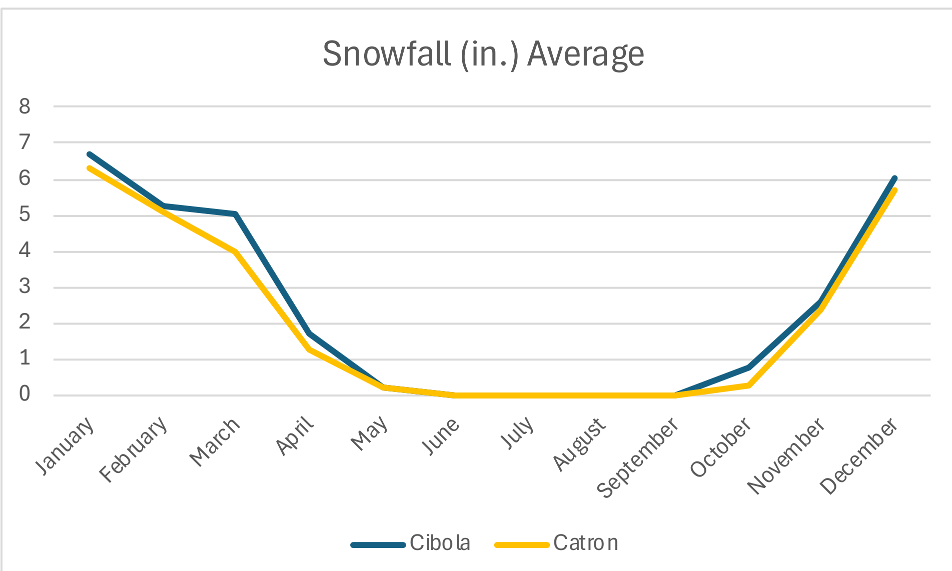


FIGURE 13 AVERAGE MONTHLY SNOWFALL.

TABLE 5 CLIMATE STATIONS UTILIZED FOR THIS ANALYSIS. COORDINATES ARE IN NAD 1983. LOCAL CLIMATE STATION DATA OBTAINED FROM: HTTP://WWW.WRCC.DRI.EDU

				Period of Record	
Station Name	**Station ID**	**Elevation (ft)**	**Location (UTM)**	**From:**	**To:**
El Morro Natl Mon	292785	7223	741816.77E, 3880470.15, 12S	1938	2024

Grants Airport	293682	6520	235950.44E, 3895334.82N, 13S	1953	2017
Hickman	293969	7805	230721.97E, 3823353.6N, 13S	1943	1985
Fence Lake	293180	7065	712945.83E, 3836994.79N, 12S	1933	2010
Jewett Work Center	294375	7405	718623.04E, 3762832.31N, 12S	1923	1967
Luna RS	295273	7050	690498.95E, 3744380.62, 12S	1903	2015
Quemado	297180	6878	730677.24E, 3803225.89N, 12S	1915	2024
Reserve 1 W	297383	5842	705983.25E, 3732763.95N, 12S	2009	2017

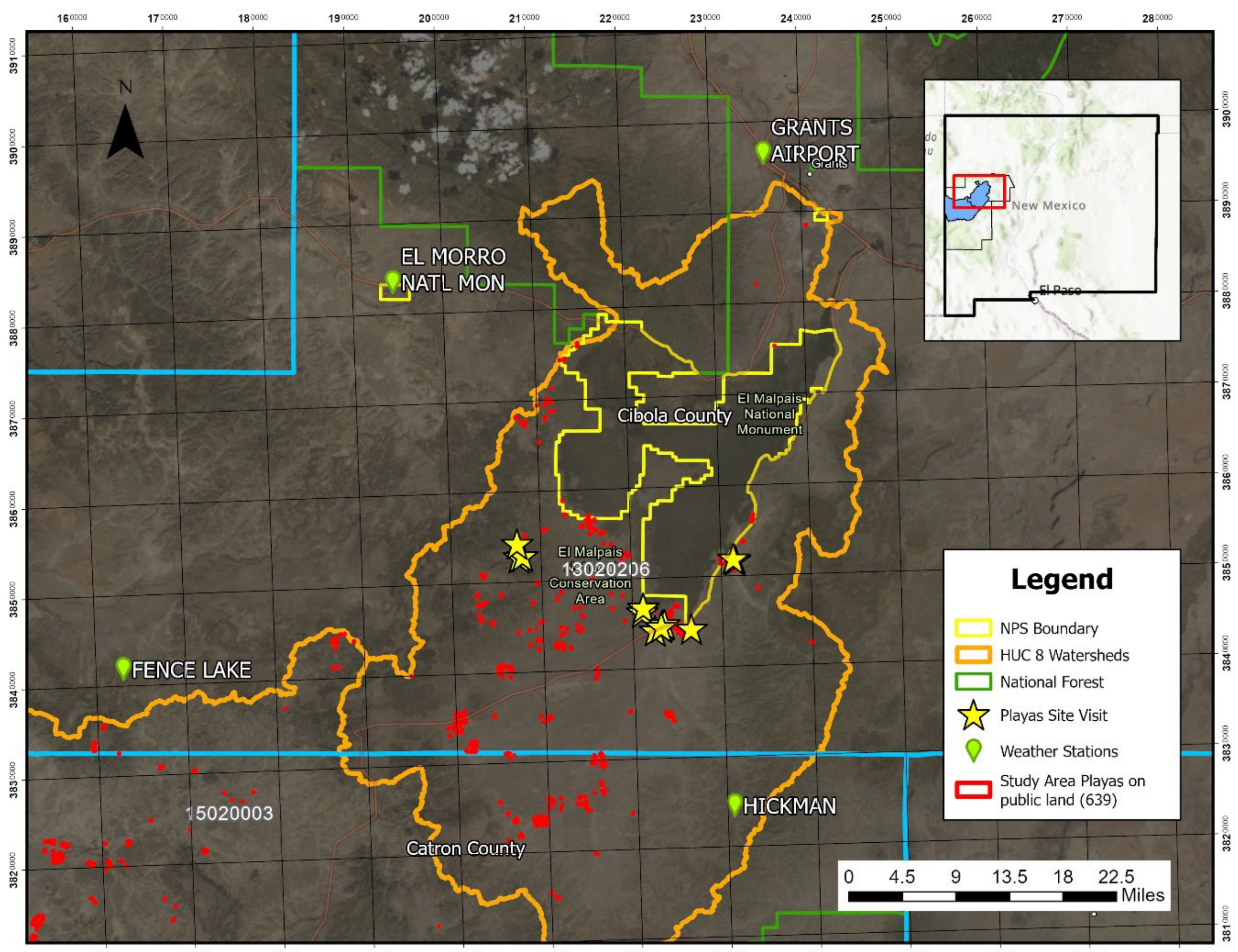


FIGURE 14 CLIMATE STATIONS NEAR CIBOLA SITES.

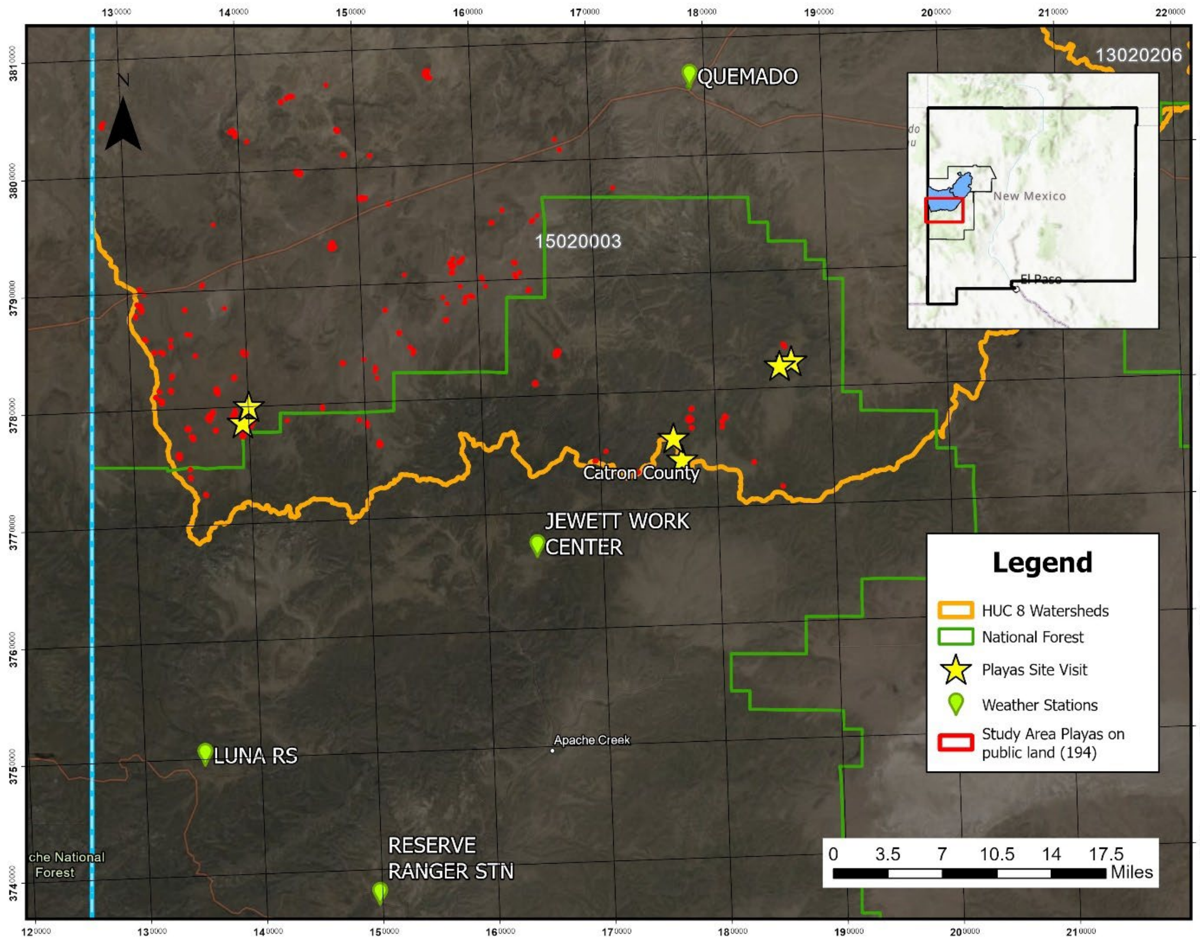


FIGURE 15 CLIMATE STATIONS NEAR CATRON SITES.

Methods

Site Selection

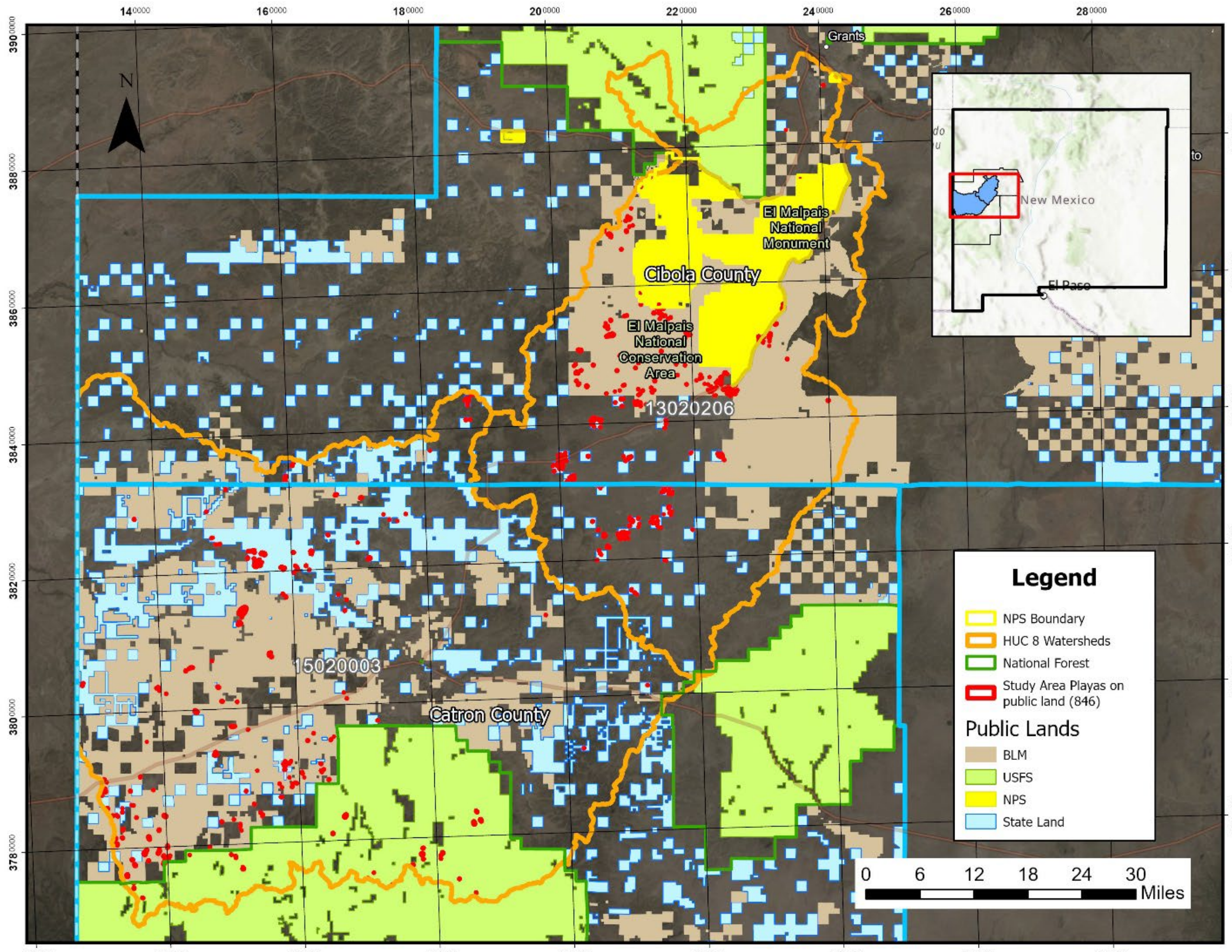


FIGURE 16 POTENTIAL PLAYAS ON PUBLIC LANDS IN THE PROJECT AREA.

To update and improve existing wetlands information in New Mexico, the NMED Wetlands Program has partnered with Saint Mary's University of Minnesota Geospatial Services (GeoSpatial Services) over the last decade to remotely map and classify wetlands and riparian areas throughout the State. Objectives of this effort were to update the US Fish and Wildlife Service National Wetland Inventory (NWI) and apply additional wetland classifications consistent with prior mapping projects in New Mexico and used by the SWQB Wetlands Program for a variety of applications. Additional classifications applied to mapped wetlands included the Landscape Position, Landform, Waterflow Path and Waterbody Type (LLWW) Classification (Tiner 2014), the Riparian Classification System (USFWS 2009), and the Hydrogeomorphic Classification System (HGM) that groups wetlands into classes based on their position on the landscape, source of water, and water flow (Brinson 1993). The HGM system includes riverine, slope, lacustrine fringe, mineral flats, and depressional wetlands. The depressional class includes subclasses, such as artificial, natural, and playa depressions.

For this wetland characterization process, depressional wetlands and the playa subclass within were identified from the mapped wetlands database. Sites were chosen across a variety of volcanic geologic units to assess if there were differences in the ecologic setting and functions of playas across the region. For ease of access, sites were within short walking distance to paved or dirt roads in public lands. In large part the selected sites fell on BLM land surrounding El Malpais National Monument in Cibola County and in and around the Gila National Forest in Catron County.

Field Methods

This report focuses on a preliminary site visit undertaken by NMED Wetlands Program Staff, Maryann McGraw, Wetlands Program Coordinator, Tiffany Anders, Dustin Nelson and Cody Vileno, Wetlands Program Project Officers, over three days from June 25 – 28, 2023. To visit as many potential wetland locations as possible, a simplified field methodology was utilized, following the Arid West Regional Supplement to the Army Corps of Engineer's Wetland Delineation manual (USACE 2008).

USACE field data sheets

For the site visit NMED staff filled out a "WETLAND DETERMINATION DATA FORM – Arid West Region," see Appendix A. The form requires general information about each site, such as location, landform, soil map unit. The form is further broken down into 4 sections, including a vegetation survey, soil descriptions, a survey for hydrologic indicators, and a report documentation page.

Vegetation surveys

The manual employs a plant-community approach for assessing vegetation, focusing on the collective assembly of plant species rather than specific indicator species' presence or absence. Hydrophytic vegetation is present when the plant community contains species that can tolerate prolonged inundation or soil saturation during the growing season. For a delineation, plants must be identified to the species level, to ascertain their indicator status in the National Wetland Plant List (USACE). The vegetation at the site is first broken down into stratum (tree, sapling/shrub, herbaceous, woody vine), with in each stratum, abundance values for each species is determined using a visual estimate to determine the percentage cover of plant species. From this, dominance and prevalence tests can be applied to determine if the site has predominant hydrophytic vegetation. For the site visit, a simple visual estimation of the cover was assessed.

Describing Soils

The National Technical Committee for Hydric Soils (NTCHS) defines a hydric soil as a soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (USDA Soil Conservation Service 1994). The first step in observing and documenting the soils is to start by clearing away any loose leaves, needles, or bark from the soil surface. The Manual recommends digging a hole to expose the soil profile to a depth sufficient to document relevant hydric soil indicators or confirm their absence, typically around 20 inches (50 cm) from the soil surface, although a shallower pit may be suitable for certain indicators. Many of our pits were shallower than the recommended depth. Once the profile is exposed, it is described, noting layer depths, color when moist, texture, while also looking for presence of hydric soil indicators (USDA Natural Resources Conservation Service 2006). At least one soil pit was dug at the center of each basin.

Hydrology

Wetland hydrology indicators, when combined with hydric soil and hydrophytic vegetation indicators, help ascertain whether an area meets the criteria for wetland classification outlined in the Corps Manual. These indicators typically reflect the medium- to long-term history of wetness at a site. They offer visible evidence that the area has experienced repeated episodes of inundation or soil saturation lasting more than a few days during the growing season over several years. This evidence suggests that the timing, duration, and frequency of wet conditions have been adequate to foster the development of characteristic wetland plant communities and hydric soil features. In cases where hydrology remains unchanged, the presence of appropriate vegetation and soil characteristics strongly suggests the presence of wetland hydrology (National Research Council, 1995). Wetland hydrology indicators further validate the ongoing presence of a wetland hydrological regime at the site, ensuring that hydric soils and hydrophytic vegetation are not remnants of past hydrological conditions.

Global Surface Water Explorer - Hydroperiod

The Global Surface Water Explorer (Pekel et al 2016) is a comprehensive resource, offering a high level of detail and temporal range regarding surface water dynamics across the planet. The dataset encompasses a period of over three decades, starting from 1984 and through December of 2021, with plans for continuous updates. This extensive timeframe allows for the observation of long-term trends and patterns in water presence, including the ebb and flow of playa wetlands, which are critical for a variety of ecological processes. The data itself is derived from high-resolution (30m) satellite imagery, primarily from the Landsat missions, which have been systematically capturing the Earth's surface since the 1970s. Through advanced processing techniques, these images are transformed into a series of maps that show the location and temporal distribution of water surfaces at a global scale, including changes in water extent, seasonal fluctuations, and long-term trends.

Within the framework of playa wetland studies, the Global Surface Water Explorer data offers an invaluable asset for understanding these unique ecosystems' hydroperiods. By providing both historical and near-real-time data on surface water, patterns of inundation and drying in these wetlands can be observed. The dataset includes metrics such as the frequency of water occurrence, changes in water extent over monthly, annual, and decadal scales, and the transitions of water bodies from one state to another (e.g., from permanent to seasonal). This level of detailed data allows scientists, conservationists, and policymakers to make informed decisions regarding the management and preservation of playa wetlands, ensuring their continued contribution to biodiversity, groundwater recharge, and carbon cycling. The ability to track and predict changes in the hydroperiods of these wetlands is particularly crucial in the face of climate change and increasing human land use pressures, making the Global Surface Water Explorer an indispensable tool in the global effort to sustain freshwater ecosystems.

For this evaluation, two datasets were downloaded and analyzed from here, including Surface Water Recurrence and Occurrence Change Intensity. The surface water recurrence data provides information about the inter-annual behavior of surface water and captures the frequency that water returns from year to year. The Occurrence Change Intensity data provides information on where surface water occurrence increased, decreased, or remained the same between 1984-1999 and 2000-2021. Both the direction of change and its intensity are documented. A value of 100 shows no change. Values of 100 down to 0 show a trending decrease, with a value of 0 being 100% loss in occurrence. Values from 100 to 200 show a trending increase in occurrence.

The Recurrence dataset has the following values and symbology. The values from 1 to 100 are discrete.

Value	Symbol	Colour	Label
0		#FFFFFF	Not water
1		#FF7F27	1% recurrence
100		#99D9EA	100% recurrence
255		#CCCCCC	No data

FIGURE 17 RECURRENCE SYMBOLOGY FROM THE GSWE.

The Occurrence Change Intensity dataset has the following values and symbology for the change_norm band. The values from 0 to 200 are discrete.

Value (TIFF)	Value (GEE)	Symbol	Colour	Label
0	-100		#FF0000	-100% loss of occurrence
100	0		#000000	No change
200	100		#00FF00	100% increase in occurrence
253	masked		#FFFFFF	Not water
254	-128		#888888	Unable to calculate a value due to no homologous months
255	127		#CCCCCC	No data

FIGURE 18 OCCURRENCE CHANGE INTENSITY SYMBOLOGY

Preliminary Findings

Playa 795

TABLE 6 PLAYA 795

Center UTM	231381.15E, 3851863.98N, 13S	Acreage	0.31
County	Cibola	Wetland Y/N	Y
Watershed (Huc - 8)	13020206	Wetland Vegetation Presence	N
Geologic Unit	Qa	Wetland Soil Presence	Y
Elevation (ft)	7124	Wetland Hydrology Presence	Y

This playa was in alluvium with a clay bottom, dominated by annuals. There was surface cracking, though the area is clearly trampled by cattle. There were three vegetated zones or rings surrounded by sand sage and blue grama. This playa was less than 100 meters from NM 117, and nearly adjacent to a dirt ranch road and numerous cattle trails.

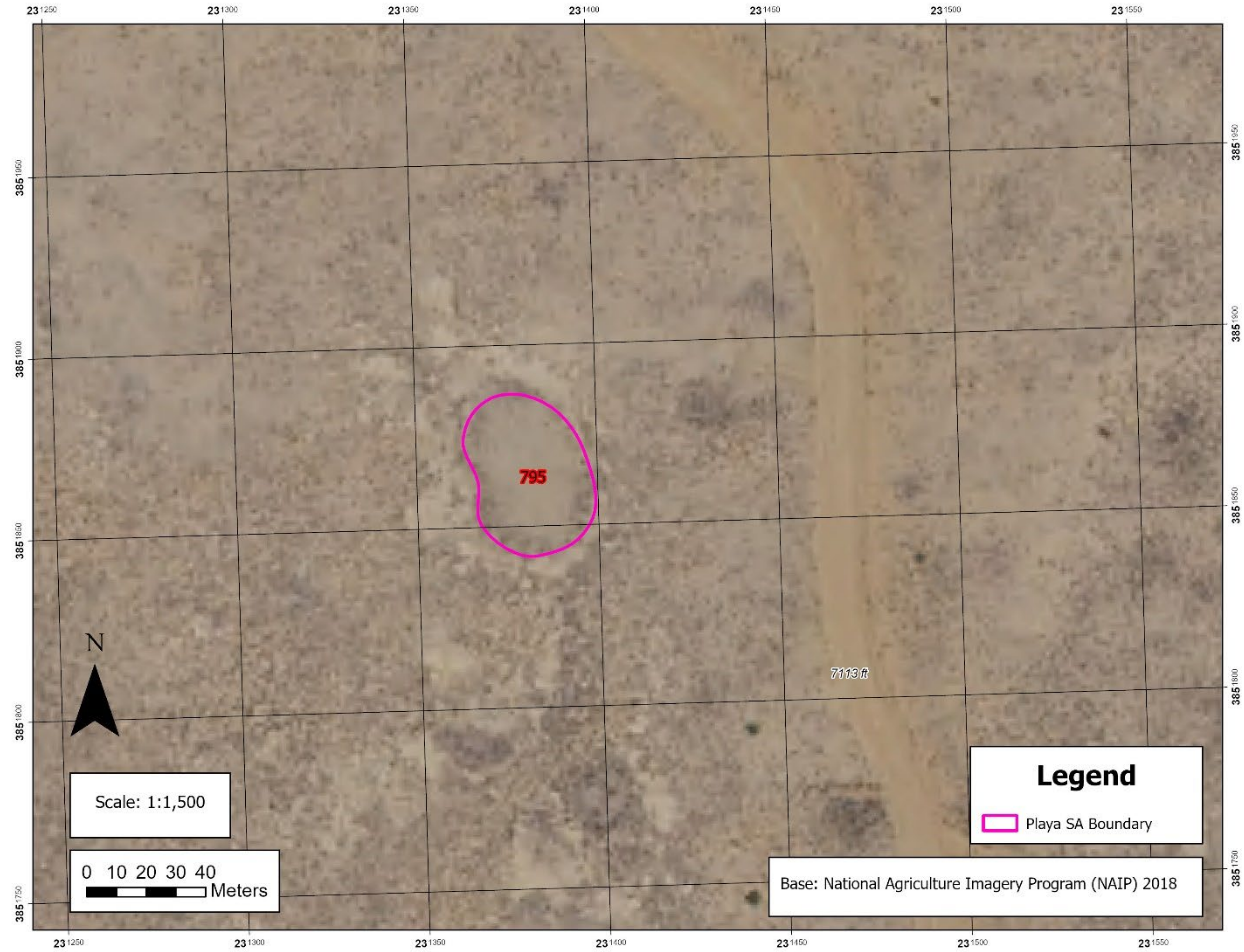


FIGURE 19 PLAYA 795 1:1,500 MAP.

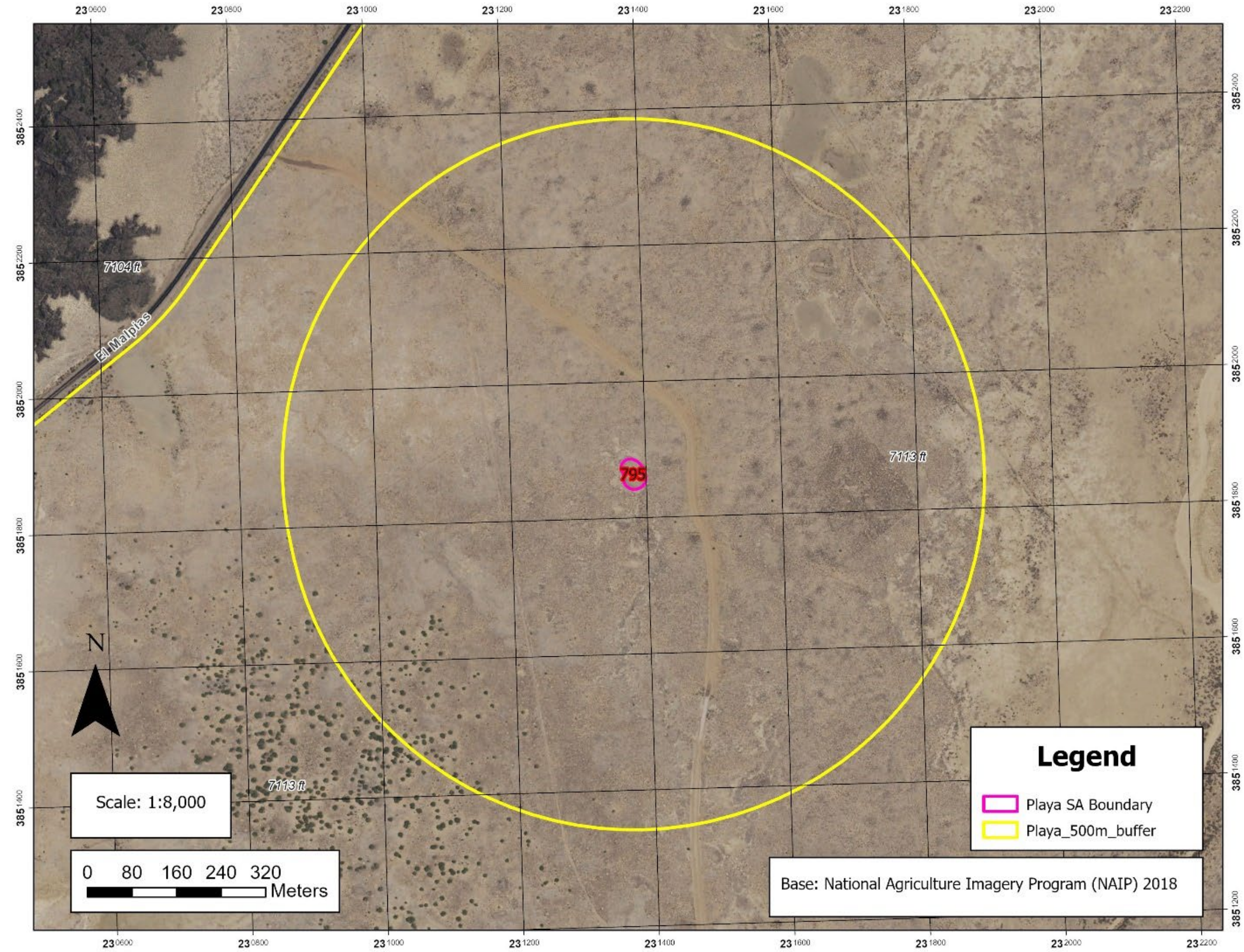


FIGURE 20 PLAYA 795 1:8,000 SURROUNDING LAND USE MAP.

VEGETATION

FIGURE 21 PLAYA 795, NEAR BARE CENTER AREA, WITH ANNUAL DOMINATED 2ND VEGETATION RING.

The vegetation was dominated by annual plants, though there was no prevalence or dominance of wetland species. There were three distinct rings of vegetation, with dense mat of annual gramma in the center, a more sparsely vegetated 2nd ring, and a near barren 3rd ring.

TABLE 7 PLAYA 795 VEGETATION (NR = OBSERVED BUT DATA NOT RECORDED)

Scientific Name	**Common Name**	**Indicator Status**	**Annual/ Perennial**	**Playa**	**% cover Center**	**% Cover 2nd ring**	**% Cover 3rd ring**
Artemisia filifolia	sand sage	Up	Perennial	795	0	5	2
Atriplex Spp.	saltbush	Up	Perennial	795	0	0	3
Bouteloua simplex	mat grama	Up	Annual	795	100	30	0
Phacelia Spp.	scorpion weed	Up	Annual	795	5	2	0
Townsendia annua	annual Townsend daisy	Up	Annual	795	1	0	0
Erigeron divergens	sand fleabane	Up	Annual	795	1	0	0
Bassia scoparia	tumble weed	Up	Annual	795	10	0	0

Oenothera albicaulis	white-stem evening primrose	Up	Annual	795	2	2	5
Amaranthus Spp.	pigweed	FACU	Annual	795	0	15	10
Spaeralcea coccinea	scarlet globemallow	Up	Perennial	795	0	1	1
Grindelia hirsutula	hairy gumweed	FACW	Perennial	795	0	0	NR
Bouteloua gracilis	blue grama	Up	Perennial	795	0	5	10
Helianthus annuus	annual sunflower	FACU	Annual	795	0	5	0
Dasyochloa pulchella	desert fluffgrass	Up	Perennial	795	0	0	3
Gutierrezia sarothrae	broom snakeweed	Up	Perennial	795	0	2	0

SOILS

Playa 795 had the hydric soil indicator redox dark surface, describes as *A layer that is at least 10 cm (4 inches) thick, starting at a depth ≤20 cm (8 inches) from the mineral soil surface, and has: a. Matrix value of 3 or less and chroma of 1 or less and 2 percent or more distinct or prominent redox concentrations occurring as soft masses or pore linings, or b. Matrix value of 3 or less and chroma of 2 or less and 5 percent or more distinct or prominent redox concentrations occurring as soft masses or pore linings.* Of note the clay layer was approximate 16" deep.

TABLE 8 PLAYA 795 SOIL DESCRIPTION

Layer 1	
1 depth (in.)	3
1 matrix color	10yr 3/1
1 matrix percent	100
1 redox color	na
1 redox percent	na
1 redox type	na
1 redox loc	na
1 texture	clay
Layer 2	
2 depth (in.)	13
2 matrix color	10yr 3/1
2 matrix percent	98
2 redox color	7.5 yr 4/4
2 redox percent	2
2 redox type	C
2 redox loc	PL
2 texture	clay
Layer 3	
3 depth (in.)	16
3 matrix color	10yr 3/2

3 matrix percent	na
3 redox color	na
3 redox percent	na
3 redox type	na
3 redox loc	na
3 texture	sand

Hydrology and Hydroperiod

The soil at this location had the hydric indicator of Surface Soil Cracks. There was no evidence to indicate the hydroperiod at this location. The Global Surface water Explorer did not have evidence of standing surface water at this location, though the depression's small size could mean that there is standing water too small in area to be seen in the satellite imagery.

Playa 794

TABLE 9 PLAYA 794

Center UTM	231579.31E, 3851747.15N, 13S	Acreage	0.26
County	Cibola	Wetland Y/N	Y

Watershed (Huc - 8)	13020206	Wetland Vegetation Presence	N
Geologic Unit	Qa	Wetland Soil Presence	N
Elevation (ft)	7112	Wetland Hydrology Presence	Y

Playa 794 was very near playa 795, more than 100 meters from NM12, and nearly adjacent to the dirt ranch road and cattle trails. This too was in alluvium, with a clay bottom, evidence of surface cracking and dominated by annual plants.

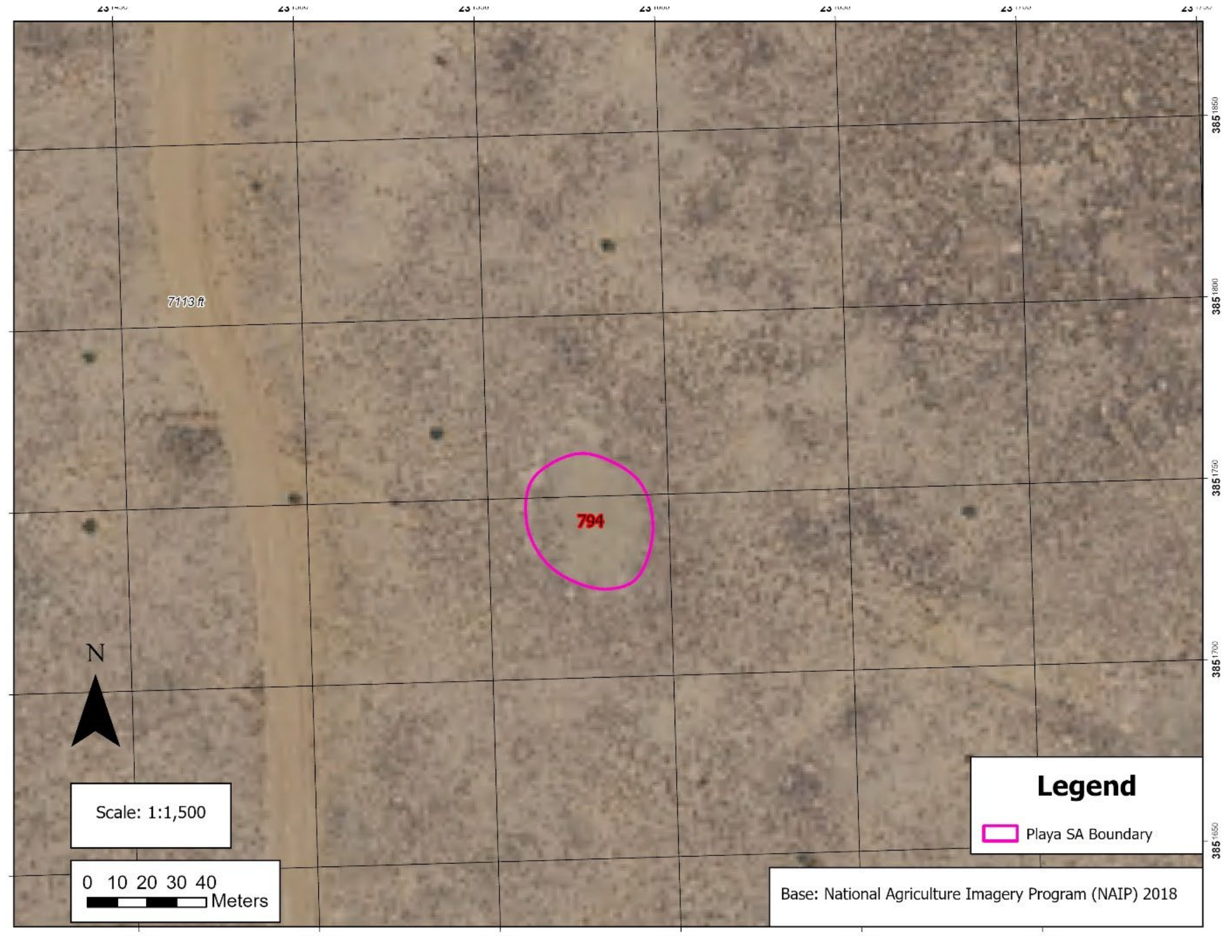


FIGURE 22 PLAYA 794 1:1,500 MAP.

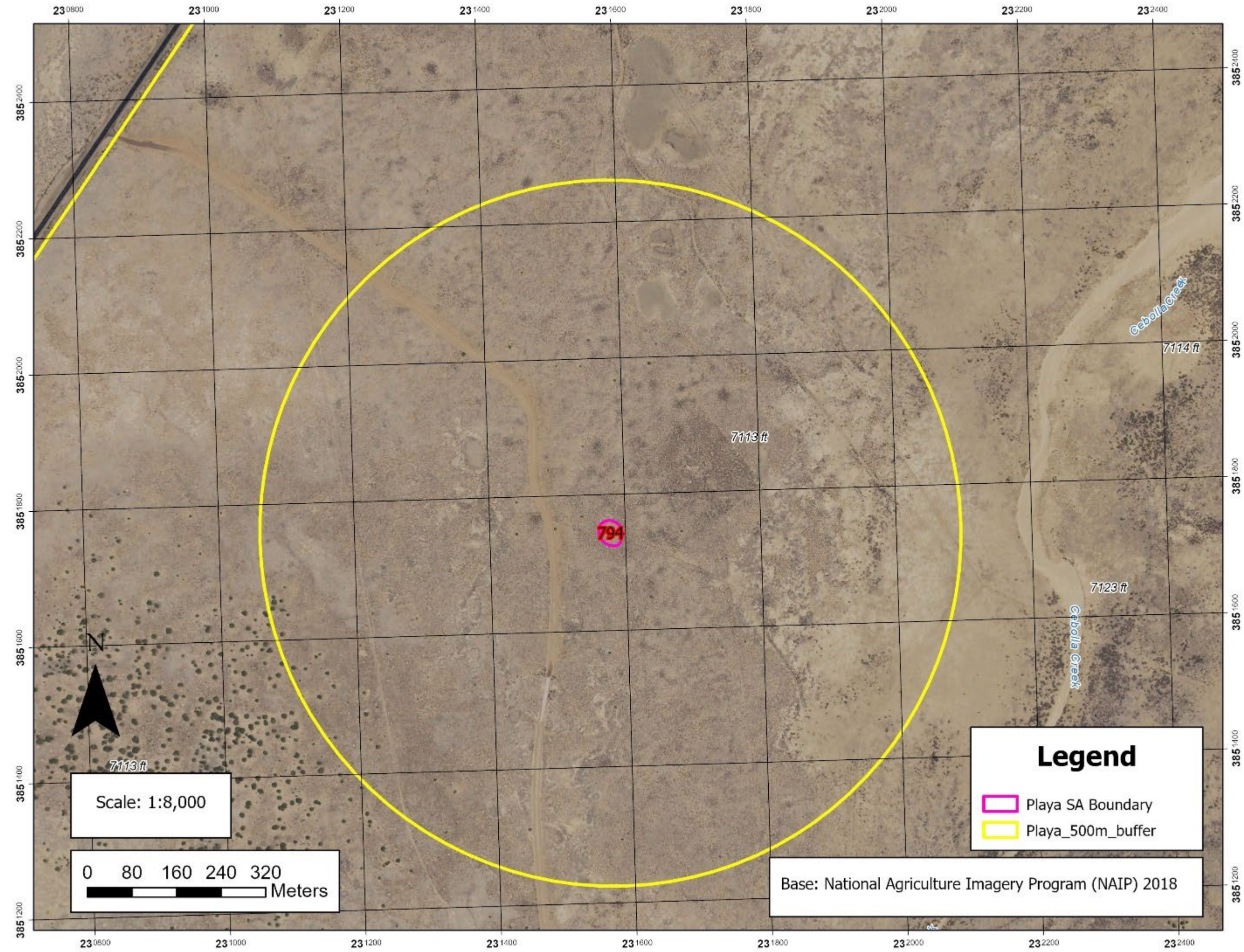


FIGURE 23 PLAYA 794 1:8000 SURROUNDING LAND USE MAP.

VEGETATION

FIGURE 24 PLAYA 794 DOMINATED BY ANNUAL VEGETATION.

This location had some hairy gumweed (FACW) present but did not meet the prevalence or dominance tests for wetland hydric vegetation. There were two distinct vegetation rings in the basin.

TABLE 10 PLAYA 794 VEGETATION (NR = OBSERVED BUT DATA NOT RECORDED)

Scientific Name	Common Name	Indicator Status	Annual/ Perennial	Playa	% cover Center	% Cover 2nd ring	% Cover 3rd ring
Artemisia filifolia	sand sage	Up	Perennial	794	4	15	0
Amaranthus Spp.	pigweed	FACU	Annual	794	NR	NR	0
Oenothera albicaulis	white-stem evening primrose	Up	Annual	794	3	0	0
Bouteloua gracilis	blue grama	Up	Perennial	794	5	15	0
Grindelia hirsutula	hairy gumweed	FACW	Perennial	794	8	0	0
Spaeralcea coccinea	scarlet globemallow	Up	Perennial	794	0	2	0
Bassia scoparia	tumble weed	Up	Annual	794	0	2	0

SOILS

This area had no hydric soil indicators. The clay layer was 8 inches thick. Perhaps too shallow to be a true playa that retains surface water.

TABLE 11 PLAYA 794 SOIL DESCRIPTION

Layer 1	
1 depth (in.)	8
1 matrix color	10yr 3/2
1 matrix percent	100
1 redox color	na
1 redox percent	na
1 redox type	na
1 redox loc	na
1 texture	clay
Layer 2	
2 depth (in.)	12
2 matrix color	7.5yr 3/2
2 matrix percent	100
2 redox color	na
2 redox percent	na
2 redox type	na
2 redox loc	na
2 texture	sandy loam

FIGURE 25 SOIL PIT PLAYA 795

HYDROPERIOD

This playa had Surface Soil Cracks, but no other wetland hydrology indicators. There was no evidence to indicate the hydroperiod at this location. The Global Surface water Explorer did not have evidence of standing surface water at this location, though the depression's small size could mean that there is standing water too small to be seen in satellite imagery.

PLAYA 886

FIGURE 26 SAND DUNES FORMING AT PLAYA EDGE.

TABLE 12 PLAYA 886

Center UTM	226481.58E, 3844238.91N, 13S	Acreage	0.31
County	Cibola	Wetland Y/N	Y
Watershed (Huc - 8)	13020206	Wetland Vegetation Presence	N
Geologic Unit	Qa	Wetland Soil Presence	Y
Elevation (ft)	7072	Wetland Hydrology Presence	Y

Playa 886 is at the southern tip of El Malpais National Monument, just down Pie Town Rd. The northwest corner of the area is being encroached in by large sand dunes, which are depositing across the playa surface. The southern edge of the area is a large, fenced area with likely defunct cattle tanks and a wind mill. The area has many cattle trails. There were several small pits in the playa basin.

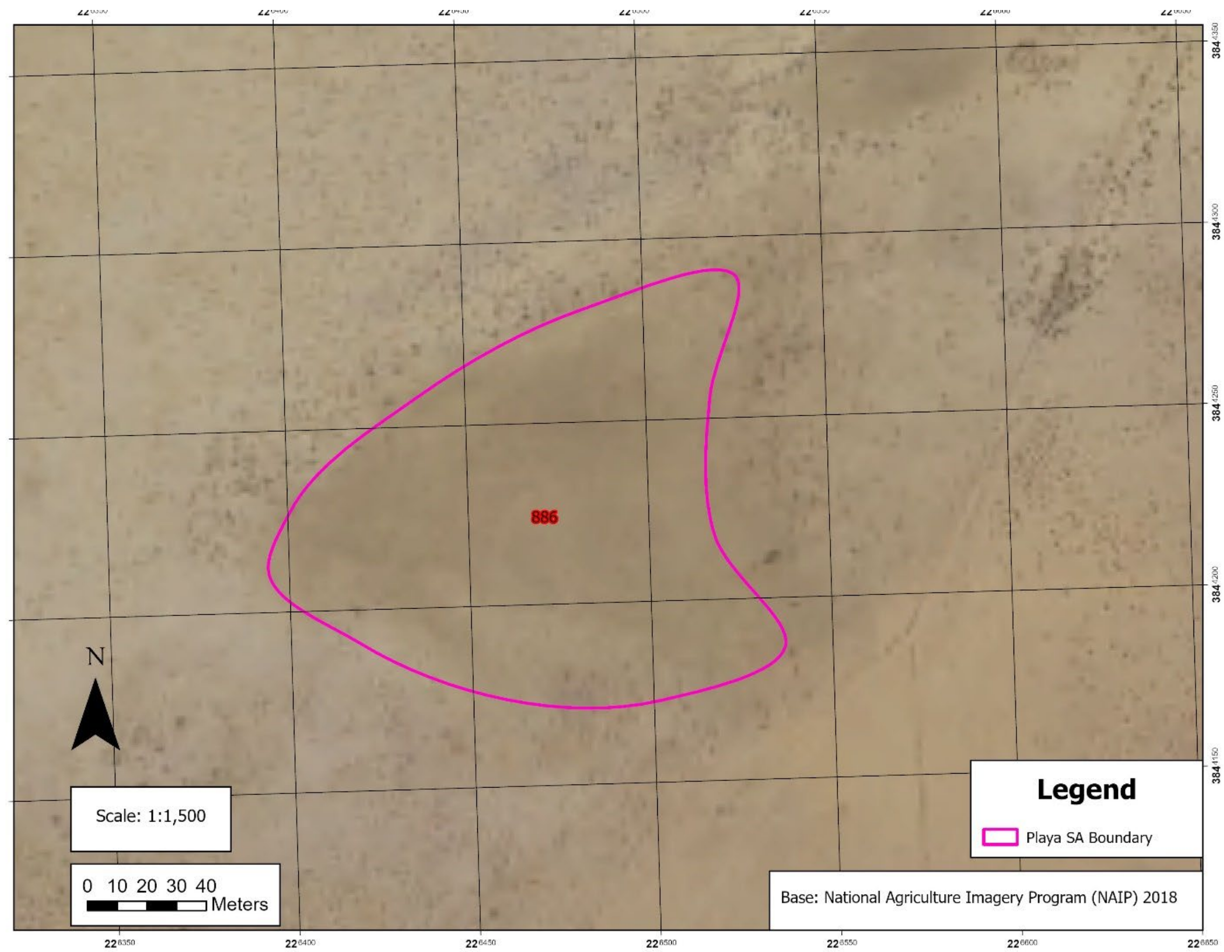


FIGURE 27 PLAYA 886 1:500 MAP.

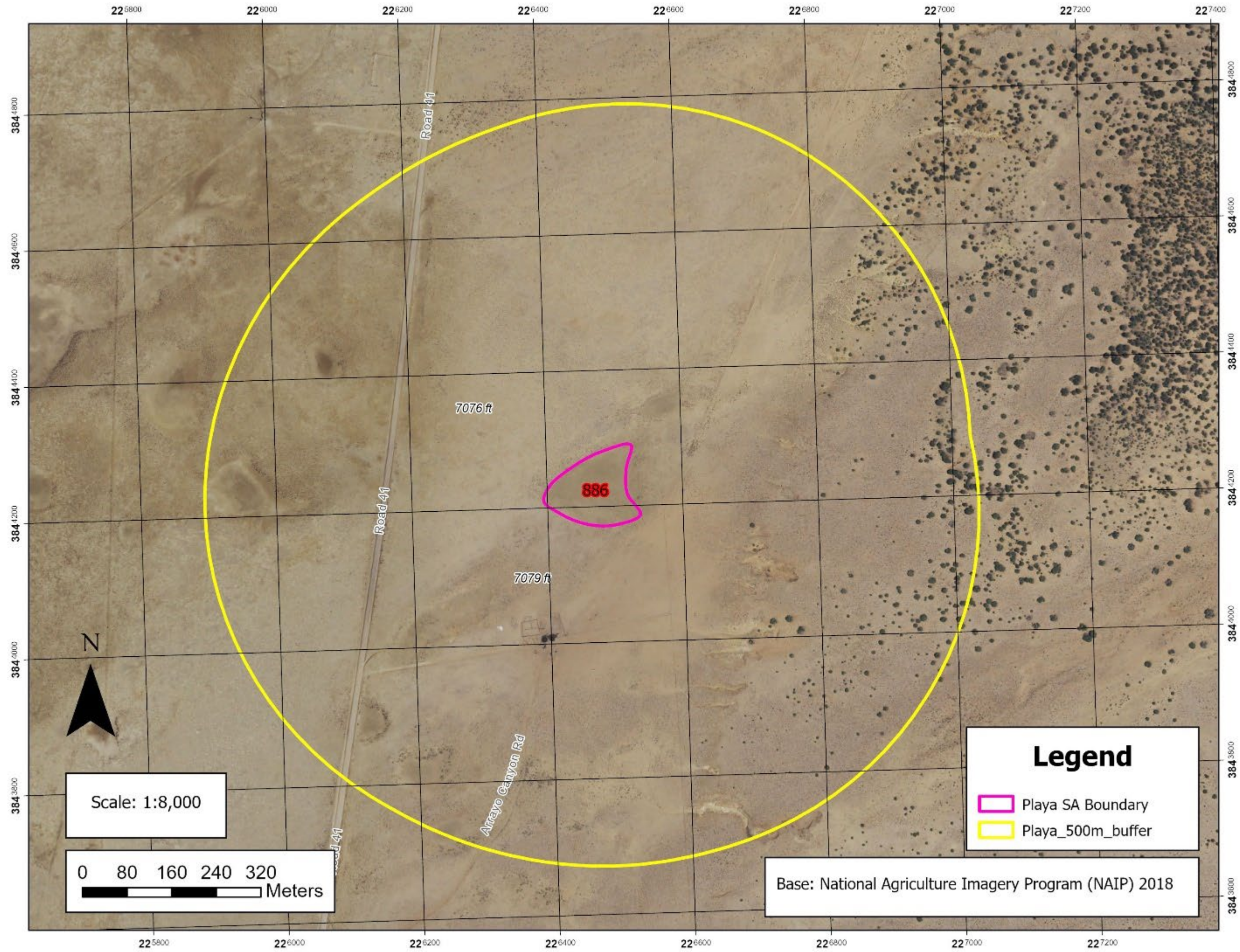


FIGURE 28 PLAYA 886 1:8,0000 SURROUNDING LAND USE MAP.

Vegetation

The playa basin did not have a prevalence or dominance of wetland vegetation. There were two distinct vegetation communities in the basin.

TABLE 13 PLAYA 886 VEGETATION (NR = OBSERVED BUT DATA NOT RECORDED))

Scientific Name	Common Name	Indicator Status	Annual/ Perennial	Playa	% cover Center	% Cover 2nd ring	% Cover 3rd ring
Chenopodium incanum	Mealy Goosefoot	Up	Annual	886	20	20	0
Pascopyrum smithii	western wheatgrass	FAC	Perennial	886	20	20	0
Bassia scoparia	tumble weed	Up	Annual	886	5	0	0
Ambrosia acanthicarpa	Annual bursage	Up	Annual	886	20	20	0
Amaranthus Spp.	pigweed	FACU	Annual	886	NR	NR	0

SOILS

Two soil pits were dug here. Note that the surface 2 – 8 inches were sand and sandy loam, likely blown in from nearby sand dunes. Dense clay was found below. Pit 2 did not have a dense clay lens, but rather a loamy clay layer to the depth that we dug. The hydric soil indicator of depleted matrix was noted "*For loamy and clayey material (and sandy material in areas of indicators A11 and A12), a depleted matrix refers to the volume of a soil horizon or subhorizon in which the processes of reduction and translocation have removed or transformed iron, creating colors of low chroma and high value*."

TABLE 14 PLAYA 886 SOIL DESCRIPTION

Layer 1	pit 1	pit 2
1 depth (in.)	2	8.5
1 matrix color	10yr 4/2	10yr 4/3
1 matrix percent	100	100
1 redox color	na	na
1 redox percent	na	na
1 redox type	na	na
1 redox loc	na	na
1 texture	sandy loam	sand
Layer 2		
2 depth	8	11.5
2 matrix color	10yr 4/2	10yr 4/3
2 matrix percent	98	98
2 redox color	7.5yr 5/6	7.5yr 5/4
2 redox percent	2	2
2 redox type	C	C
2 redox loc	PL	M
2 texture	clay	sandy clay

Hydrology and Hydroperiod

FIGURE 29 DEEP SURFACE CRACKS SHOWING MIXING OF SURFACE SANDS INTO DEEPER DRY CLAY LAYERS IN PLAYA 886.

Playa 886 had the hydrology of surface soil cracks. GSWE data shows that Playa 886 has very low recurrence in April and May, likely, and higher recurrence, <25% during the typical monsoon season through early fall. This is an infrequently flooded playa with evidence of standing surface water in only 7 of the 37 recorded years (see figures 30, 31, 32). The occurrence change data shows a strong increase in the northeast corner of the playa.

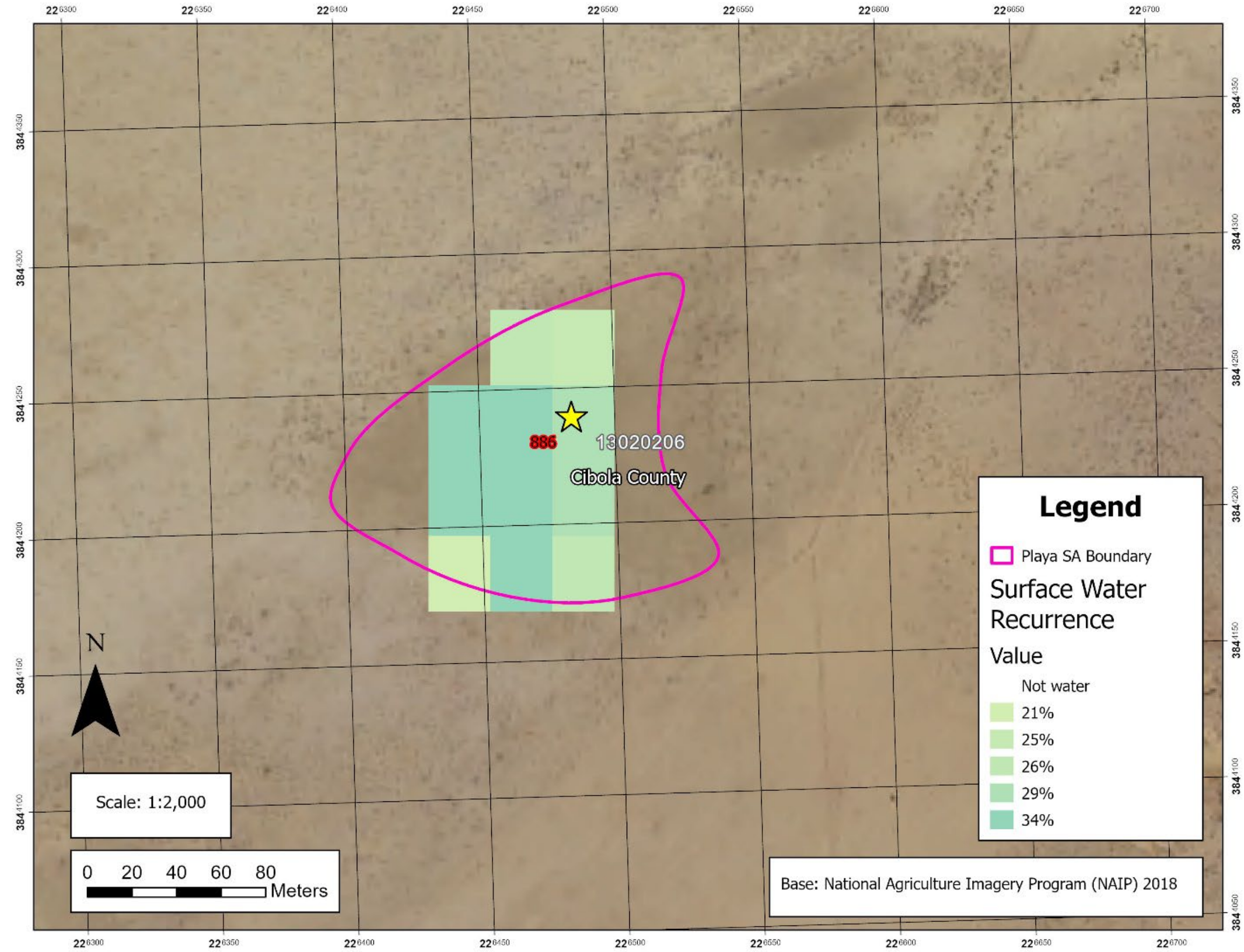


FIGURE 30 PLAYA 886 ANNUAL SURFACE WATER RECURRENCE (GSWE)

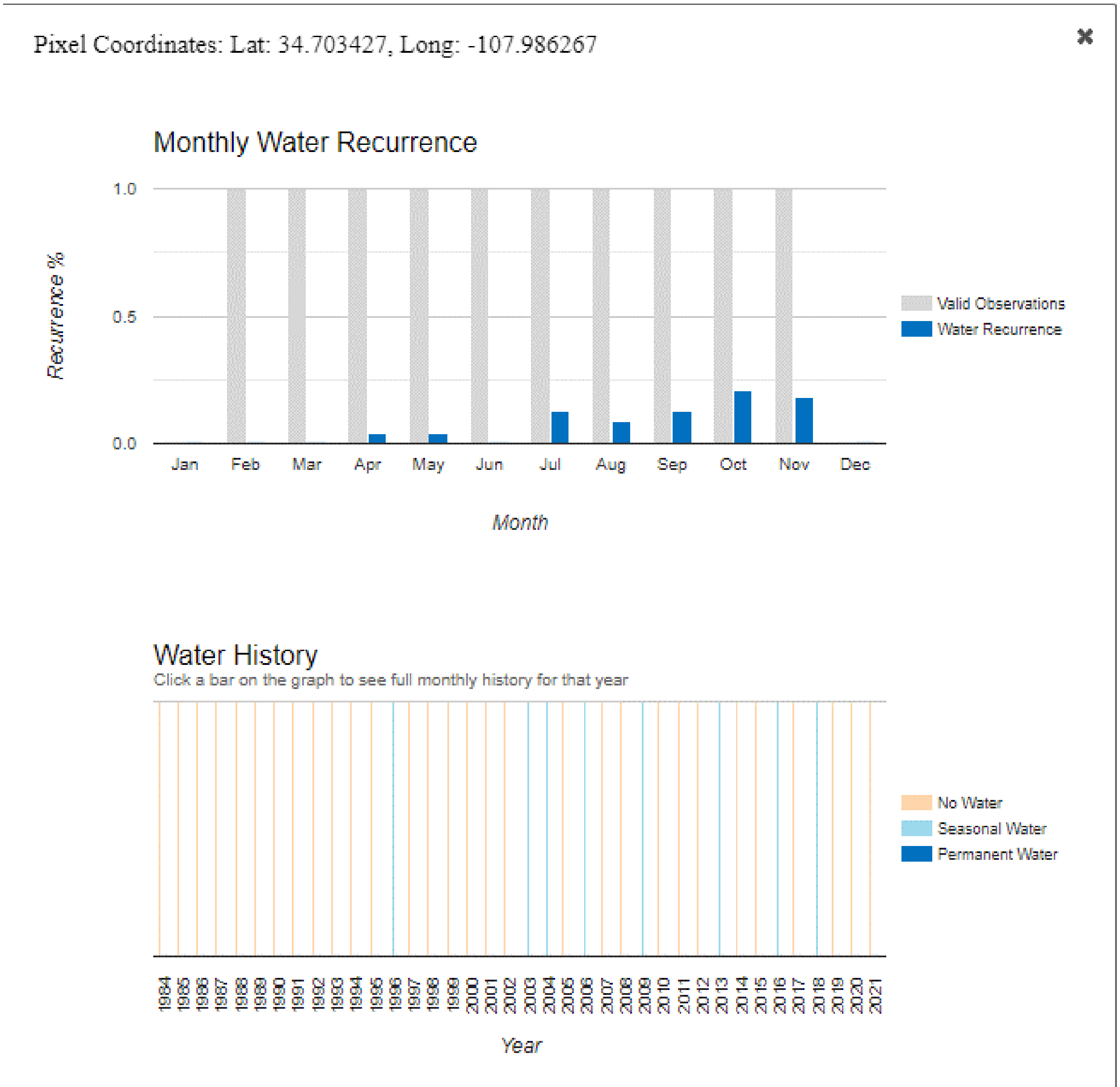


FIGURE 31 PLAYA 886 PLAYA 356 MONTHLY SURFACE WATER RECURRENCE. GSWE.

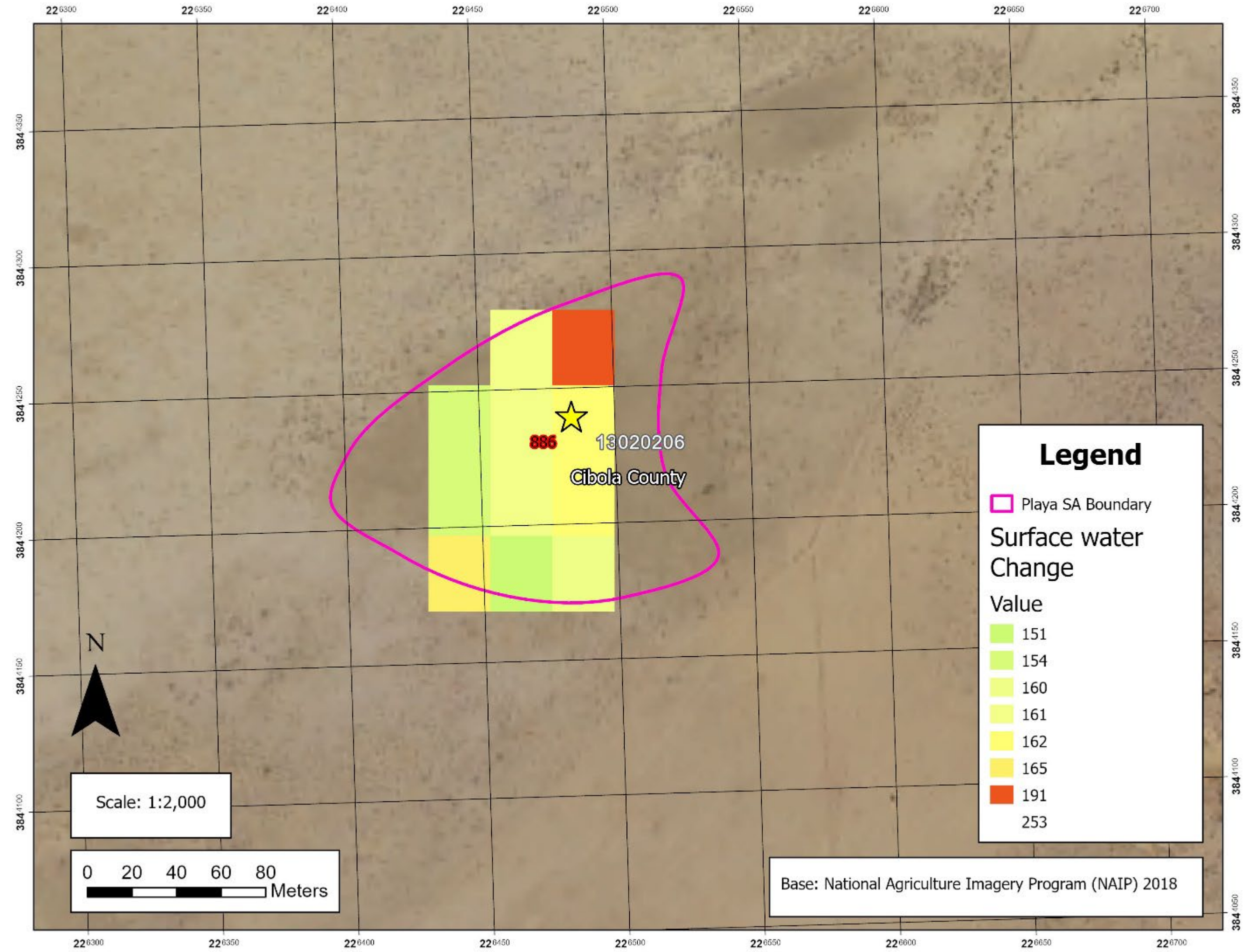


FIGURE 32 PLAYA 886 SURFACE WATER CHANGE INTENSITY (GSWE).

Playa 559

Playa 559 was directly adjacent to Cibola County Rd 42 in the El Malpais National Conservation Area managed by the BLM. This playa was very heavily trampled by cattle, with trails and deep hoof punches throughout the basin. Vegetation was cropped very low with large areas of bare soil. There was cobble sized volcanic rock throughout the basin and surrounding area.

TABLE 15 PLAYA 559

Center UTM	756640.88E, 3851671.41N, 12S	Acreage	4.35
County	Cibola	Wetland Y/N	Y
Watershed (Huc - 8)	13020206	Wetland Vegetation Presence	Y
Geologic Unit	Qbo	Wetland Soil Presence	N
Elevation (ft)	7426	Wetland Hydrology Presence	Y

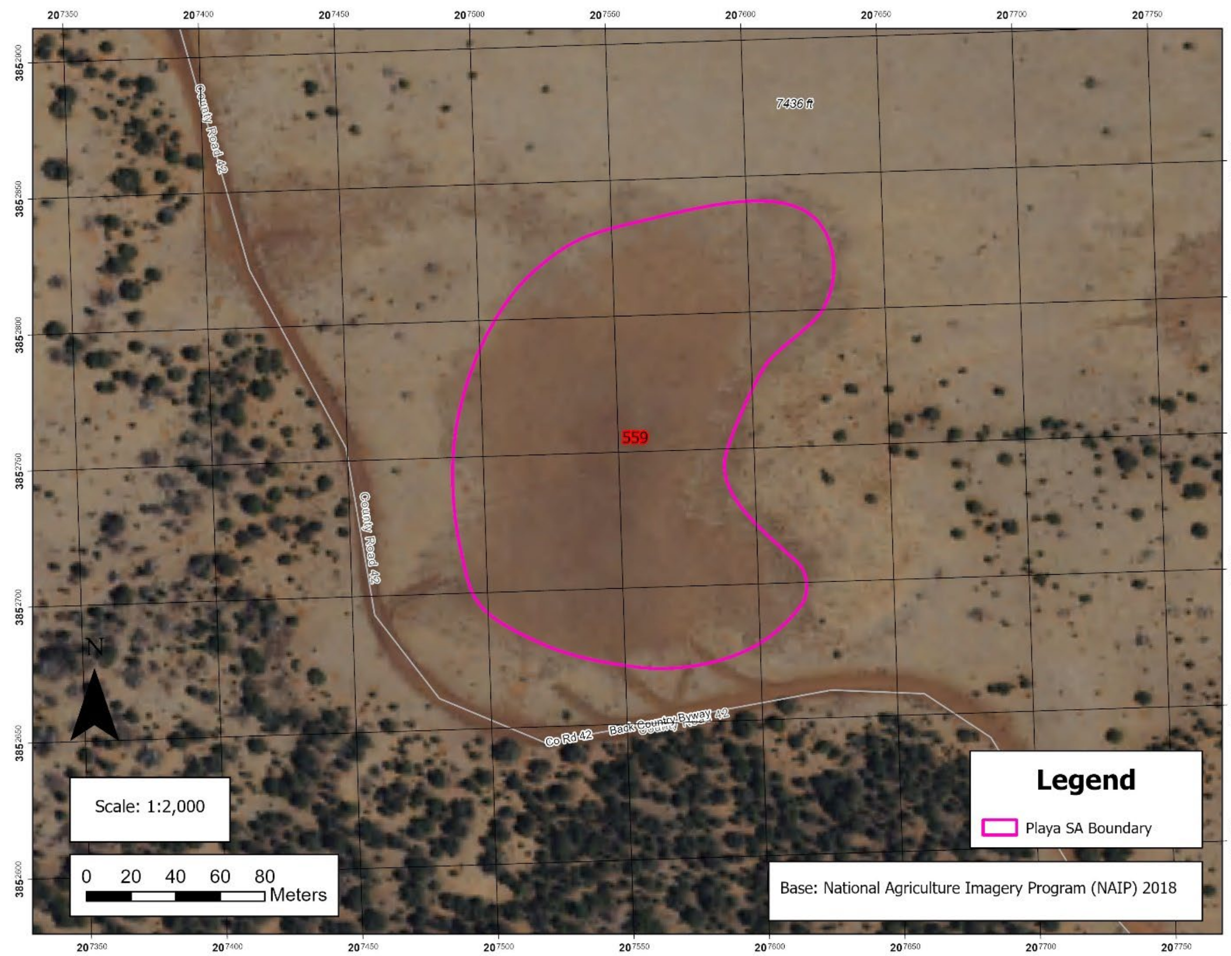


FIGURE 33 PLAYA 559 1:2,000 MAP.

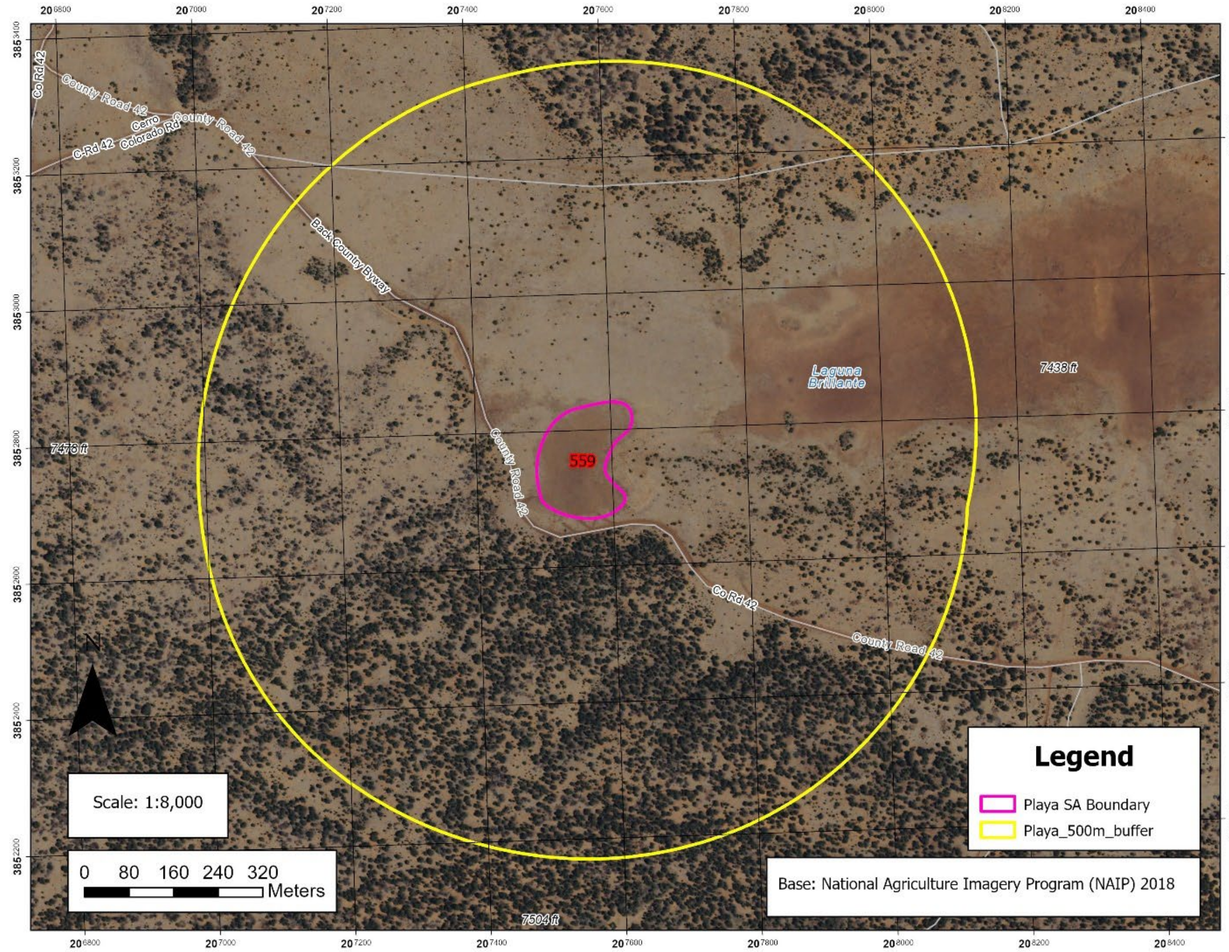


FIGURE 34 PLAYA 559 1:8,000 SURROUNDING LAND USE MAP.

VEGETATION

FIGURE 35 LARGELY BARE CENTER WITH LOW HEAVILY GRAZED VEGETATION, MAINLY FROGFRUIT, A PERENNIAL, FACULTATIVE WETLAND (FACW) PLANT. THERE WAS VERY LITTLE DIVERSITY, AND ALL VEGETATION WAS CROPPED TO AROUND 5CM.

TABLE 16 PLAYA 559 VEGETATION (NR = OBSERVED BUT DATA NOT RECORDED)

Scientific Name	Common Name	Indicator Status	Annual/ Perennial	Playa	% cover Center	% Cover 2nd ring	% Cover 3rd ring
Phyla nodiflora	frogfruit	FACW	Perennial	559	50	0	0
Portulaca oleracea	common purselane	FAC	Annual	559	1	0	0
Cryptantha Spp.	catseye	Up	Annual	559	1	0	0
Bouteloua gracilis	blue grama	Up	Perennial	559	0	NR	0
Pascopyrum smithii	western wheatgrass	FAC	Perennial	559	0	NR	0

SOILS

The soil has cattle hoof punched, dense dry clay. There was no evidence of hydric soils to the depth that we dug.

TABLE 17 PLAYA 559 SOIL DESCRIPTION

Layer 1	
1 depth (in.)	12
1 matrix color	10yr 3/2
1 matrix percent	100
1 redox color	na
1 redox percent	na
1 redox type	na
1 redox loc	na
1 texture	clay

FIGURE 36 DENSE CLAY SOILS AT PLAYA 559.

Hydrology and Hydroperiod

There was evidence of surface soil cracks, however there was no evidence to indicate the hydroperiod at this location. The Global Surface water Explorer did not have evidence of standing surface water at this location.

Playa 560

TABLE 18 PLAYA 560

Center UTM	757021.80E, 3851808.63N, 12S	Acreage	75.7
County	Cibola	Wetland Y/N	Y
Watershed (Huc - 8)	13020206	Wetland Vegetation Presence	Y
Geologic Unit	Qbo	Wetland Soil Presence	N
Elevation (ft)	7439	Wetland Hydrology Presence	Y

Playa 560 is shown as Laguna Brilliante on maps. It is a large playa, just over 75 acres. The west end had a shallowly dug pit to hold water for cattle, with a larger deeper pit on the eastern side of the basin. The day we visited there were cattle in and around the playa, including a dead specimen that had been caught in the mud and died there. The basin was heavily trampled by cattle with deep hoof punching and numerous trails throughout. The vegetation is heavily grazed and very short. This playa is on the edge of the Chain of Crater region. There are cobble-sized volcanic rocks in the basin, with larger samples found in the surrounding area.

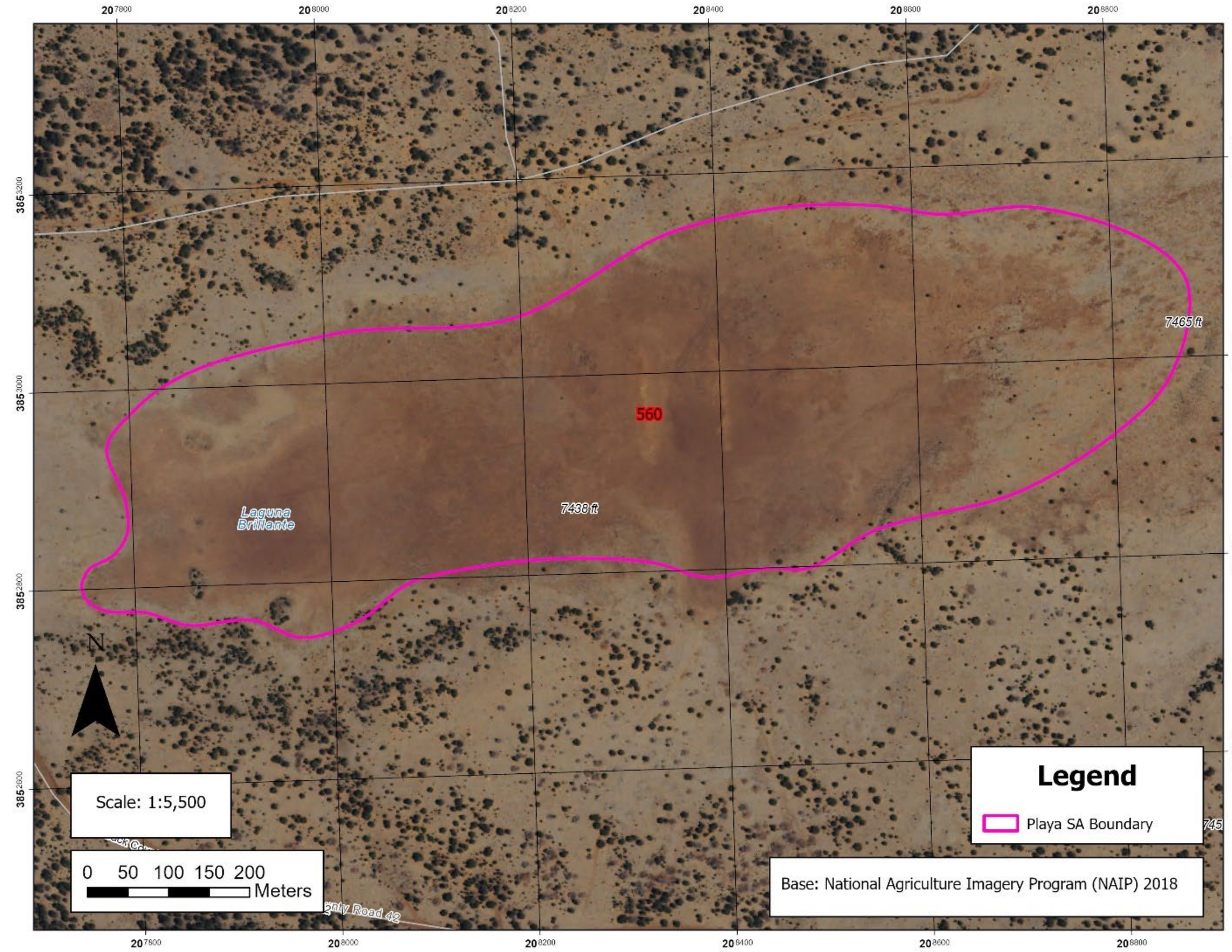


FIGURE 37 PLAYA 560 1:5,500 MAP.

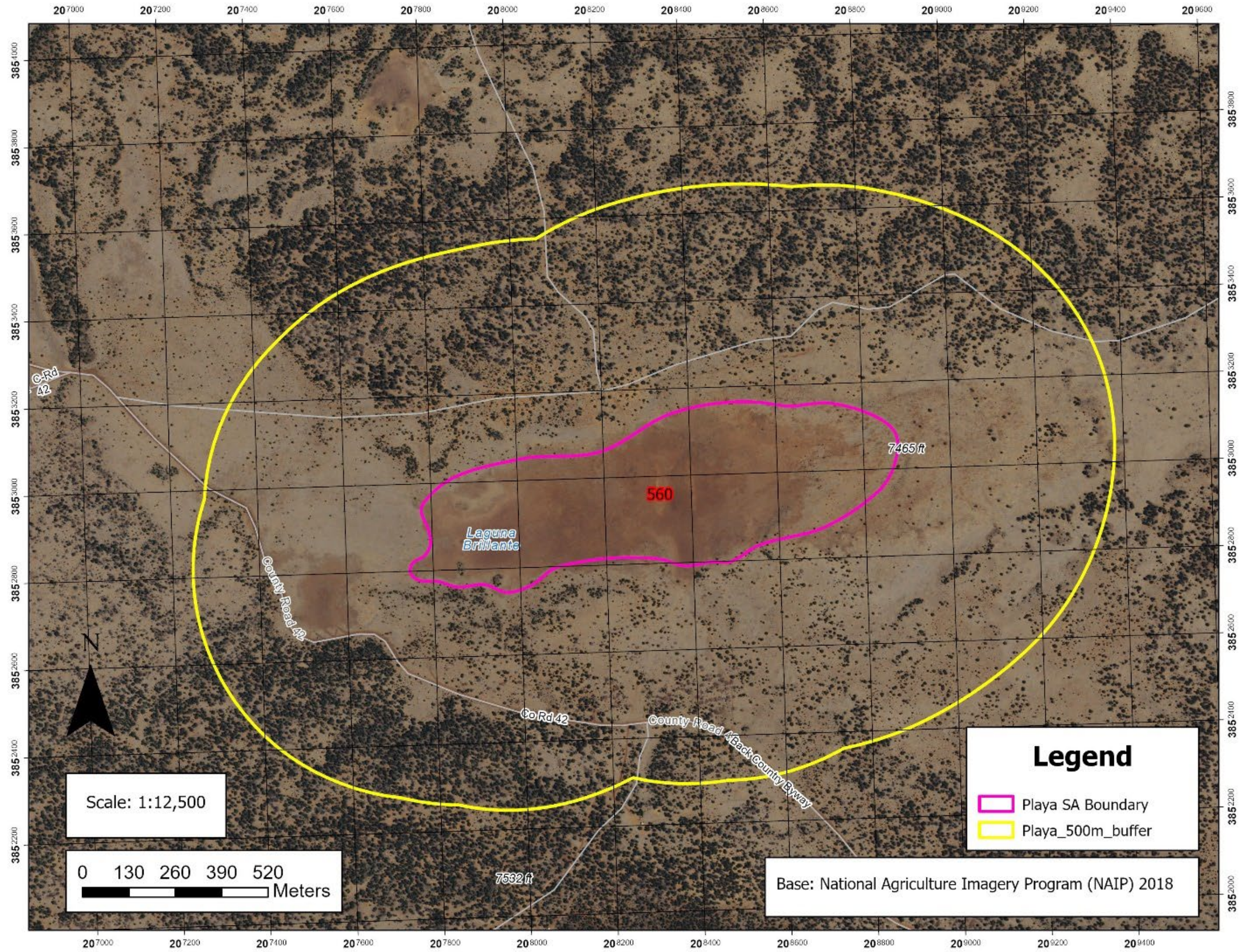


FIGURE 38 PLAYA 560 1:12,500 SURROUNDING LAND USE MAP.

VEGETATION

The area was mainly bare soil with low percent cover of frog fruit (FACW) and spikerush species (FACW). Cover was not noted on the data sheets, photo show an overall percent cover of approximately 5%.

TABLE 19 PLAYA 560 VEGETATION (NR = OBSERVED BUT DATA NOT RECORDED)

Scientific Name	Common Name	Indicator Status	Annual/ Perennial	Playa	% cover Center	% Cover 2nd ring	% Cover 3rd ring
Eleocharis spp.	spikerush	FACW	Annual	560	NR	0	0
Ambrosia acanthicarpa	Annual bursage	Up	Annual	560	NR	0	0
Phyla nodiflora	frogfruit	FACW	Perennial	560	NR	0	0

Soils

The soil was a dense clay with deep cracks throughout, however, there was no evidence of hydric soil in the center of the basin. This is likely due to the excavated pits on both ends of the playa, reducing standing water availability larger basin. Hydric soils may be present nearer to the pits.

TABLE 20 PLAYA 560 SOIL DESCRIPTION

Layer 1	
1 depth (in.)	12
1 matrix color	7.5yr 4/3
1 matrix percent	100
1 redox color	na
1 redox percent	na
1 redox type	na
1 redox loc	na
1 texture	clay

FIGURE 39 PLAYA 560 SOILS, NO CLAYS IN PIT DUG IN CENTER OF LARGER BASIN.

Hydrology and Hydroperiod

The GSWE shows evidence of recurrence in the center of the larger area in the excavated pit, with near 100% recurrence and to a lesser extent in the western end. There is no evidence of standing water elsewhere in the larger basin since 1984. This is very likely caused by the excavation of the playa basin. The GSWE showed standing water in the eastern pit 29 of the 37 recorded years, with 100% increase in the western pit (figure 35. The data also shows that the western end of the basin is drier with water observed 24 years, with a trending decreasing trend of surface water occurrence.

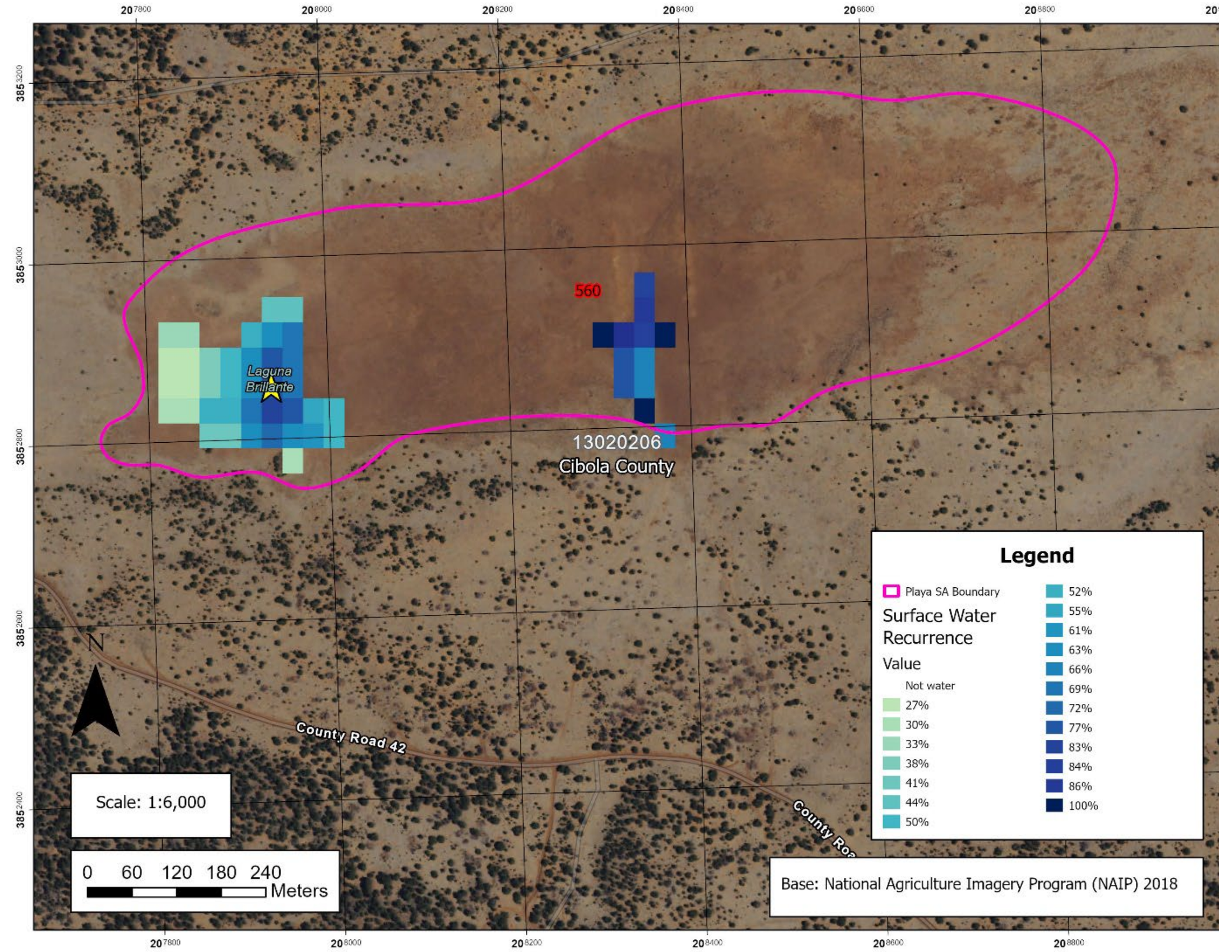
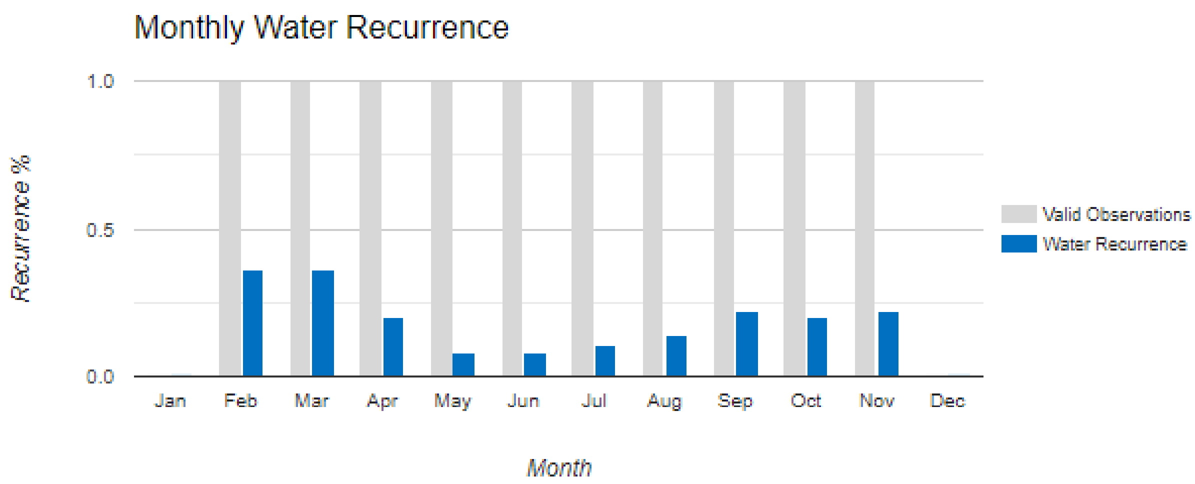


FIGURE 40 PLAYA 560 ANNUAL SURFACE WATER RECURRENCE (GSWE).

Pixel Coordinates: Lat: 34.776004, Long: -108.191572



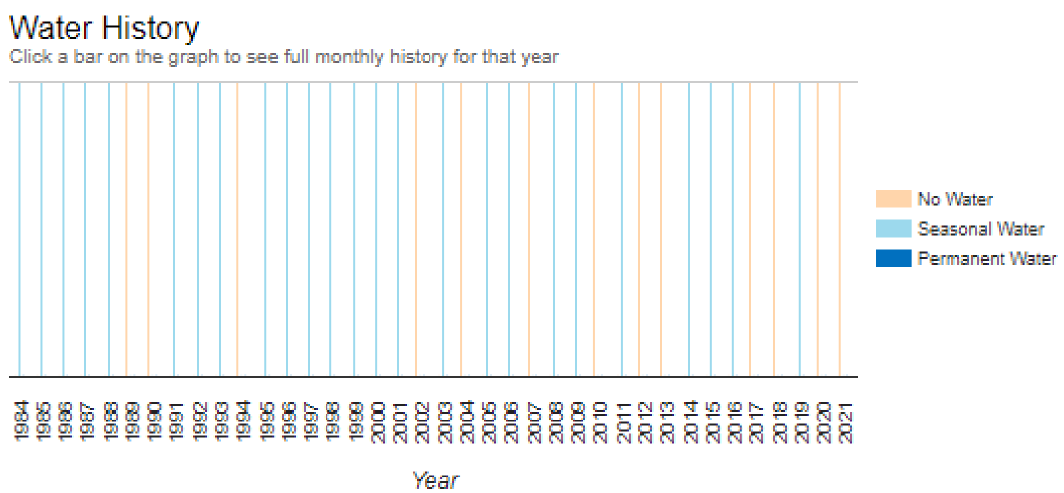


FIGURE 41 PLAYA 560 WET END MONTHLY WATER RECURRENCE (GSWE).

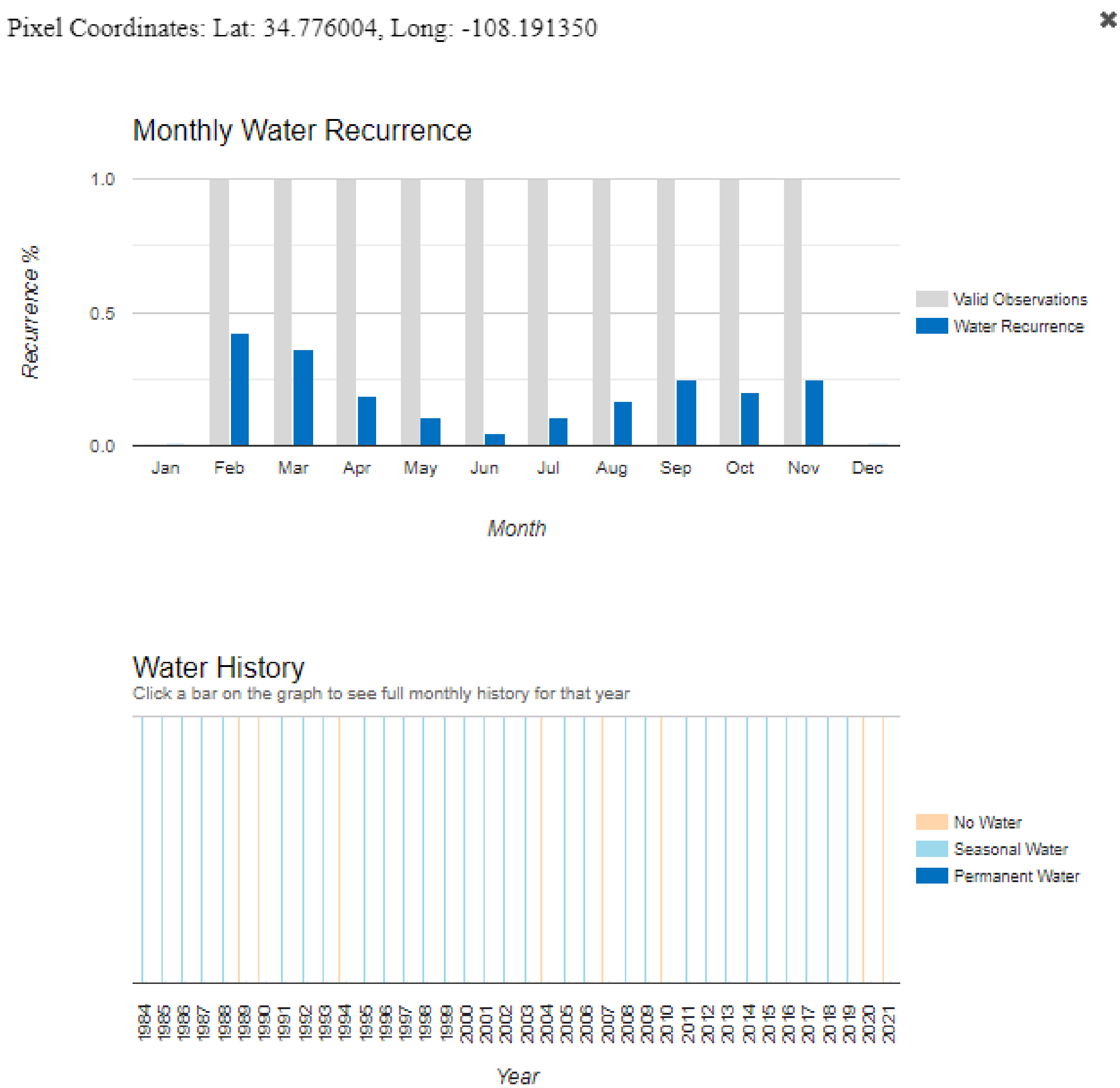


FIGURE 42 PLAYA 560 PLAYA EXCAVATED PIT MONTHLY WATER RECURRENCE (GSWE).

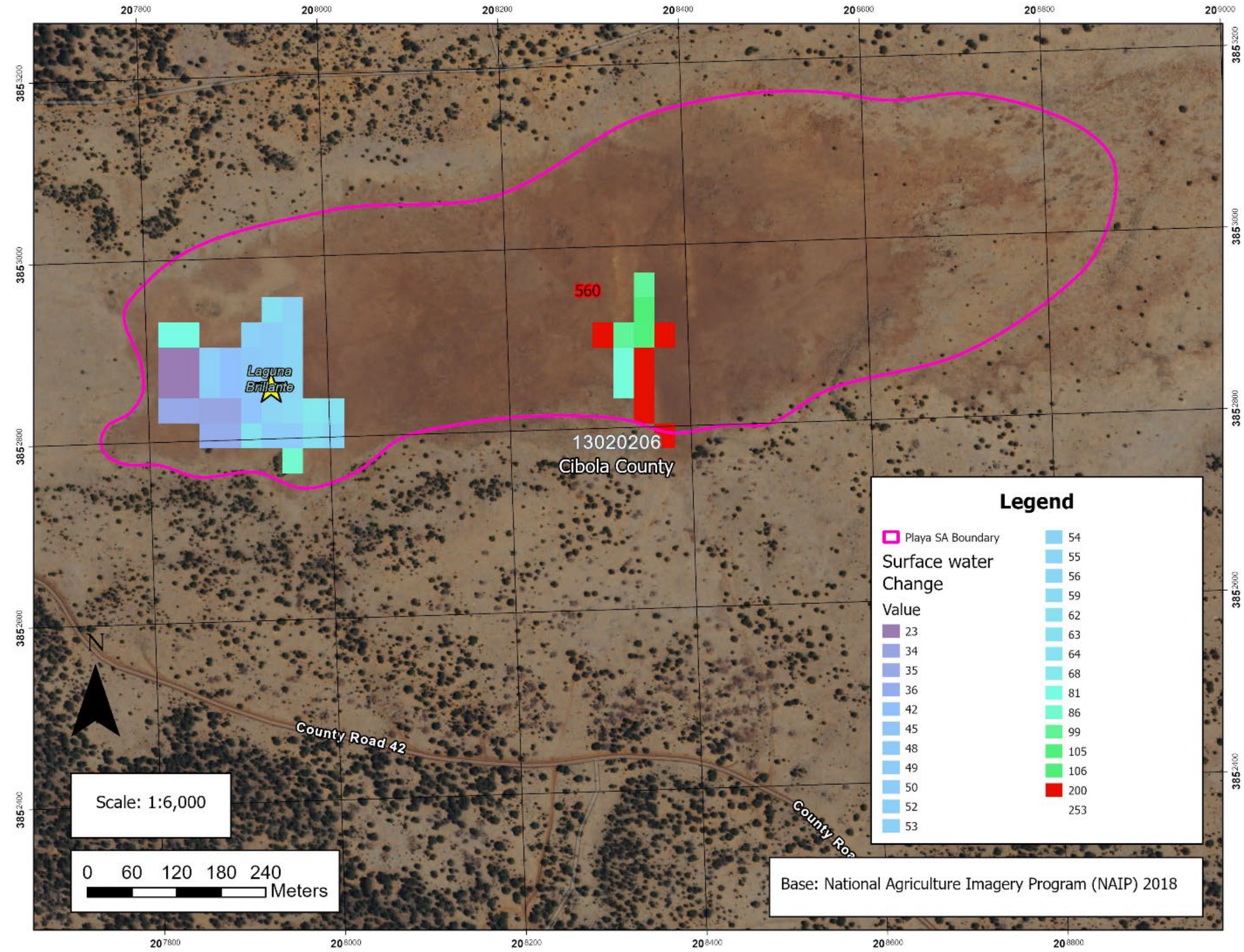


FIGURE 43 SURFACE WATER CHANGE INTENSITY (GSWE).

Playa 1004

TABLE 21 PLAYA 1004

Center UTM	756380.05E, 3853138.55N, 12S	Acreage	0.76
County	Cibola	Wetland Y/N	Y
Watershed (Huc - 8)	13020206	Wetland Vegetation Presence	Y
Geologic Unit	Qbo	Wetland Soil Presence	N
Elevation (ft)	7480	Wetland Hydrology Presence	Y

This small basin was approximately 30 meters from County Rd 42 on a small rise. The basin was covered in cobble-to-basketball sized volcanic rock. The soils were dense clay with deep cracks.

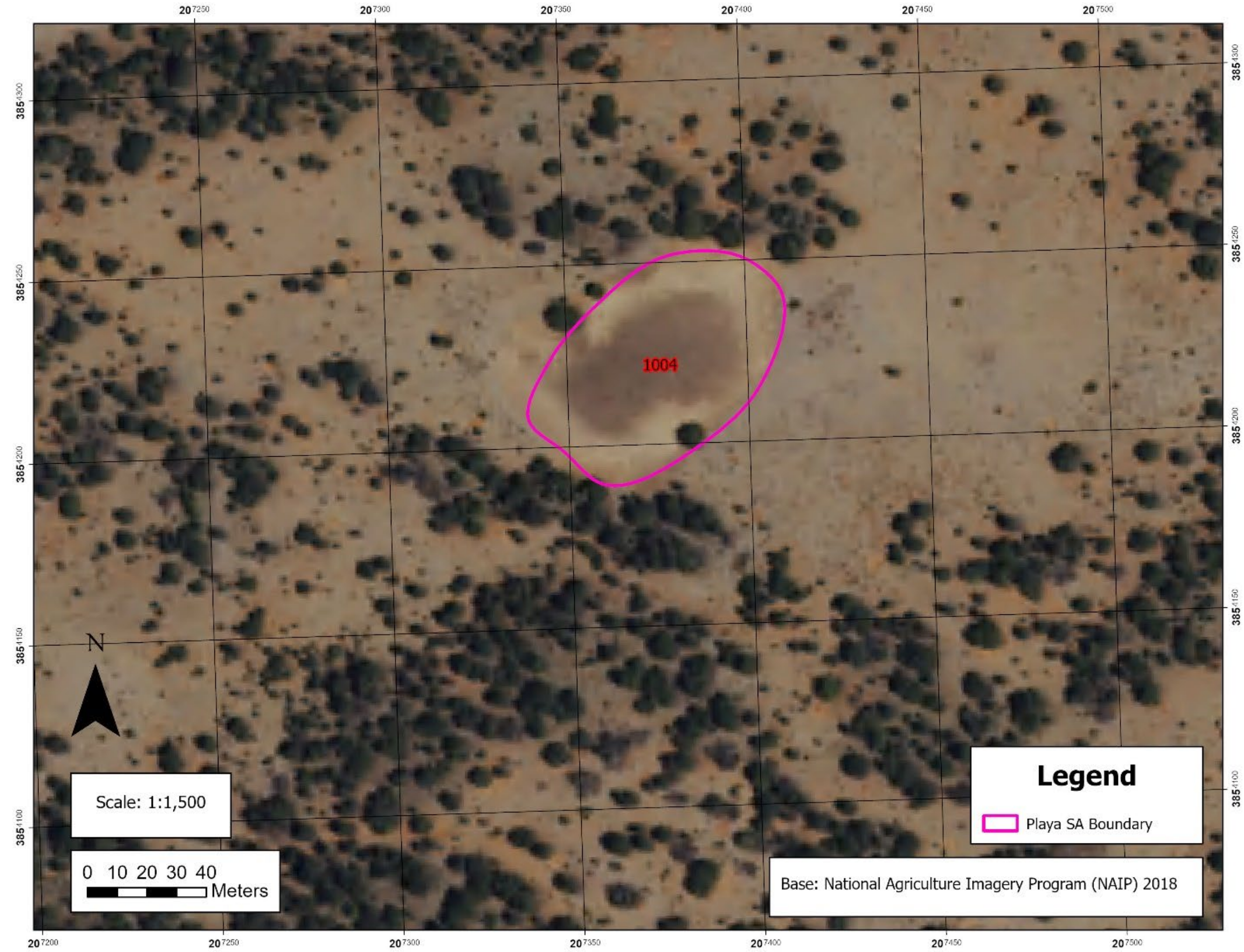


FIGURE 44 PLAYA 1004 1:1,500 MAP.

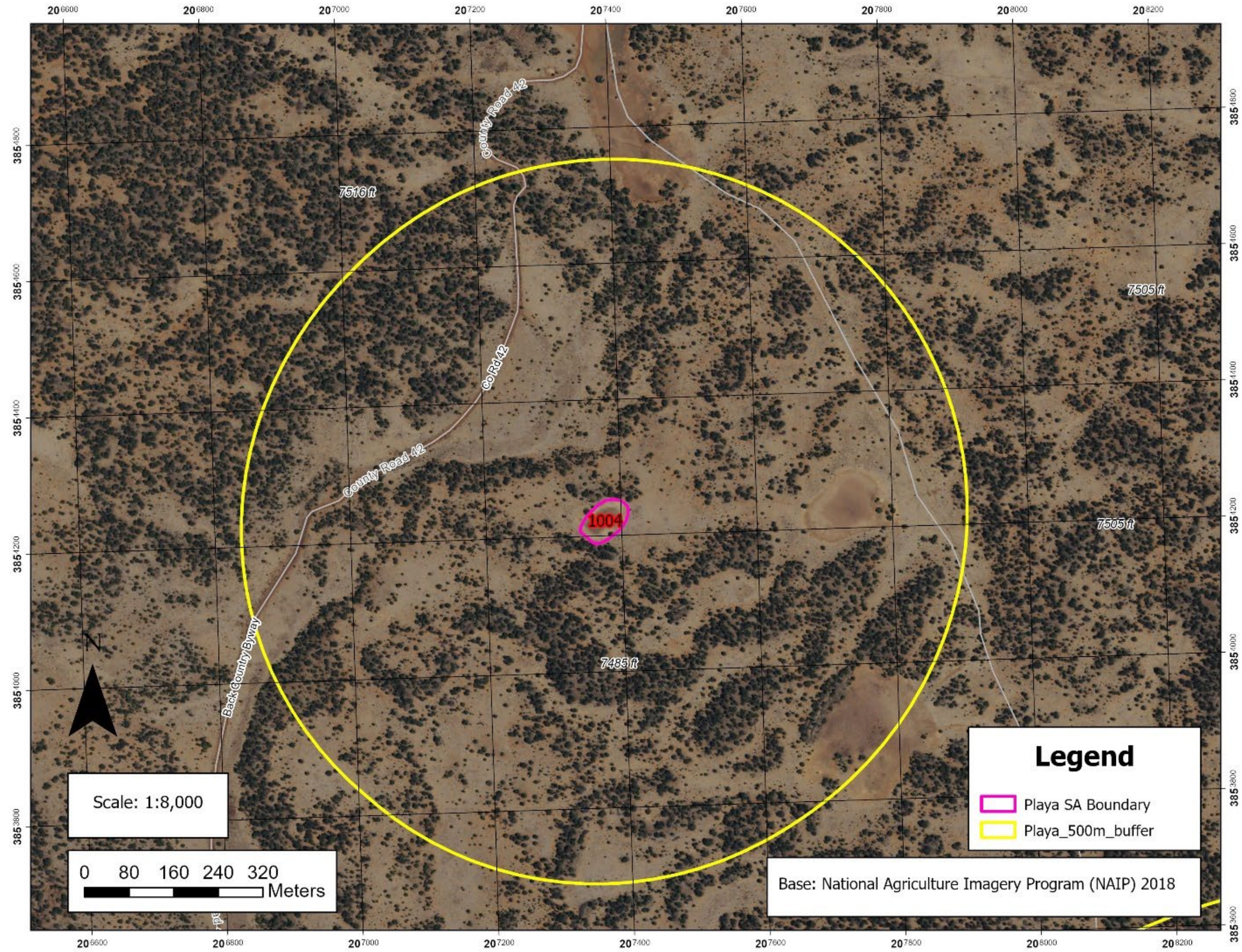


FIGURE 45 PLAYA 1004 1:8,000 SURROUNDING LAND USE MAP.

VEGETATION

The playa had a prevalence of wetland vegetation, with frog fruit (FACW) and western wheatgrass (FAC). There were two distinct vegetation communities.

TABLE 22 PLAYA 1004 VEGETATION

Scientific Name	Common Name	Indicator Status	Annual/ Perennial	Playa	% cover Center	% Cover 2nd ring	% Cover 3rd ring
Phyla nodiflora	frogfruit	FACW	Perennial	1004	30	30	0
Erigeron Spp.	fleabane	UNK	UNK	1004	30	30	0
Pascopyrum smithii	western wheatgrass	FAC	Perennial	1004	10	10	0
Bouteloua gracilis	blue grama	Up	Perennial	1004	5	5	0
Panicum spp?	vine mesquite	Up	Perennial	1004	3	0	0
Lupinus kingii	king lupine	Up	Annual	1004	0	1	0

Gutierrezia sarothrae	broom snakeweed	Up	Perennial	1004	0	4	0

Soils

The soils were dense clay with deep cracks. The surface was covered in large volcanic rocks throughout the basin and larger areas. No hydric soil indicators were found.

TABLE 23 PLAYA 1004 SOIL DESCRIPTION

Layer 1	
1 depth	12
1 matrix color	10yr 3/2
1 matrix percent	100
1 redox color	na
1 redox percent	na
1 redox type	na
1 redox loc	na
1 texture	clay

FIGURE 46 CRACKED CLAYS SOILS IN PLAYA 1004

Hydrology and Hydroperiod

Surface soil cracks were the only hydrology indicators found. There was also no evidence to indicate the hydroperiod at this location. The Global Surface water Explorer did not have evidence of standing surface water at this location, though the depression's small size could mean that there is standing water too small in area to be seen in the satellite imagery.

Playa 549

This was a small basin with a fence running north-south through the center of the basin. It was located directly adjacent to CR 42 and was surrounded by small hills.

TABLE 24 PLAYA 549

Center UTM	770628.64E, 3846460.93N, 12S	Acreage	0.81
County	Cibola	Wetland Y/N	Y
Watershed (Huc - 8)	13020206	Wetland Vegetation Presence	Y
Geologic Unit	Qbo	Wetland Soil Presence	N
Elevation (ft)	7070	Wetland Hydrology Presence	N

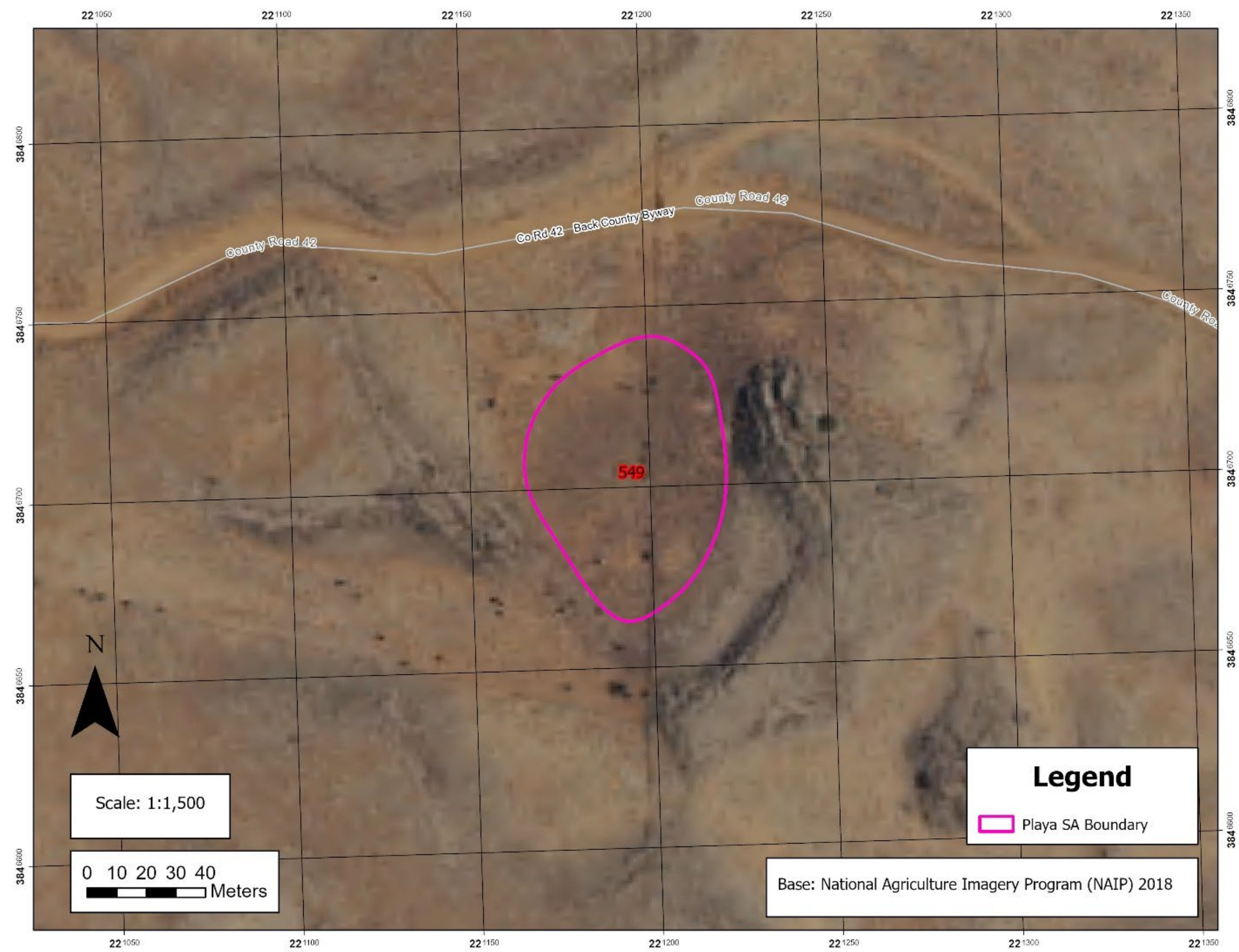


FIGURE 47 PLAYA 549 1:1,500 MAP

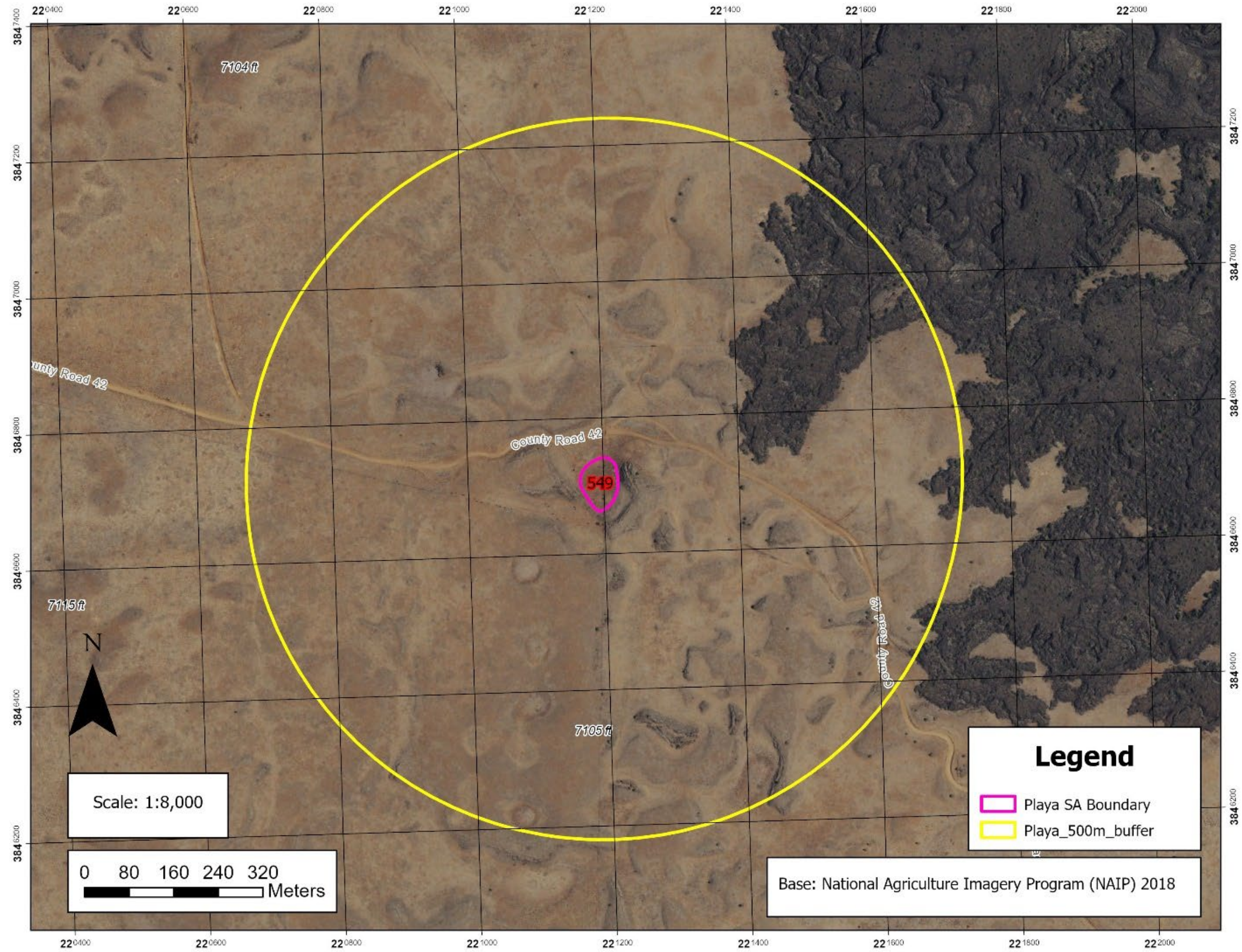


FIGURE 48 PLAYA 549 1:8,000 SURROUNDING LAND USE MAP

VEGETATION

The vegetation was dominated by hairy gumweed, a FACW wetland plant. There were no distinct rings of vegetation around the center of this playa.

TABLE 25 VEGETATION PLAYA 549.

Scientific Name	Common Name	Indicator Status	Annual/ Perennial	Playa	% cover Center	% Cover 2nd ring	% Cover 3rd ring
Grindelia hirsutula	hairy gumweed	FACW	Perennial	549	40	0	0
Erigeron Spp.	fleabane	UNK	UNK	549	5	0	0
Hordeum jubatum	fox tail barley	FAC	Perennial	549	5	0	0
Convolvulus arvensis	field bindweed	Up	Annual	549	10	0	0
Spaeralcea coccinea	scarlet globemallow	Up	Perennial	549	2	0	0
Distichlis spicata	desert salt grass	FAC	Perennial	549	15	0	0

Oenothera albicaulis	white-stem evening primrose	Up	Annual	549	2	0	0

Soils

The top 12 inches of soil was sandy loam, with no hydric indicators.

TABLE 26 PLAYA 549 SOILS

Layer 1	
1 depth (in.)	12
1 matrix color	7.5yr 3/3
1 matrix percent	100
1 redox color	na
1 redox percent	na
1 redox type	na
1 redox loc	na
1 texture	silt loam

Hydrology and hydroperiod

There were no hydrology indicators found. There was also no evidence to indicate the hydroperiod at this location. The Global Surface water Explorer did not have evidence of standing surface water at this location, though the depression's small size could mean that there is standing water too small in area to be seen in the satellite imagery.

DEPRESSION 543

FIGURE 49 DEPRESSION 543, NOTE THAT THIS SITE WAS NOT A WETLAND.

This was one of a number of shallow depressions on the hills west of CR 42 near Playa 549. There were no wetland indicators found at this location, though it was mapped as a playa.

TABLE 27 DEPRESSION 543

Center UTM	770514.78E, 3845967.90N, 12S	Acreage	0.40
County	Cibola	Wetland Y/N	N
Watershed (Huc - 8)	13020206	Wetland Vegetation Presence	N
Geologic Unit	Qbo	Wetland Soil Presence	N
Elevation (ft)	7113	Wetland Hydrology Presence	N

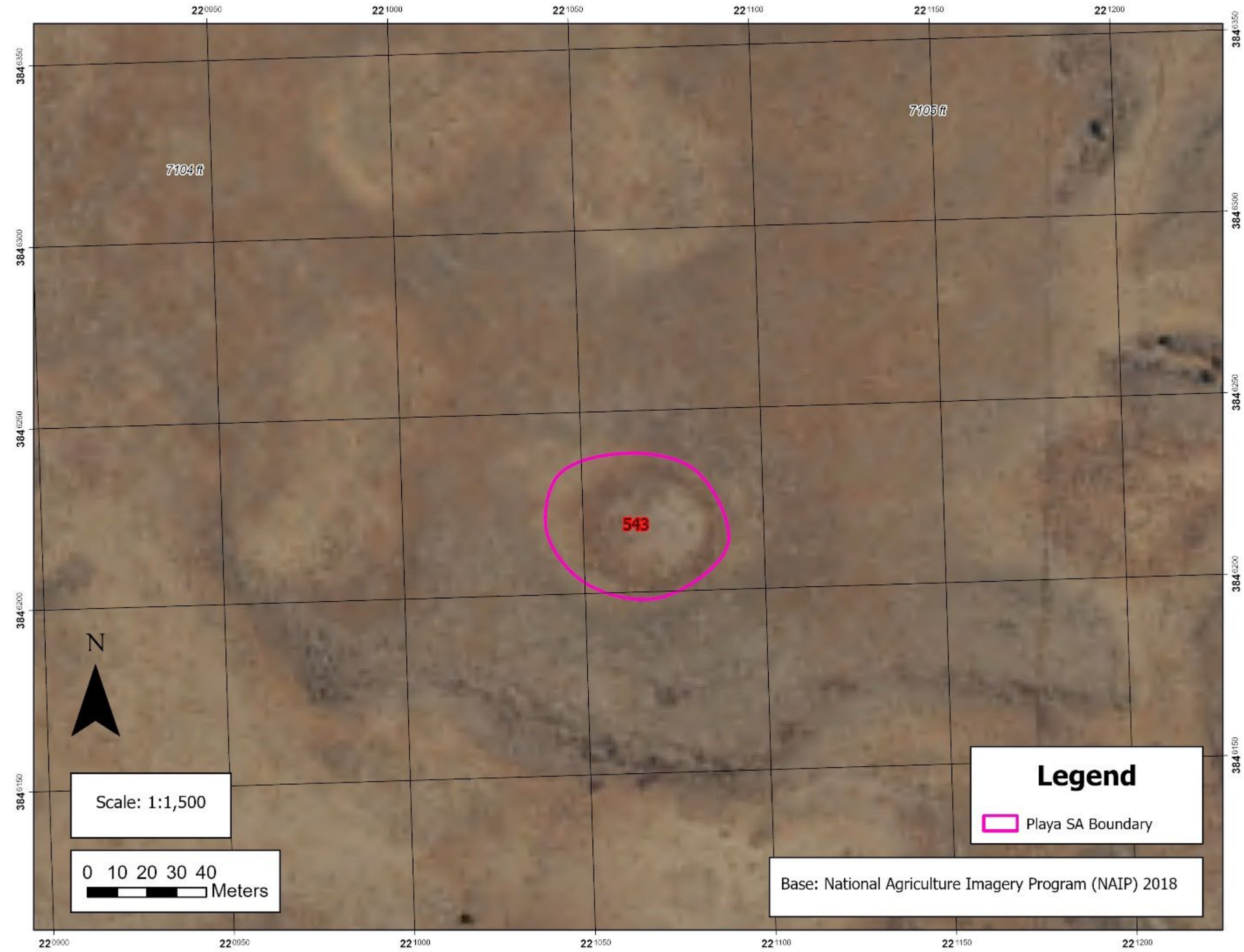


FIGURE 50 DEPRESSION 543 1:1,500 MAP.

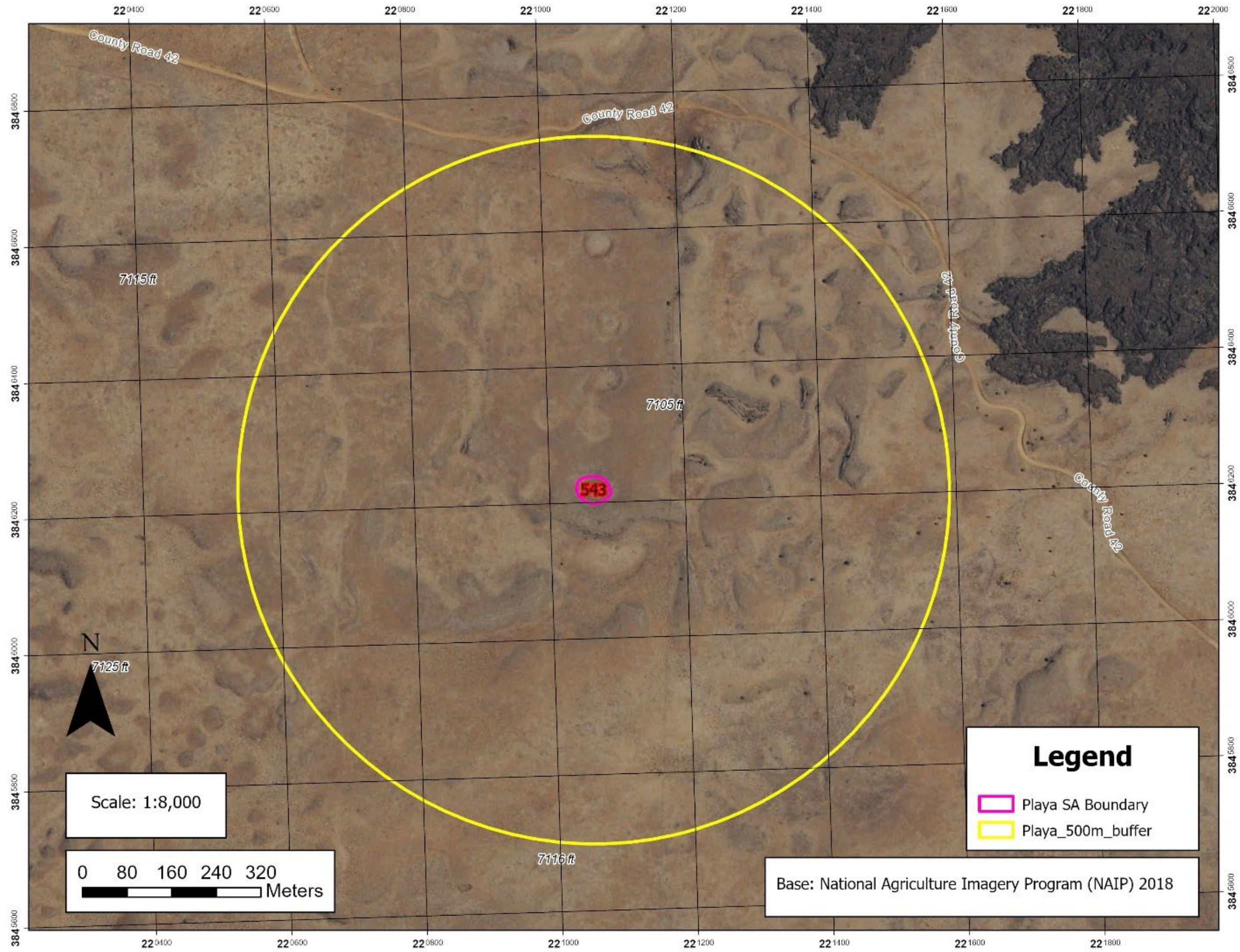


FIGURE 51 PLAYA 543 1:8,000 SURROUNDING LAND USE MAP.

Vegetation

TABLE 28 DEPESSION 543 VEGETATION (NR = OBSERVED BUT DATA NOT RECORDED)

Scientific Name	Common Name	Indicator Status	Annual/ Perennial	Playa	% cover Center	% Cover 2nd ring	% Cover 3rd ring
Bouteloua gracilis	blue grama	Up	Perennial	543	40	0	0
Erigeron Spp.	fleabane	UNK	UNK	543	40	0	0
Artemisia frigida	prairie sagewort	Up	Perennial	543	NR	0	0
Spaeralcea coccinea	scarlet globemallow	Up	Perennial	543	5	0	0
Verbena bracteata	Big-bract Verbena	FAC	Annual	543	NR	0	0
Bouteloua simplex	mat grama	Up	Annual	543	NR	0	0

Soils

TABLE 29 DEPRESSION 543 SOILS.

Layer 1	

1 depth	12
1 matrix color	7.5yr 3/3
1 matrix percent	100
1 redox color	na
1 redox percent	na
1 redox type	na
1 redox loc	na
1 texture	silt loam

Hydrology and Hydroperiod

There were no hydrology indicators found. There was also no evidence to indicate the hydroperiod at this location. The Global Surface Water Explorer did not have evidence of standing surface water at this location, though the depression's small size could mean that there is standing water too small in area to be seen in the satellite imagery.

Playa 950

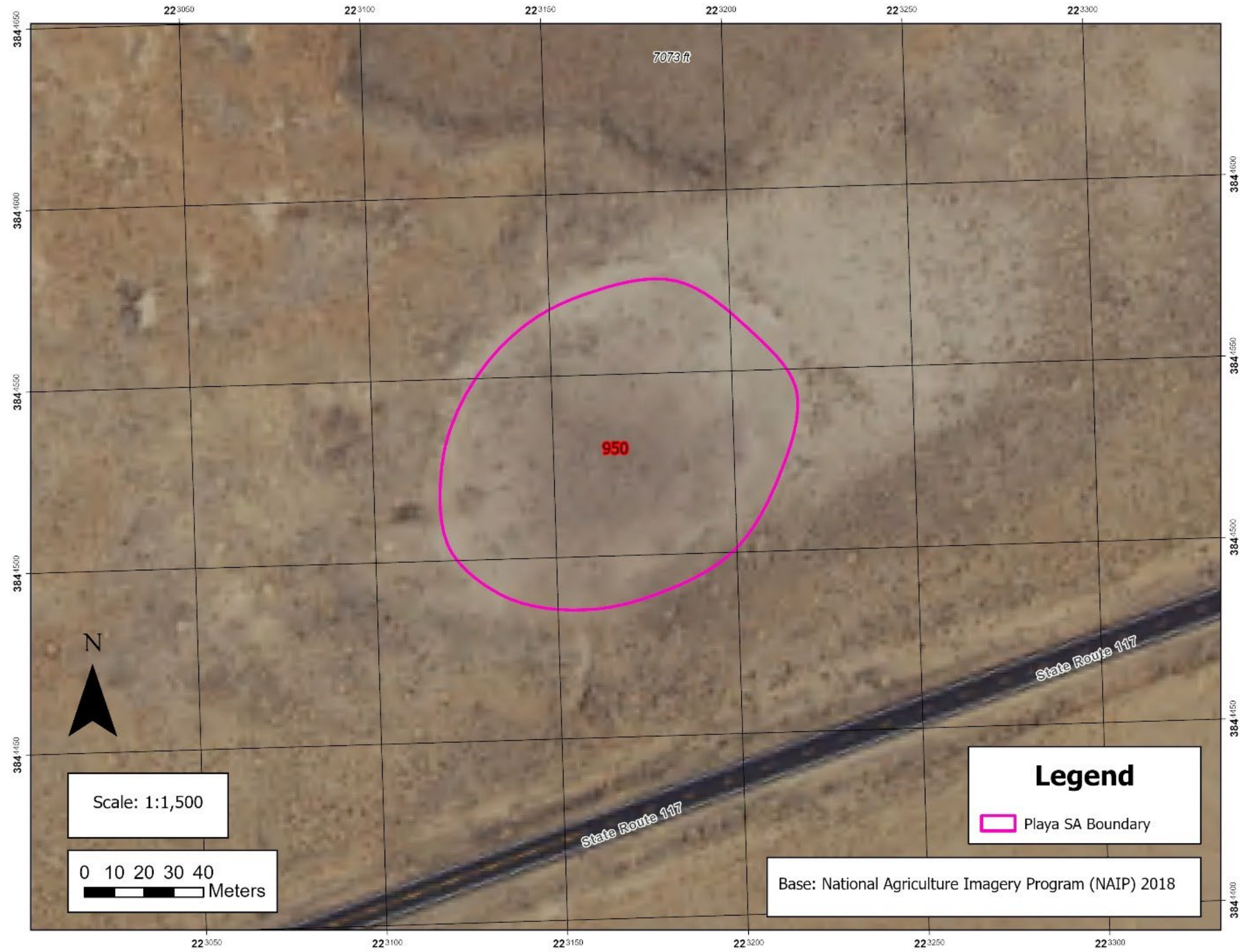


FIGURE 52 PLAYA 950 1:1,500 MAP.

TABLE 30 PLAYA 950

Center UTM	772715.61E, 384407.20N, 12S	Acreage	1.69
County	Cibola	Wetland Y/N	Y
Watershed (Huc - 8)	13020206	Wetland Vegetation Presence	N
Geologic Unit	Qb	Wetland Soil Presence	N
Elevation (ft)	7061	Wetland Hydrology Presence	Y

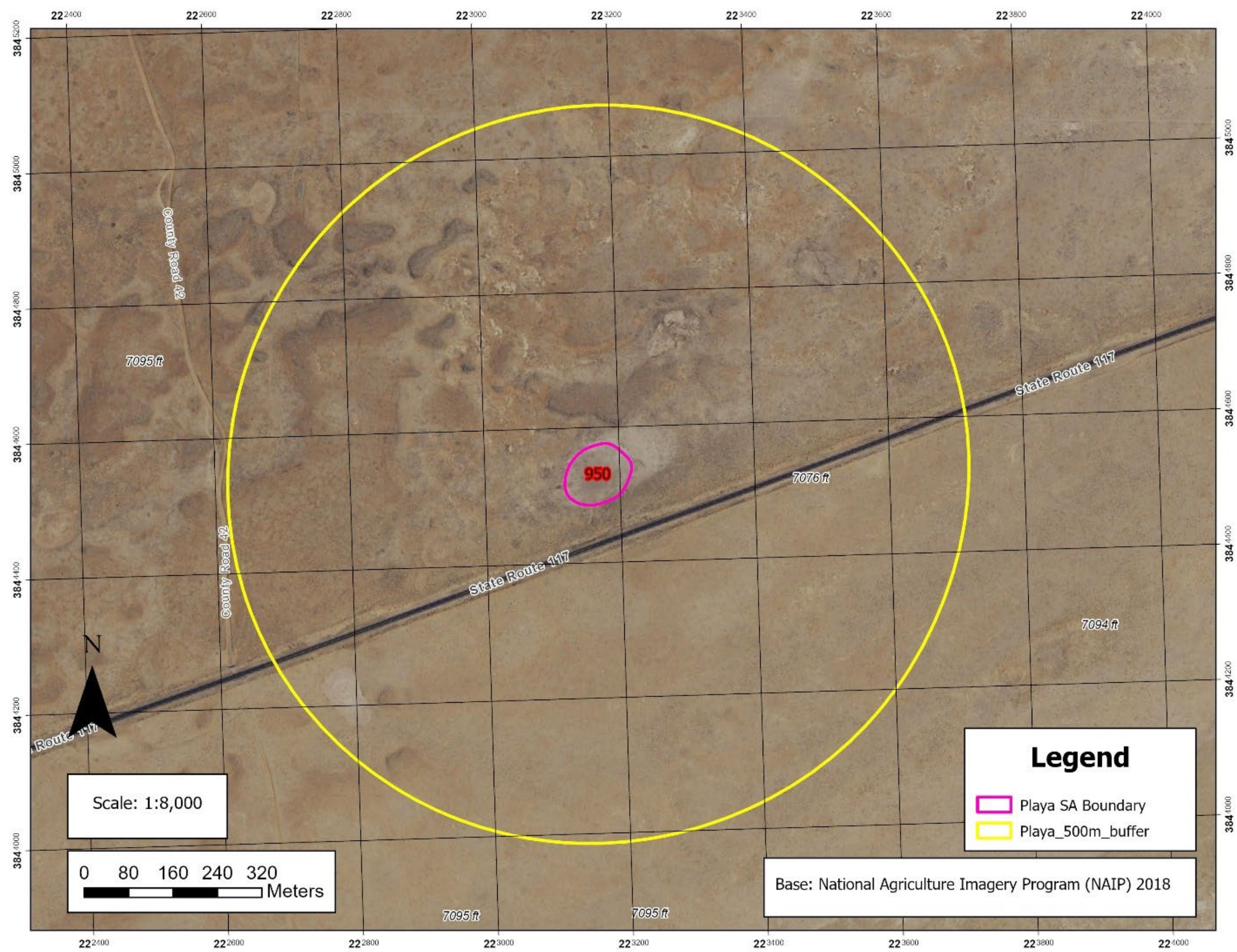


FIGURE 53 PLAYA 950 1:8,000 SURROUNDING LAND USE MAP

Playa 950 is one of a series of small depressions adjacent to NM 117 near the turn off to CR 42. This location had surface soil cracks and a bare soil center that was heavily trampled by cattle. There were cobble sized volcanic cobble and boulders throughout the basin and surrounding areas. A culvert under NM 117 and a small gully were increasing flow into the playa. A long-billed curlew was present in the playa.

VEGETATION

The center of the playa was bare and cracked soil. The 2nd ring was dominated by sunflowers and goosefoot with no prevalence of wetland species. There were two distinct vegetation communities surrounding the bare soil center.

TABLE 31 PLAYA 950 VEGETATION

Scientific Name	Common Name	Indicator Status	Annual/ Perennial	Playa	% cover Center	% Cover 2nd ring	% Cover 3rd ring

Asteracea spp	sunflower spp	UNK	UNK	950	0	25	0
Chenapodium spp	UNK goosefoot	UNK	UNK	950	0	25	0
Rumex salicifolius	willow dock	FACW	Perennial	950	0	5	0
Phyla nodiflora	frogfruit	FACW	Perennial	950	0	3	3
Verbena bracteata	Big-bract Verbena	FAC	Annual	950	0	2	0
Asteracea spp	UNK	UNK	UNK	950	0	2	0
Astragalus Spp	UNK milkvetch	UNK	UNK	950	0	2	
Grindelia hirsutula	hairy gumweed	FACW	Perennial	950	0	0	25
Pascopyrum smithii	western wheatgrass	FAC	Perennial	950	0	0	10
Erigeron Spp.	fleabane	UNK	UNK	950	0	0	5
Sporobolus airoides	alkali sacaton	FAC	Perennial	950	0	0	5
Aristada spp	threeawn spp	UNK	UNK	950	0	0	1
Elymus elymoides	bottlebrush squirreltail	FACU	Perennial	950	0	0	1

Soils

TABLE 32 PLAYA 950 SOILS

Layer 1	
1 depth	15
1 matrix color	10yr 4/2
1 matrix percent	100
1 redox color	na
1 redox percent	na
1 redox type	na
1 redox loc	na
1 texture	clay

FIGURE 54 CLAY SOILS WITH DEEP CRACKS, PLAYA 950.

Hydrology and Hydroperiod

This playa had the hydrology indicator of surface soil cracks. Satellite imagery data shows that Playa 950 has less than 10% recurrence of surface water in the late winter and early spring, with a near 50% recurrence of surface water over the last 37 years in the monsoon season. The playa is relatively dry with surface water observed 18 of the recorded years. Occurrence change data shows a slight decrease in recurrence in part of the basin and an increase in the western end of the playa. This could be due to the influence of the culvert and shallow drainage into the basin.

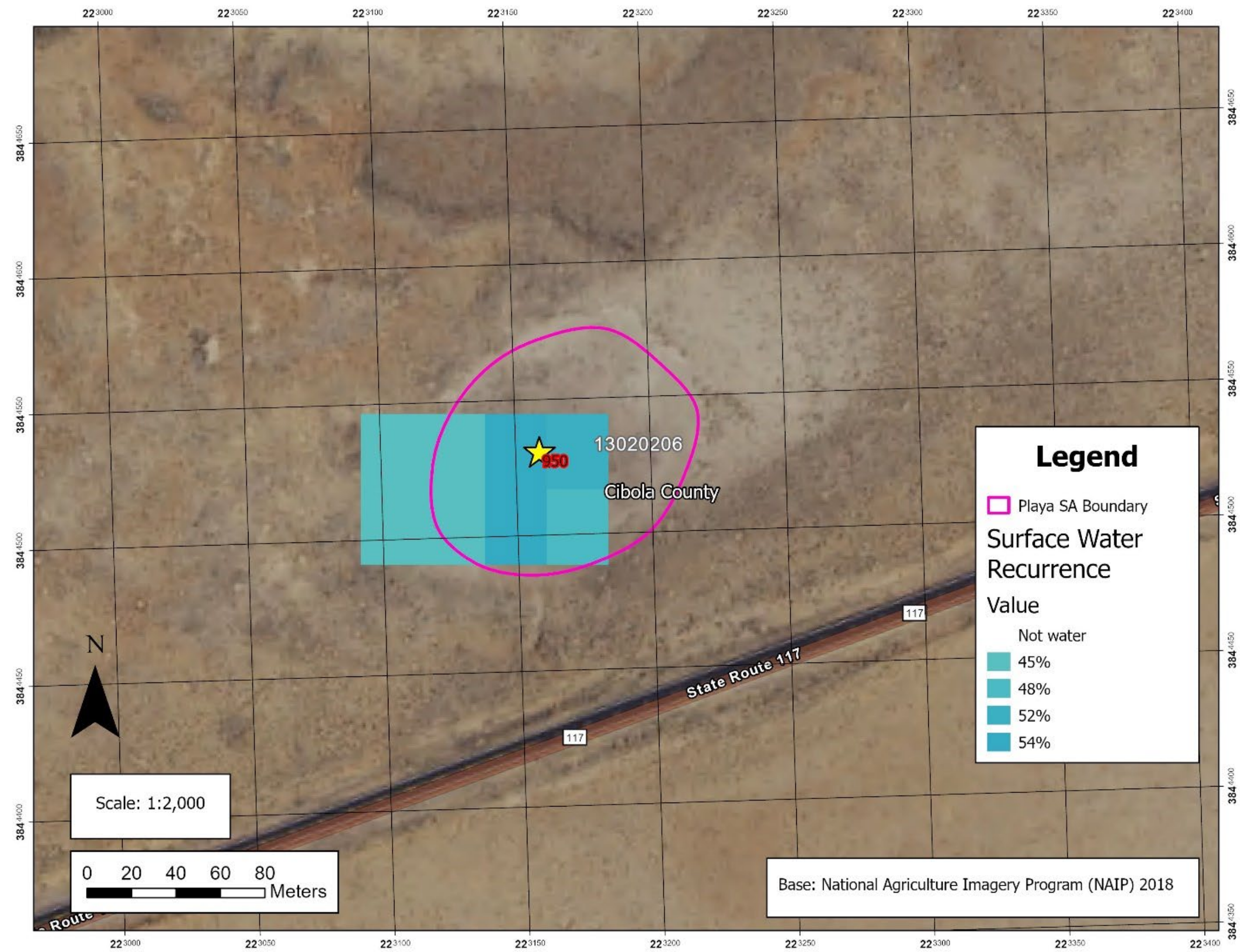


FIGURE 55 PLAYA 950 ANNUAL SURFACE WATER RECURRENCE (GSWE).

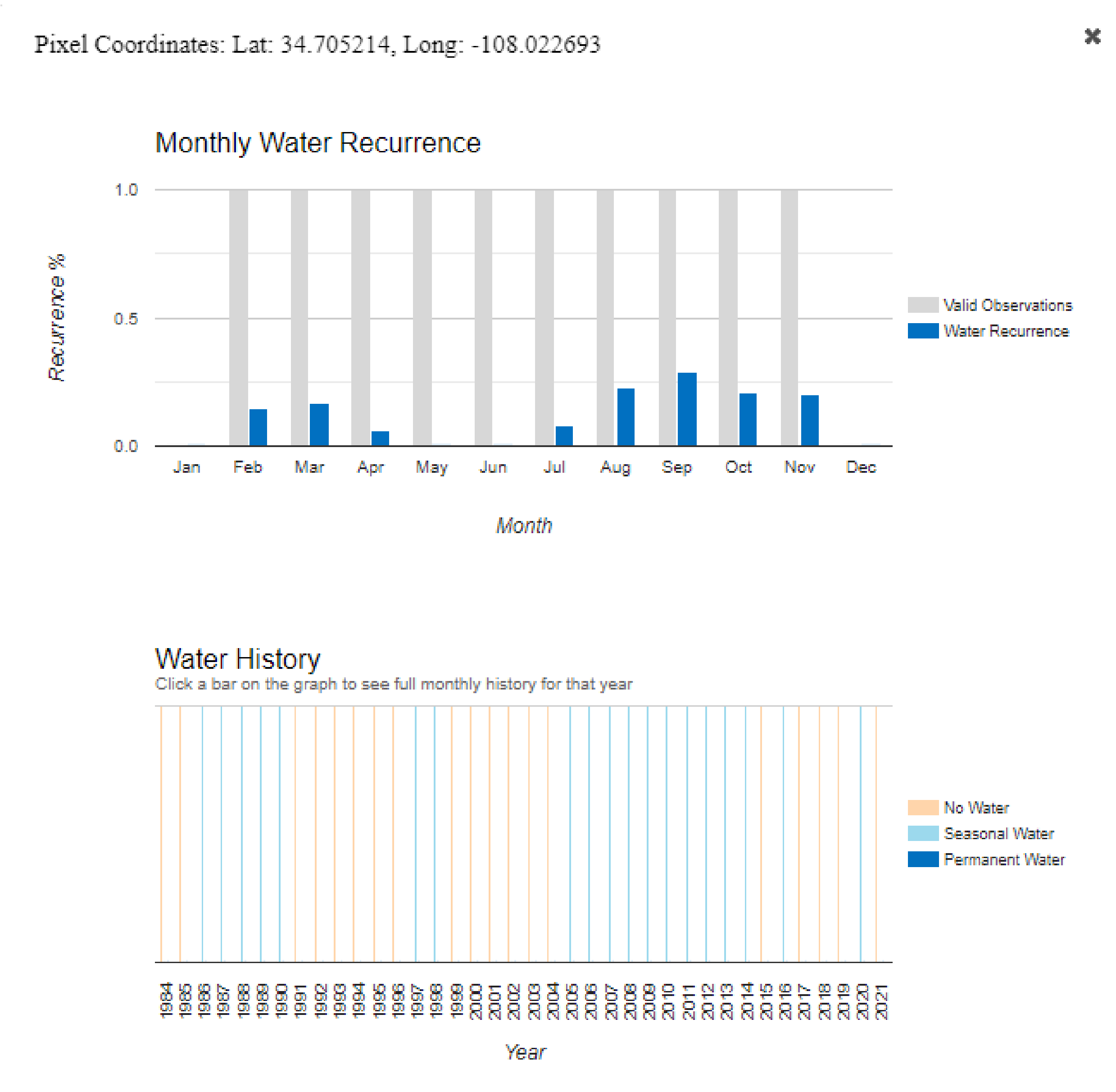


FIGURE 56 PLAYA 950 PLAYA 356 MONTHLY SURFACE WATER RECURRENCE (GSWE).

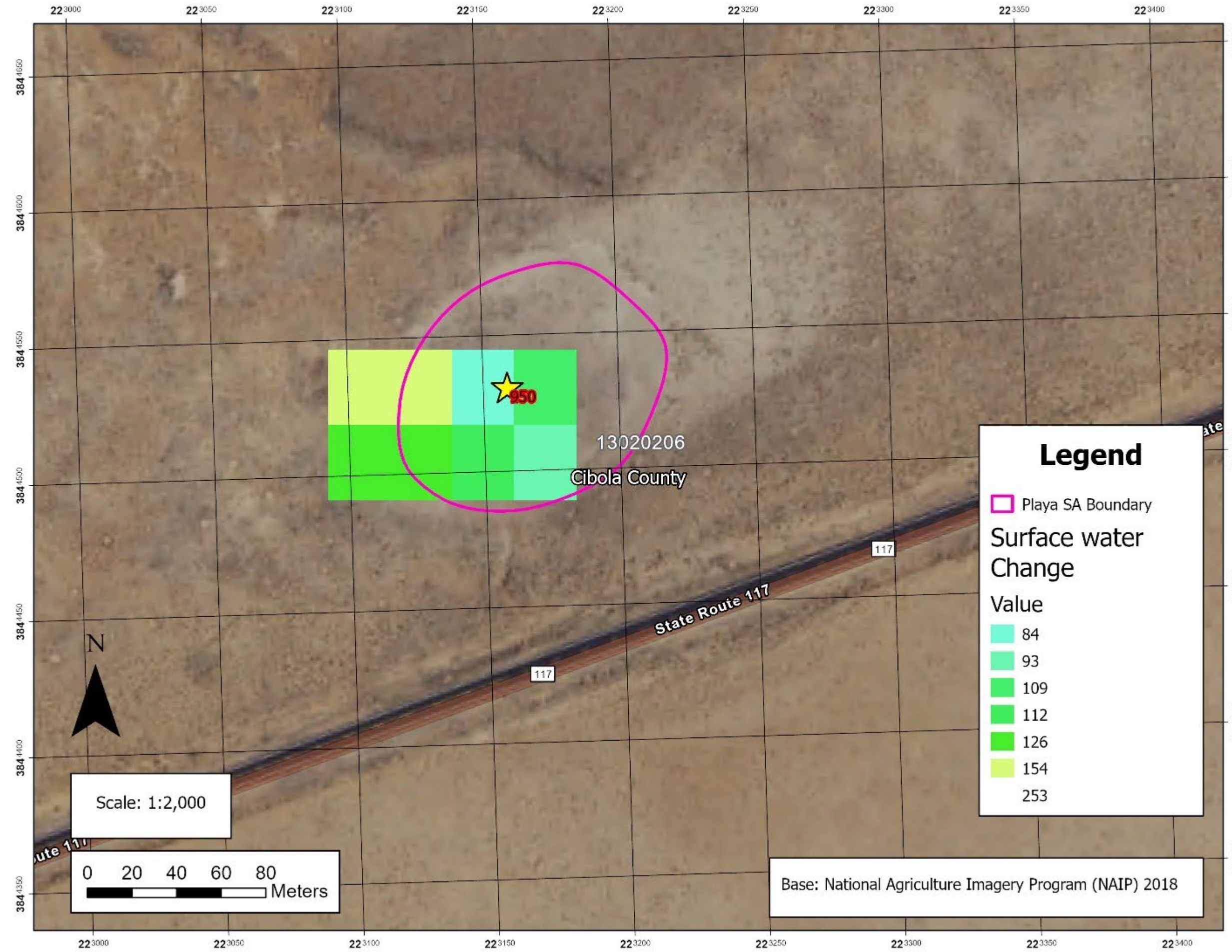


FIGURE 57 SURFACE WATER CHANGE INTENSITY (GSWE)

Depression 525

This site was near the west end of an oblong depression near NM 117 just west of Playa 950. It had two inlets that were allowing drainage and sedimentation into the basin. There were cobble-sized volcanic rocks throughout the basin and surrounding area. There were no hydric indicators present. This depression is not a wetland.

TABLE 33 DEPRESSION 525

Center UTM	772810.61E, 3844605.45, 12S	Acreage	0.3
County	Cibola	Wetland Y/N	N
Watershed (Huc - 8)	13020206	Wetland Vegetation Presence	N
Geologic Unit	Qb	Wetland Soil Presence	N
Elevation (ft)	7095	Wetland Hydrology Presence	N

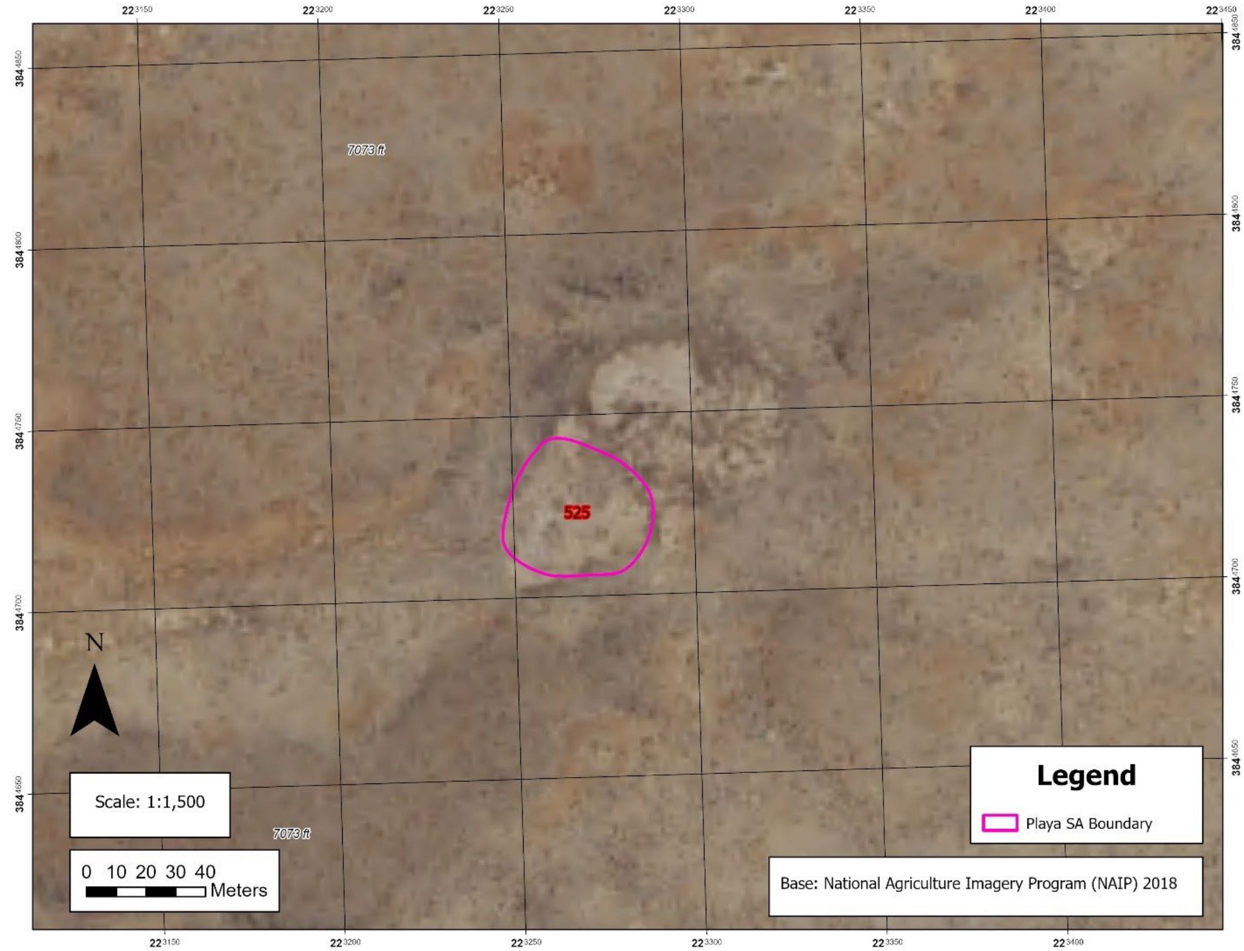


FIGURE 58 DEPRESSION 525 1:1,500 MAP.

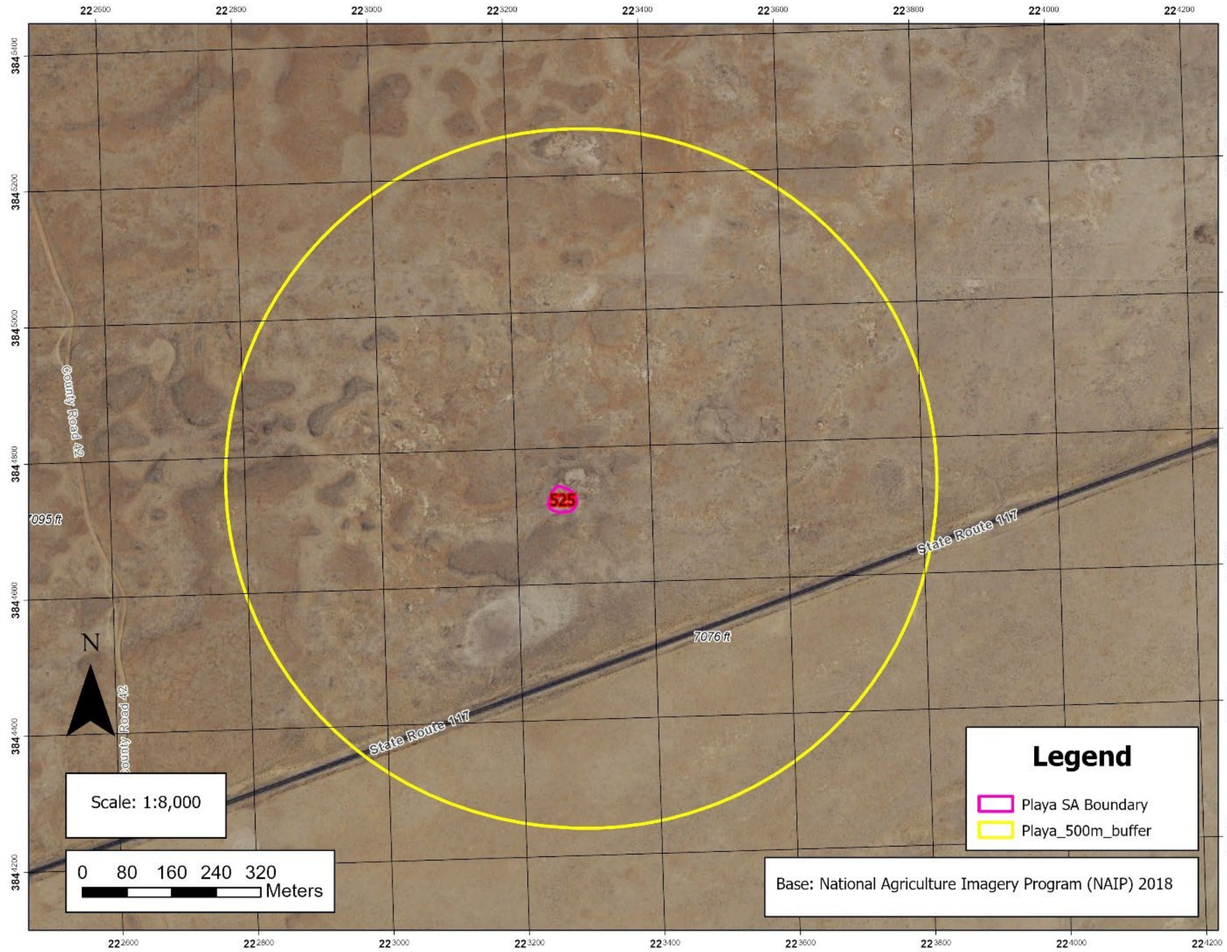


FIGURE 59 DEPRESSION 525 1:8,000 SURROUNDING LAND USE MAP.

VEGETATION

The vegetation was dominated by upland annuals, though only a small presence of FACW species. There was only one vegetation community present.

TABLE 34 DEPRESSION 525 VEGETATION

Scientific Name	Common Name	Indicator Status	Annual/ Perennial	Playa	% cover Center	% Cover 2nd ring	% Cover 3rd ring
Bouteloua simplex	mat grama	Up	Annual	525	30	0	0
Grindelia hirsutula	hairy gumweed	FACW	Perennial	525	5	0	0
Erigeron Spp.	fleabane	UNK	UNK	525	2	0	0
Sporobolus airoides	alkali sacaton	FAC	Perennial	525	5	0	0
Phyla nodiflora	frogfruit	FACW	Perennial	525	2	0	0
Asteracea spp	UNK	UNK	UNK	525	5	0	0

Oenothera albicaulis	white-stem evening primrose	Up	Annual	525	1	0	0

Soils

There were no hydric soil indicators and the top 4” of soil was silt loam covering a buried clay layer.

Hydrology and Hydroperiod

There were no hydrology indicators found. There was also no evidence to indicate the hydroperiod at this location. The Global Surface water Explorer did not have evidence of standing surface water at this location, though the depression’s small size could mean that there is standing water too small in area to be seen in the satellite imagery.

Depression 697

This depression is just west of depression 525 at the far west end of the same oblong basin. It was dominated by an unknown clump grass, with a ring of bare soil surrounding it. There was a shallow drainage bringing water and sedimentation to the depression. There were cobble-to-basketball sized volcanic rocks in the basin. There were no hydric indicators present. This depression is not a wetland.

TABLE 35 PLAYA 697

Center UTM	772837.20E, 3844636.22N, 12S	Acreage	0.28
County	Cibola	Wetland Y/N	N
Watershed (Huc - 8)	13020206	Wetland Vegetation Presence	N
Geologic Unit	Qb	Wetland Soil Presence	N
Elevation (ft)	7073	Wetland Hydrology Presence	N

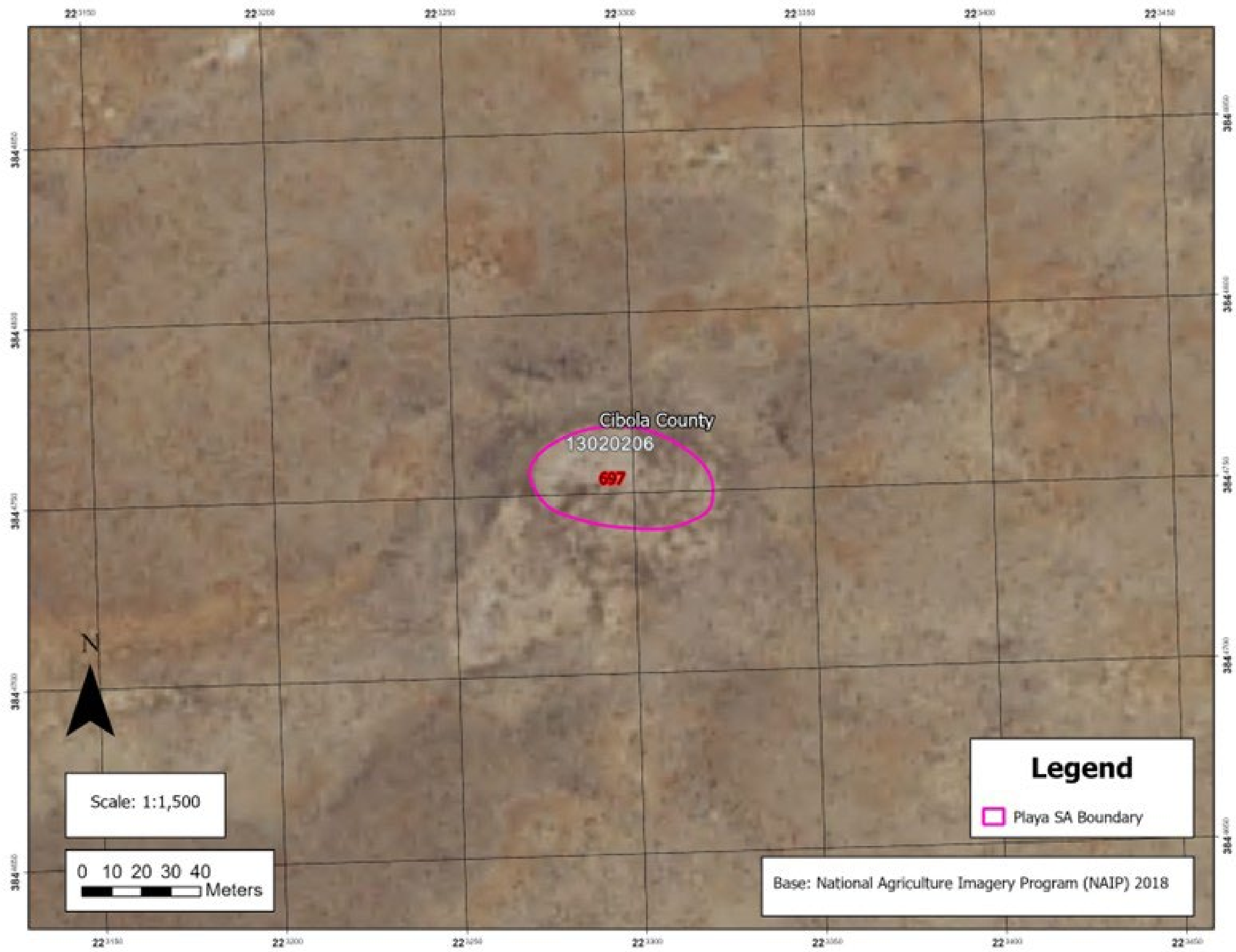


FIGURE 60 DEPRESSION 697 1:1,500 MAP.

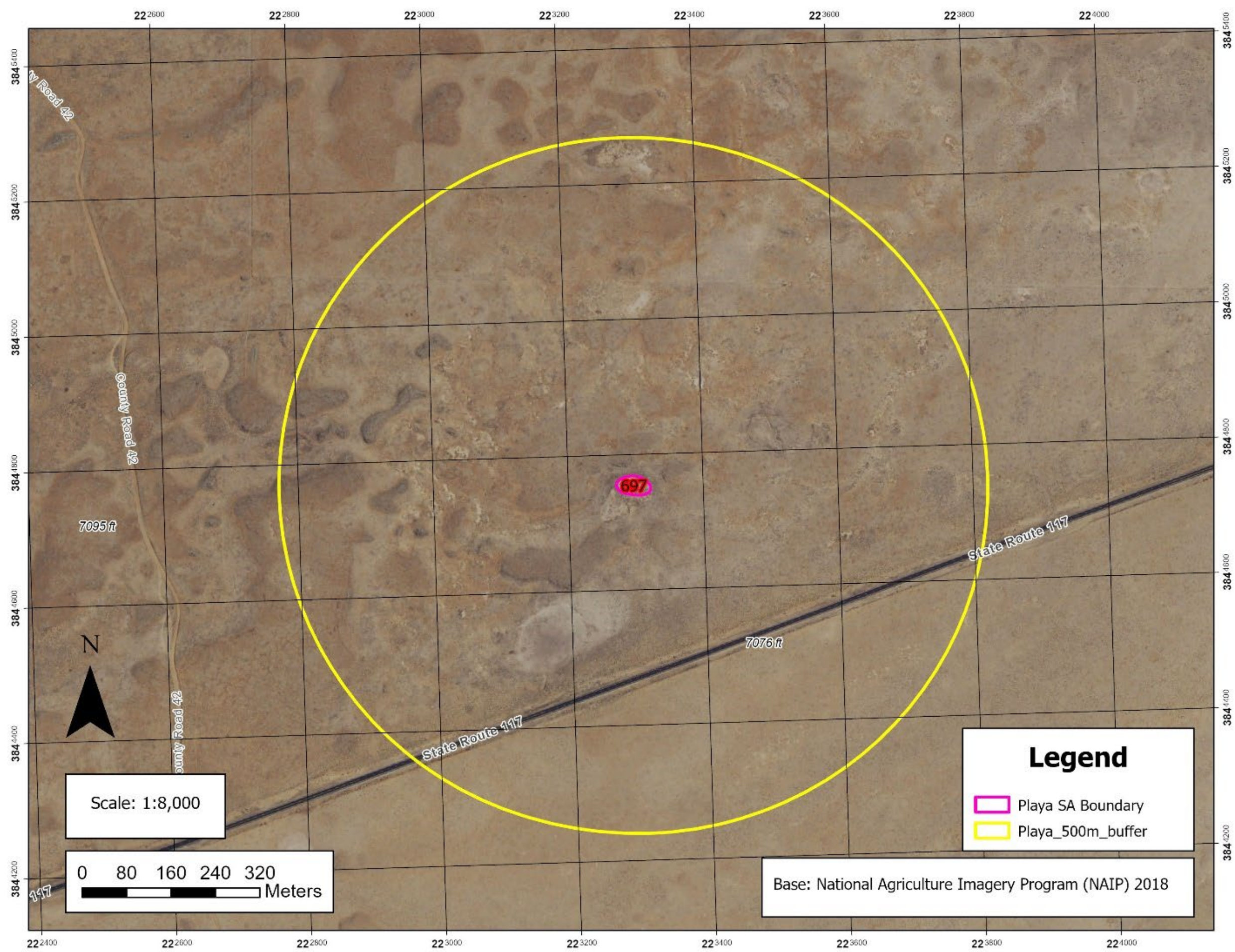


FIGURE 61 PLAYA 697 1:8,000 SURROUNDING LAND USE MAP.

VEGETATION

This depression was dominated by a dense mat of sacaton grass. There was no prevalence of wetland species.

TABLE 36 PLAYA 697 VEGETATION (NR = OBSERVED BUT DATA NOT RECORDED

Scientific Name	Common Name	Indicator Status	Annual/ Perennial	Playa	% cover Center	% Cover 2nd ring	% Cover 3rd ring
Sporobolus airoides	alkali sacaton	FAC	Perennial	698	60	0	0
Poacea spp.	UNK grass	UNK	UNK	698	20	0	0
Erigeron Spp.	fleabane	UNK	UNK	698	NR	0	0
Verbena bracteata	Big-bract Verbena	FAC	Annual	698	0	3	0
Bouteloua simplex	mat grama	Up	Annual	698	0	5	0
Poacea spp. 2	UNK grass	UNK	UNK	698	0	30	0
Grindelia hirsutula	hairy gumweed	FACW	Perennial	698	0	5	0
Bouteloua gracilis	blue grama	Up	Perennial	698	0	2	0
Brassicacea spp.	UNK	UNK	UNK	698	0	1	0

Soils

The surface 5" of soil was a silt, loam with a buried clay layer. There were no hydric soil indicators present.

TABLE 37 DEPRESSION 697 SOILS

Layer 1	
1 depth (in.)	5
1 matrix color	10yr 3/2
1 matrix percent	100
1 redox color	na
1 redox percent	na
1 redox type	na
1 redox loc	na
1 texture	silty loam
Layer 2	
2 depth	10
2 matrix color	10yr 3/2
2 matrix percent	100
2 redox color	na
2 redox percent	na
2 redox type	na
2 redox loc	na
2 texture	clay

Hydrology and Hydroperiod

There were no hydrology indicators found. There was also no evidence to indicate the hydroperiod at this location. The Global Surface water Explorer did not have evidence of standing surface water at this location, though the depression's small size could mean that there is standing water too small in area to be seen in the satellite imagery.

Depression 698

This depression was on a small hill west of the previous location. The center contained bare soil, that may have been covered in cryptobiotic soil. Volcanic gravel and cobble were present. There were no hydric indicators present. Like the previous sites this is not a wetland.

TABLE 38 PLAYA 698

Center UTM	767539.22E, 3844565.15N, 12S	Acreage	0.35
County	Cibola	Wetland Y/N	N
Watershed (Huc - 8)	13020206	Wetland Vegetation Presence	N
Geologic Unit	Qb	Wetland Soil Presence	N
Elevation (ft)	7080	Wetland Hydrology Presence	N

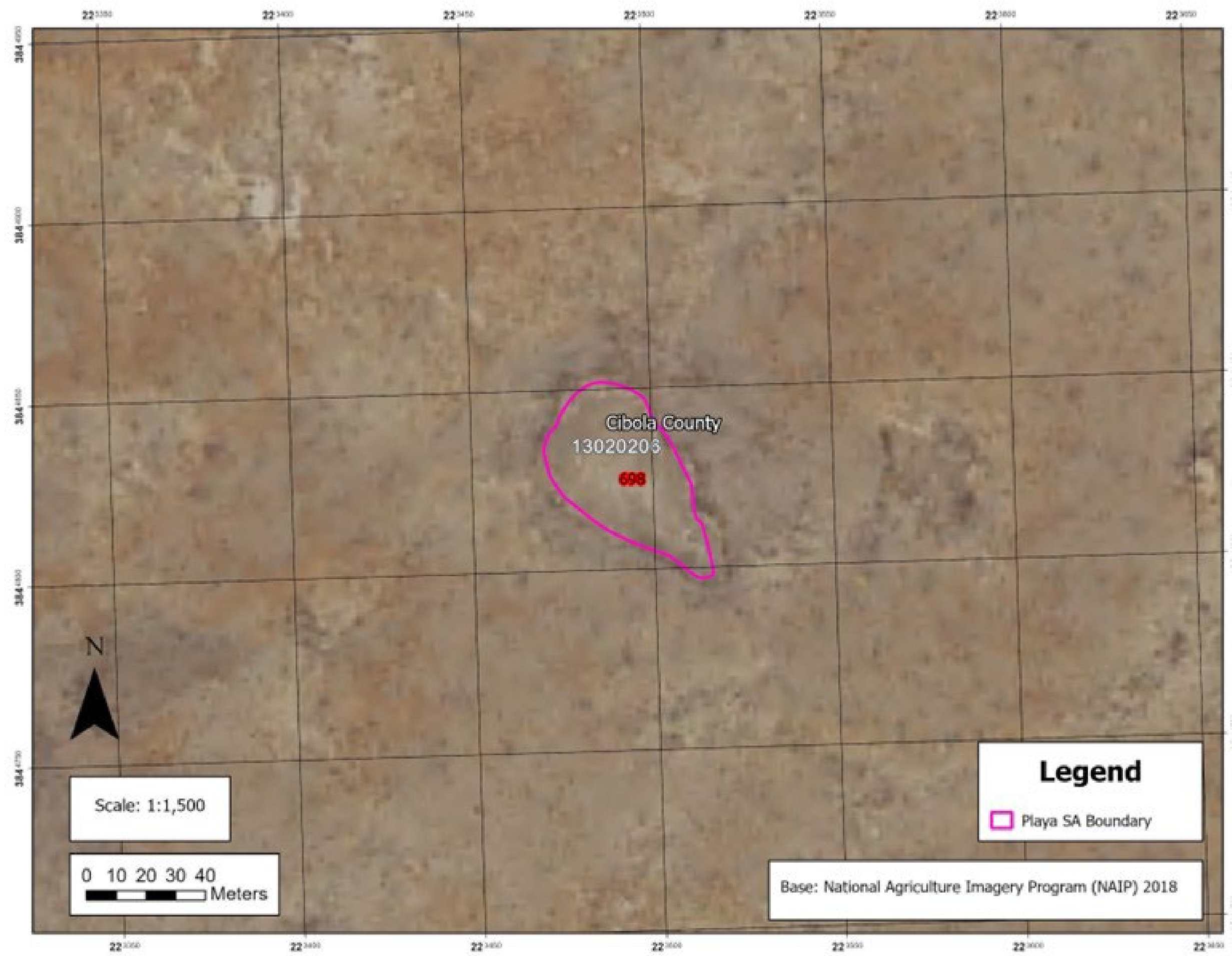


FIGURE 62 DEPRESSION 698 1:1,500 MAP.

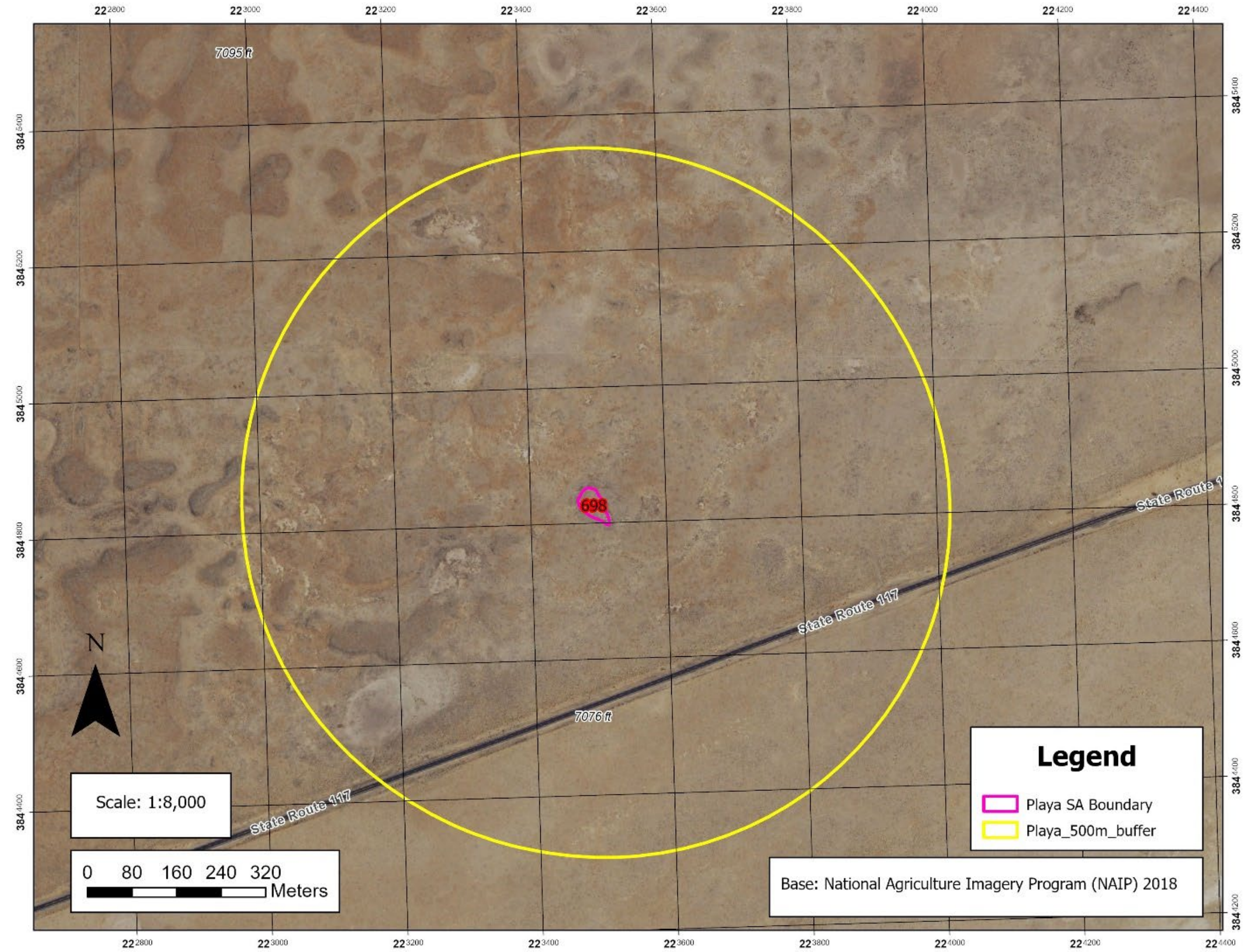


FIGURE 63 DEPRESSION 698 1:8,000 SURROUNDING LAND USE MAP.

VEGETATION

The dominant vegetation was mat gramma, an annual upland species, with a small percentage of gumweed (FACW).

TABLE 39 DEPRESSION 697 VEGETATION

Scientific Name	Common Name	Indicator Status	Annual/ Perennial	Playa	% cover Center	% Cover 2nd ring	% Cover 3rd ring
Bouteloua simplex	mat grama	Up	Perennial	697	75	0	0
Grindelia hirsutula	hairy gumweed	FACW	Perennial	697	2	0	0
Erigeron Spp.	fleabane	UNK	UNK	697	5	0	0
Asteracea spp	UNK	UNK	UNK	697	2	0	0
Sporobolus airoides	alkali sacaton	FAC	Perennial	697	2	0	0
Oenothera coronopifolia	crownleaf evening primrose	Up	Perennial	697	1	0	0

Oenothera albicaulis	white-stem evening primrose	Up	Annual	697	1	0	0
Artemisia frigida	prairie sagewort	Up	Perennial	697	2	0	0
Elymus elymoides	bottlebrush squirreltail	FACU	Perennial	697	2	0	0

Soils

The soil was a silty clay loam with no hydric indicators.

Layer 1	
1 depth (in.)	12
1 matrix color	10yr 3/3
1 matrix percent	100
1 redox color	na
1 redox percent	na
1 redox type	na
1 redox loc	na
1 texture	silty clay loam

Hydrology and Hydroperiod

There were no hydrology indicators found. There was also no evidence to indicate the hydroperiod at this location. The Global Surface Water Explorer did not have evidence of standing surface water at this location, though the depression's small size could mean that there is standing water too small in area to be seen in the satellite imagery.

PLAYA 356

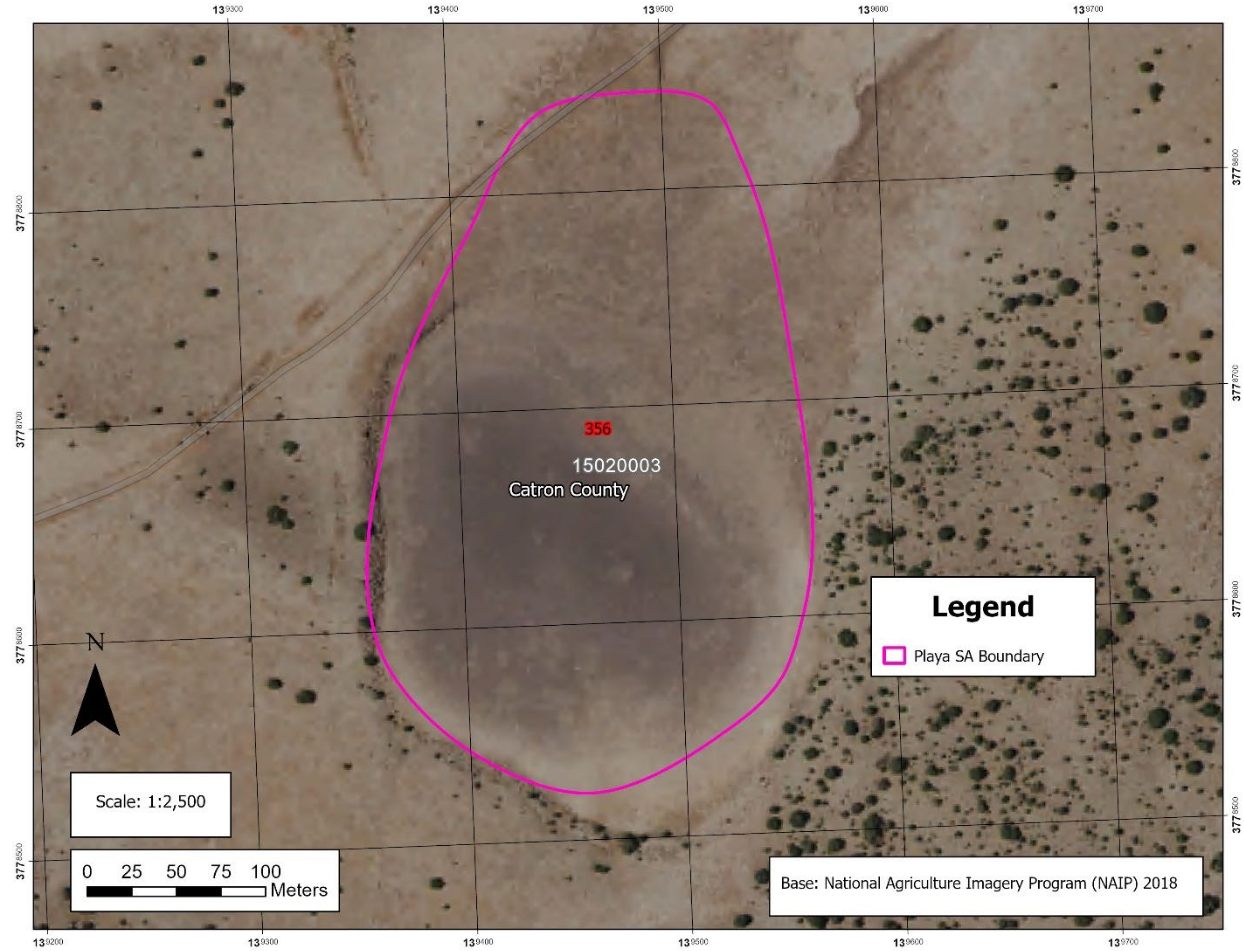


FIGURE 64 PLAYA 356 1:2,500 MAP.

Playa 356 is fully fenced except for a large gate. It is adjacent to a windfarm and numerous ranch roads. The shores were heavily trampled by cattle. The south and west shores of the were very rocky with gravel to boulder sized volcanic rocks. The east shore was below a steep sloped hill.

TABLE 40 PLAYA 356

Center UTM	693122.59E, 3773716.83N, 12S	Acreage	12.84
County	Catron	Wetland Y/N	Y
Watershed (Huc - 8)	15020003	Wetland Vegetation Presence	Y
Geologic Unit	QTb	Wetland Soil Presence	Y
Elevation (ft)	7968	Wetland Hydrology Presence	Y

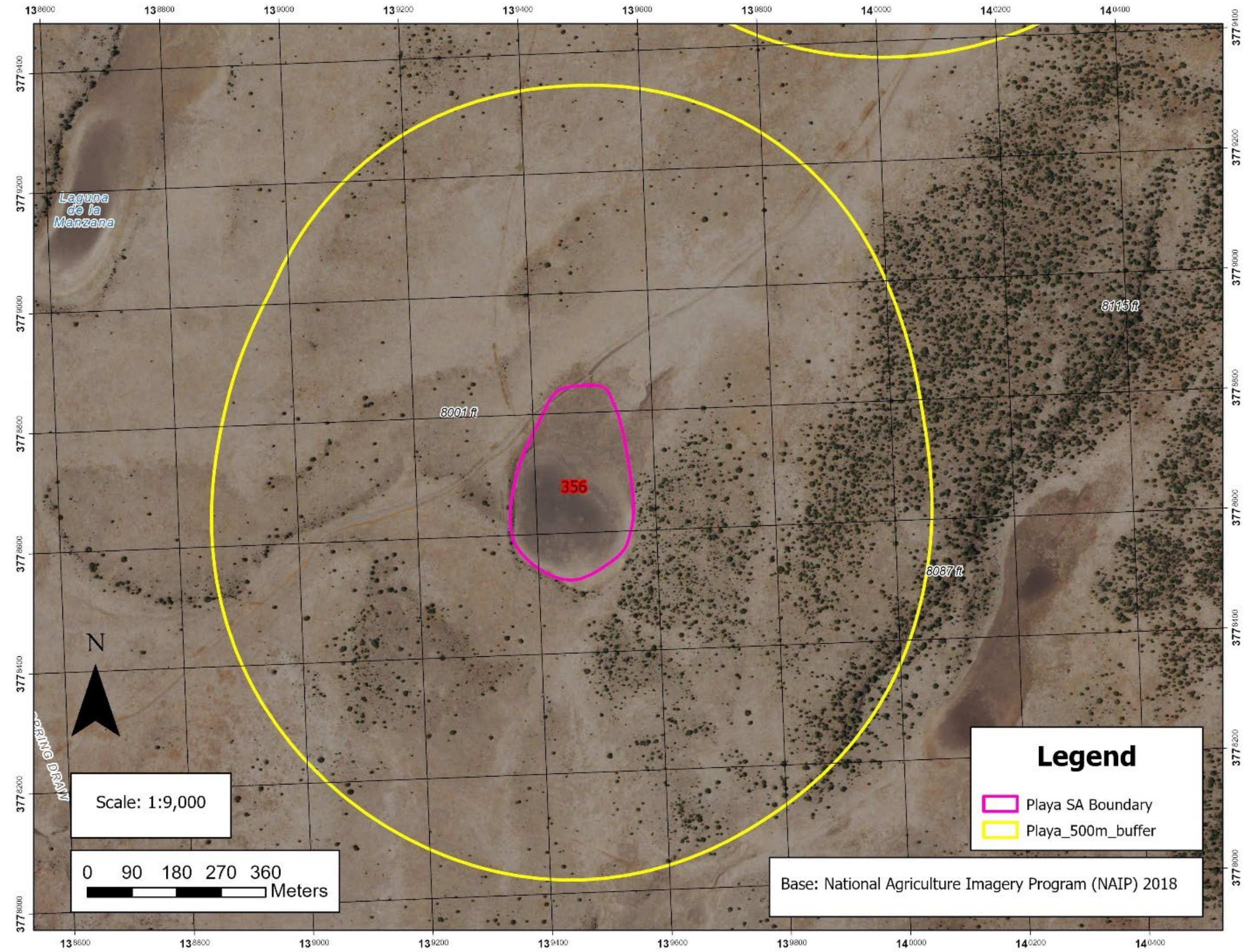


FIGURE 65 PLAYA 356 1:9,000 SURROUNDING LAND USE MAP.

VEGETATION

Most of the basin was open water, with wetland vegetation in the water and on the shore. Spikerush (FACW) was the dominant species in the first ring of vegetation, with numerous FACW, FAC, and FACU species in the outer vegetation ring.

TABLE 41 PLAYA 356 VEGETATION

Scientific Name	Common Name	Indicator Status	Annual/ Perennial	Playa	% cover Center	% Cover 2nd ring	% Cover 3rd ring
Eleocharis spp.	spikerush	FACW	Annual	356	2	0	0
Amaranthus blitoides	protrate pigweed	FACU	Annual	356	1	0	0
Asteracea spp	UNK	UNK	UNK	356	2	0	0
Ambrosia acanthicarpa	Annual bursage	Up	Annual	356	2	0	0
Chenopodium incanum	Mealy Goosefoot	Up	Annual	356	2	0	0

Verbena bracteata	Big-bract Verbena	FAC	Annual	356	2	0	0
Oenothera albicaulis	white-stem evening primrose	Up	Annual	356	2	1	0
Phyla nodiflora	frogfruit	FACW	Perennial	356	0	2	0
Pascopyrum smithii	western wheatgrass	FAC	Perennial	356	0	2	0
Grindelia hirsutula	hairy gumweed	FACW	Perennial	356	0	1	0
Rumex salicifolius	willow dock	FACW	Perennial	356	0	1	0
Amaranthus Spp.	pigweed	FACU	Annual	356	0	4	0
Corydalis aurea	scrambled eggs	Up	Annual	356	0	1	0
Suckleya suckleyana	poison suckleya	FACW	Annual	356	1	0	0

SOILS

The soil sample was taken from the shore and was a heavy wet clay, that met the depleted matrix wetland soil indicator.

FIGURE 66 PLAYA 356 SOILS WITH DEPLETED MATRIX.

FIGURE 67 PLAYA 356 SOILS WITH REDOX FEATURES.

TABLE 42 PLAYA 356 SOIL DESCRIPTION.

Layer 1	
1 depth	13

1 matrix color	10yr 4/1
1 matrix percent	98
1 redox color	5yr 4/6
1 redox percent	2
1 redox type	C
1 redox loc	M
1 texture	clay

Hydrology and Hydroperiod

This playa had several hydrology indicators including surface water, high water table, water marks, and surface soil cracks. GSWE data shows that Playa 356 has an approximately 25% recurrence of surface water both in the late summer / early spring and after monsoon season. Data shows surface water at that location occurring 26 of the 37 recorded years with a trend of decreasing occurrence.

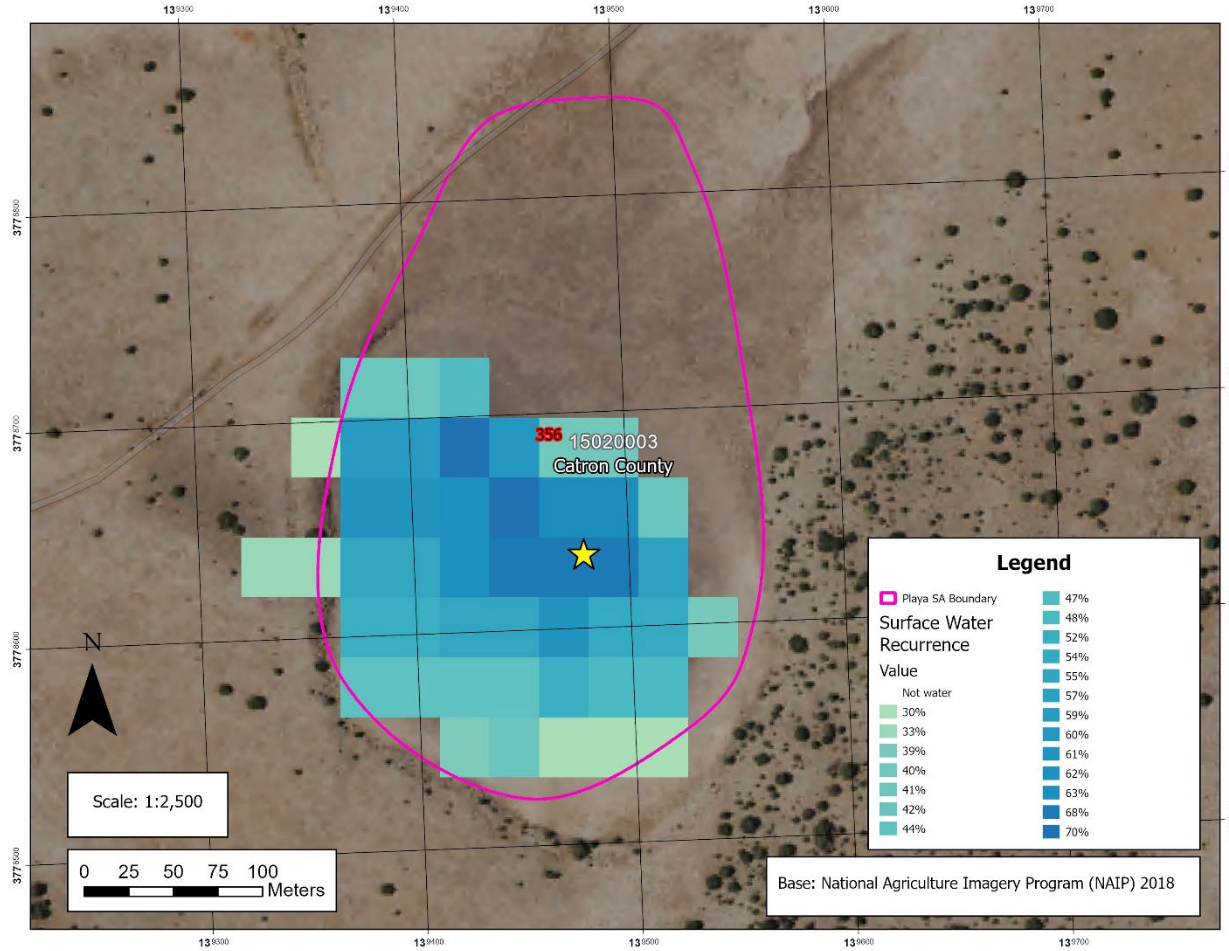
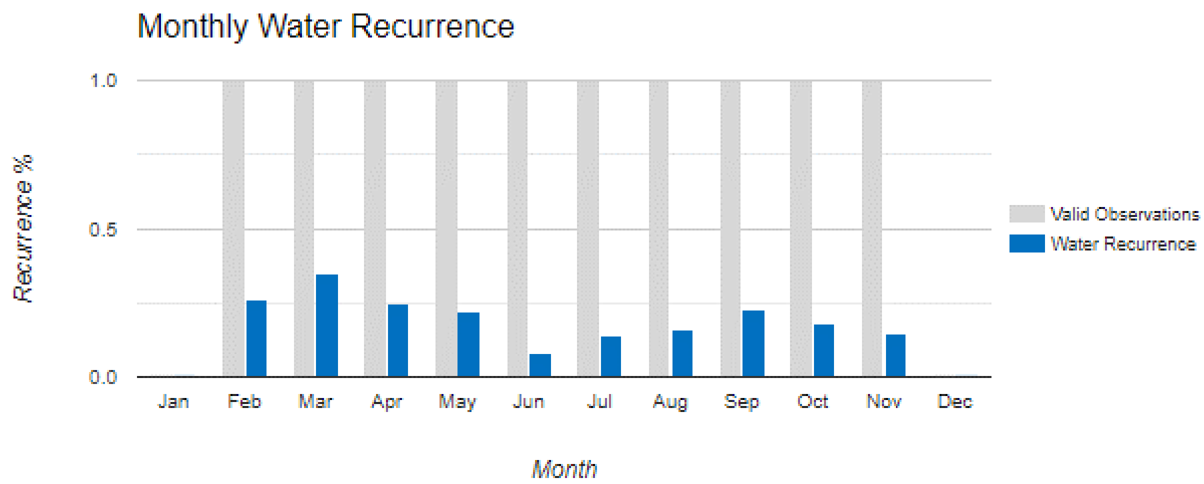


FIGURE 68 ANNUAL SURFACE WATER RECURRENCE (GSWE).

Pixel Coordinates: Lat: 34.086253, Long: -108.906995



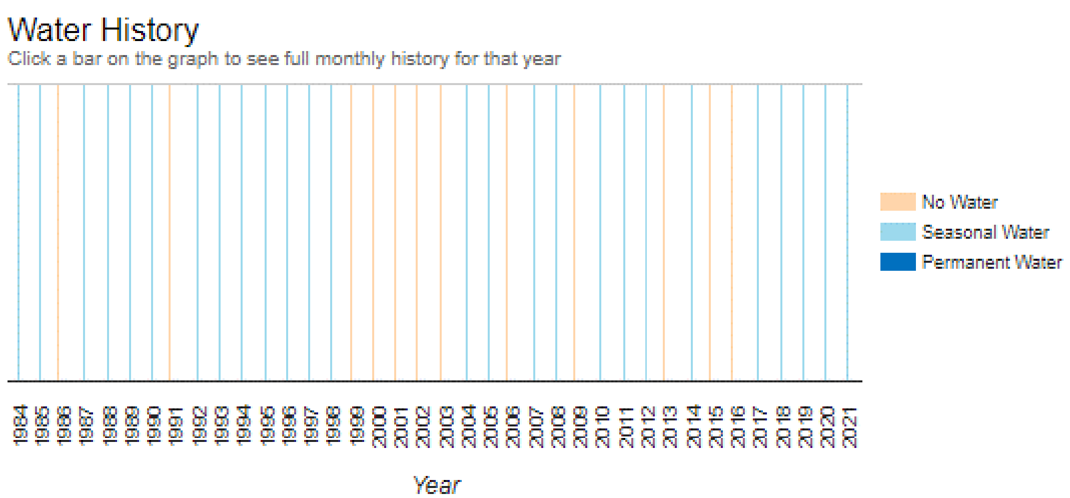


FIGURE 69 PLAYA 356 MONTHLY SURFACE WATER RECURRENCE (GSWE).

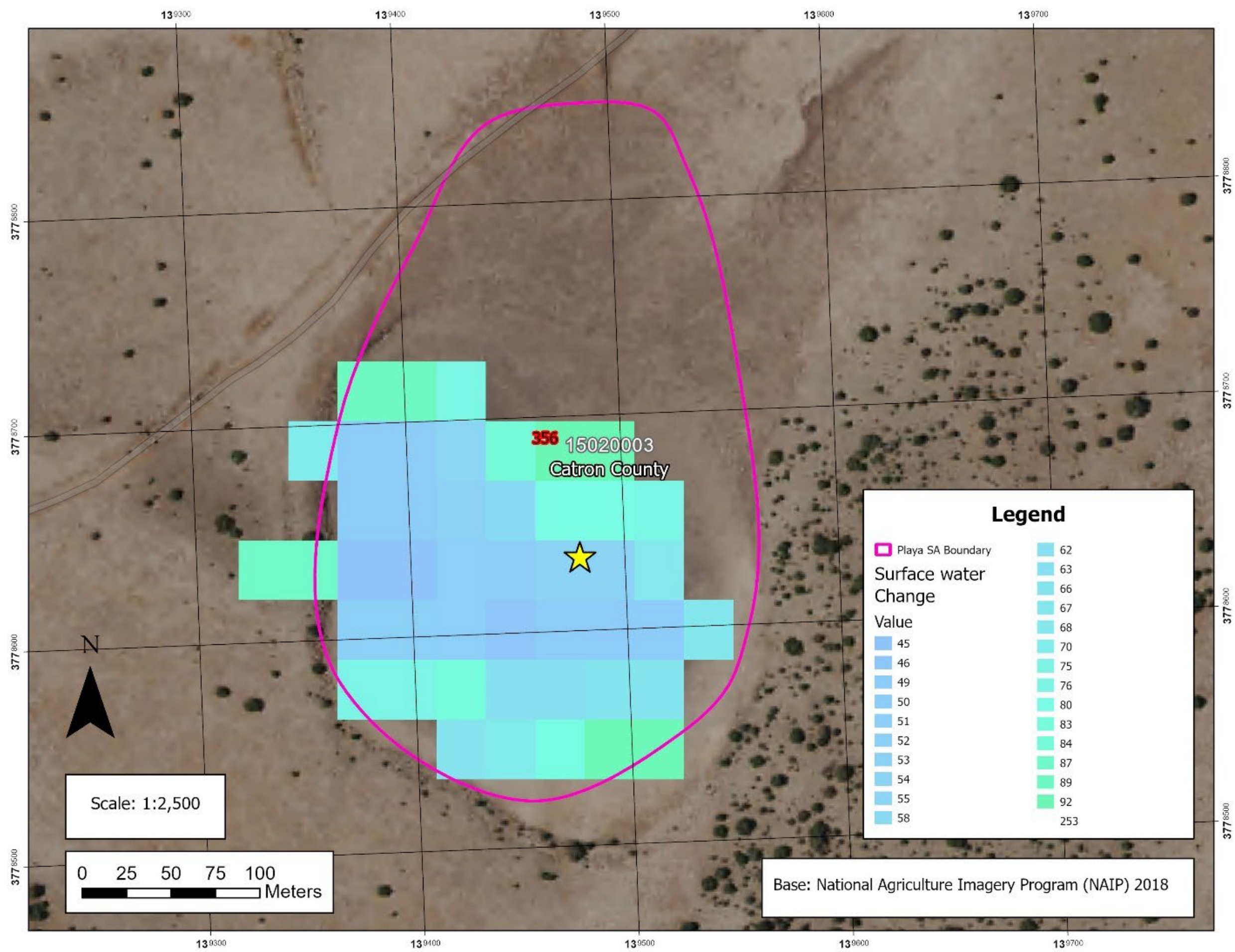


FIGURE 70 PLAYA 356 SURFACE WATER CHANGE INTENSITY (GSWE).

PLAYA 357

Playa 357 is noted as Jones Lake on the map and is on the edge of a large wind farm and has clearly been excavated to some extent. There were a few small volcanic rocks present. The playa basin was approximately 50% covered in standing water with very gradual sloping shores that were largely bare. The vegetation was very heavily grazed. Deep hoof punching was present throughout the area with several cattle trails throughout. The surrounding land use map (NAIP 2018) does not show the adjacent wind farm. A very shallow drainage is forming that drains into the southern end of the basin.

TABLE 434 PLAYA 357

Center UTM	693610.32E, 3775140.35N, 12S	Acreage	8.54
County	Catron	Wetland Y/N	Y
Watershed (Huc - 8)	15020003	Wetland Vegetation Presence	Y
Geologic Unit	Qtb	Wetland Soil Presence	N
Elevation (ft)	8004	Wetland Hydrology Presence	Y

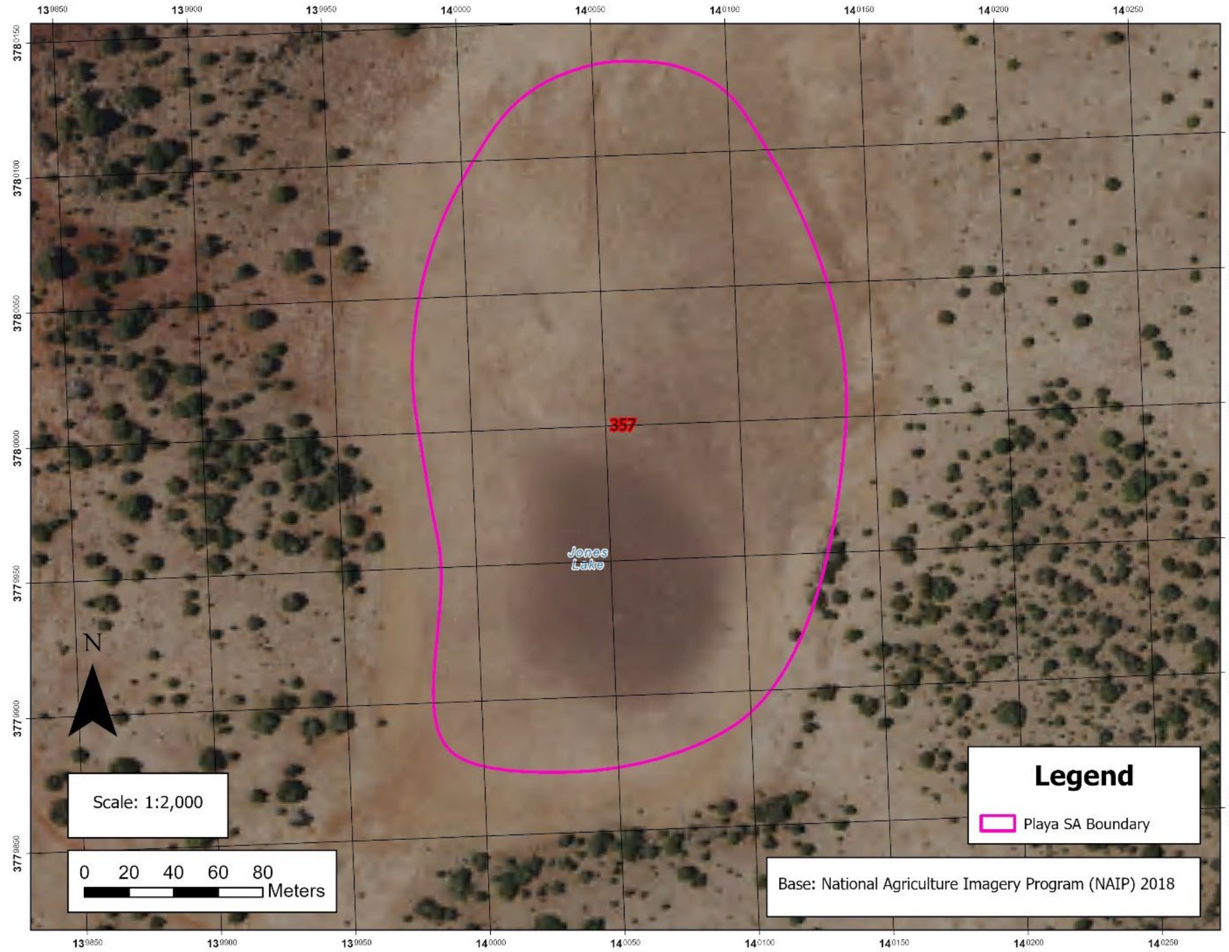


FIGURE 71 PLAYA 357 1:2,000 MAP.

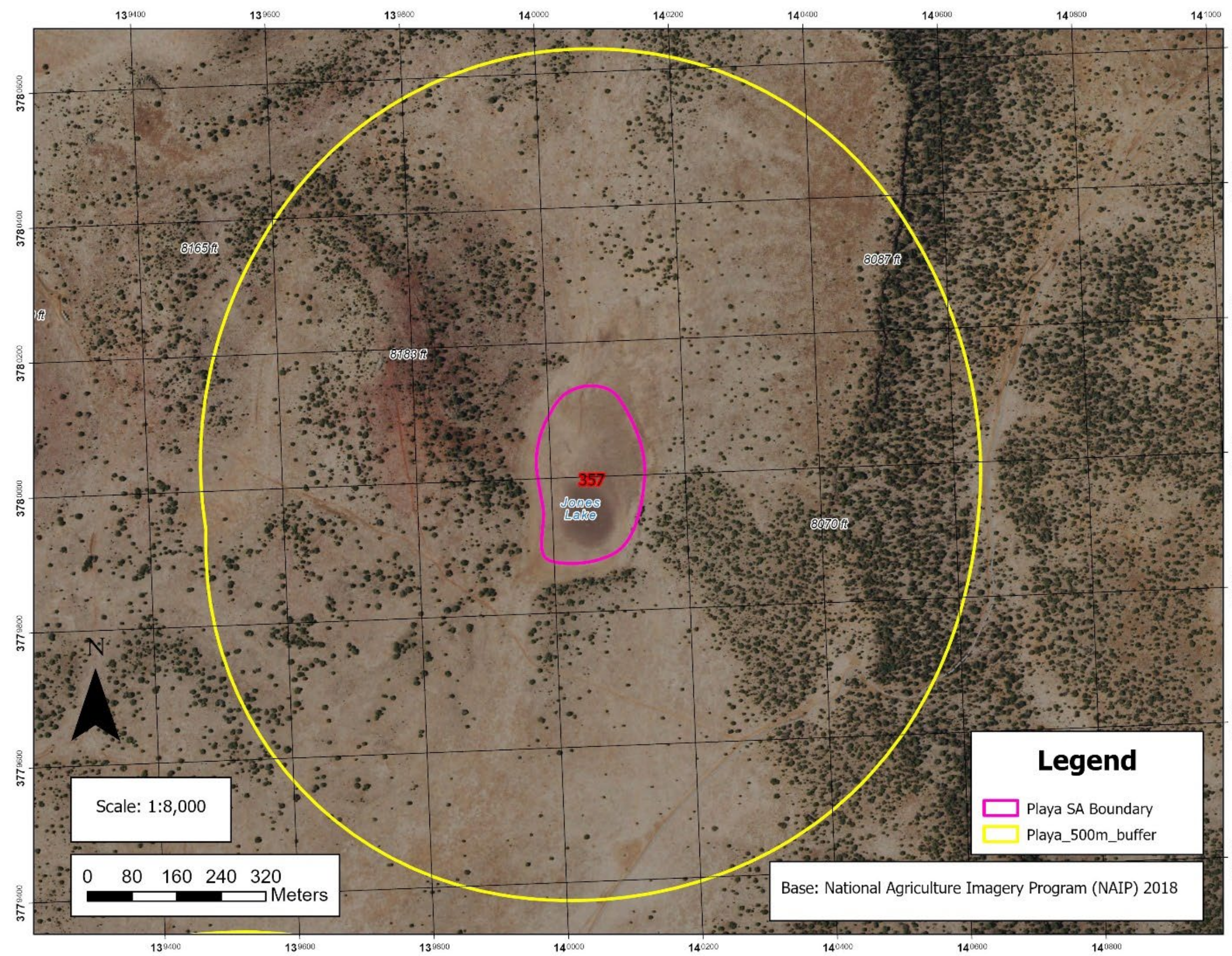


FIGURE 72 PLAYA 357 1:8,000 SURROUNDING LAND USE MAP.

VEGETATION

There were three distinct vegetation zones in the playa. Spikerush (FACW) was the dominant species in the center, growing in the shallow water and along the shore, and second ring. The outer ring was dominated by western wheat grass (FACU).

TABLE 44 PLAYA 356 VEGETATION

Scientific Name	Common Name	Indicator Status	Annual/ Perennial	Playa	% cover Center	% Cover 2nd ring	% Cover 3rd ring
Eleocharis spp.	spikerush	FACW	Annual	357	15	1	0
Rumex salicifolius	willow dock	FACW	Perennial	357	5	1	1
Pascopyrum smithii	western wheatgrass	FAC	Perennial	357	0	2	30
Ambrosia tomentosa	skeletonleaf bursage	Up	Annual	357	1	0	1

Chenopodium incanum	Mealy Goosefoot	Up	Annual	357	1	1	0
Asteracea spp	UNK	UNK	UNK	357	2	2	0
Verbena bracteata	Big-bract Verbena	FAC	Annual	357	0	0	1

SOILS

A soil pit was dug on the southern shore of the playa and hydric soil was not found at that location. Hydric indicators may be found closer to the low water line.

TABLE 45 PLAYA 357 SOIL DESCRIPTION

Layer 1	
1 depth	15
1 matrix color	10 yr 4/2
1 matrix percent	100
1 redox color	na
1 redox percent	na
1 redox type	na
1 redox loc	na
1 texture	clay

FIGURE 73 PLAYA 357 SOIL PIT FROM SOUTHERN SHORE.

HYDROLOGY AND HYDROPERIOD

The hydrology indicators of surface water and surface soil cracks were both present at this site. GSWE data shows that Playa 357 has an approximately 35% recurrence of surface water both in the late summer / early spring and after monsoon season, occurring 26 of the 37 recorded years. Occurrence change data shows that this playa has evidence of slight increase in some areas of the playa and slight decrease in others.

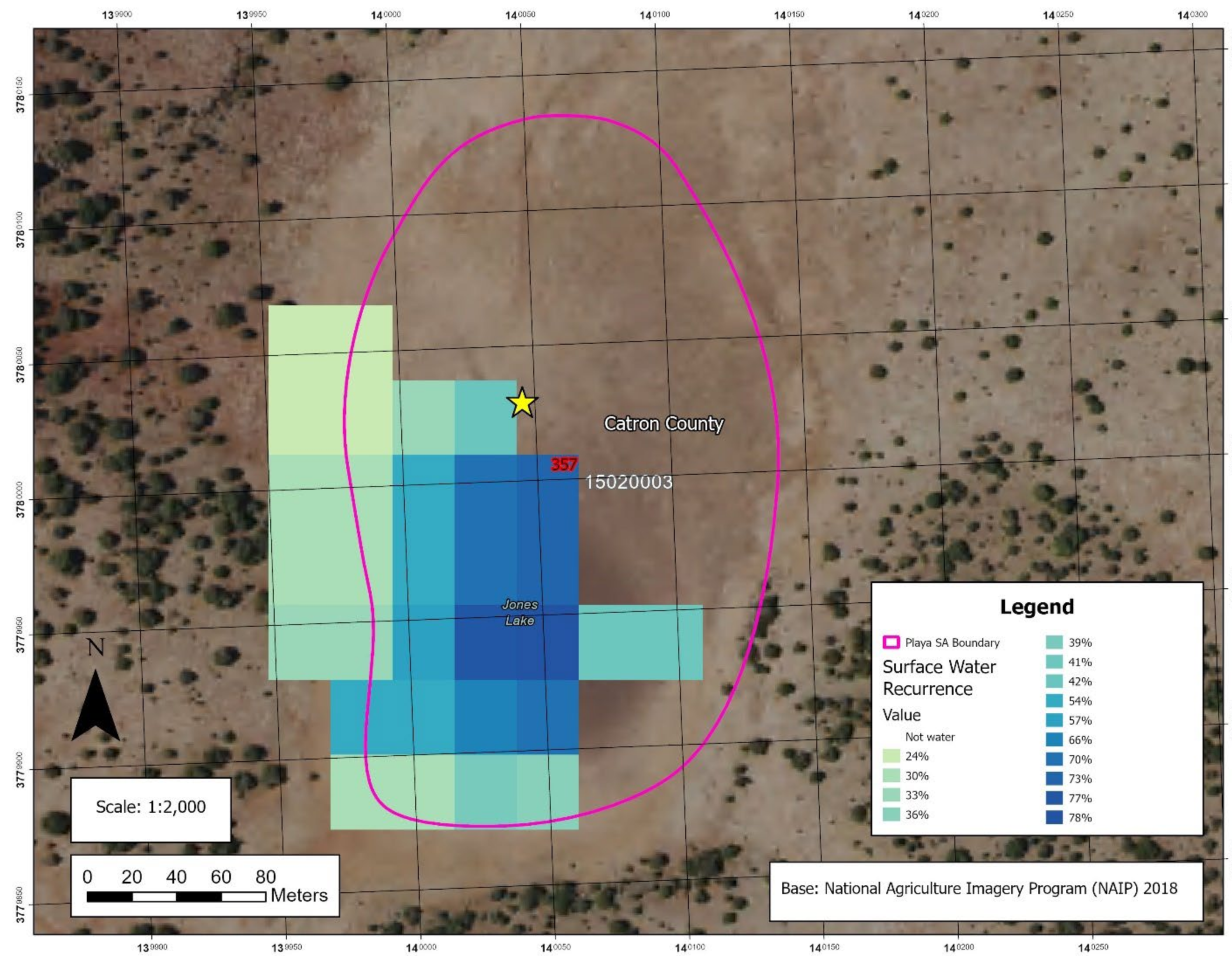


FIGURE 74 PLAYA 357 ANNUAL SURFACE WATER RECURRENCE (GSWE). THE SMALL AREA OF HIGH RECURRENCE IS LOCATED IN THE EXCAVATED AREA.

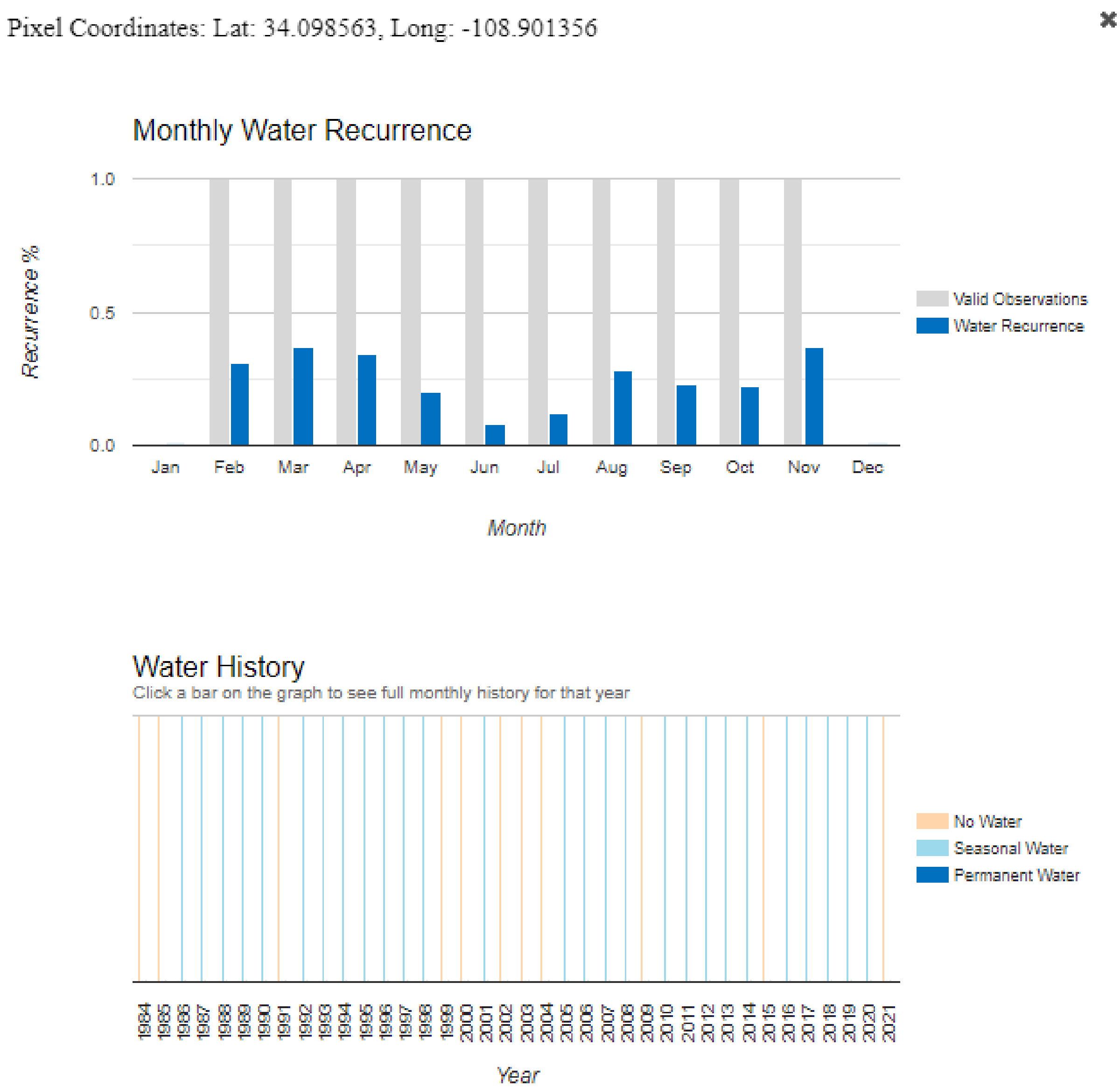


FIGURE 75 PLAYA 357 MONTHLY SURFACE WATER RECURRENCE (GSWE).

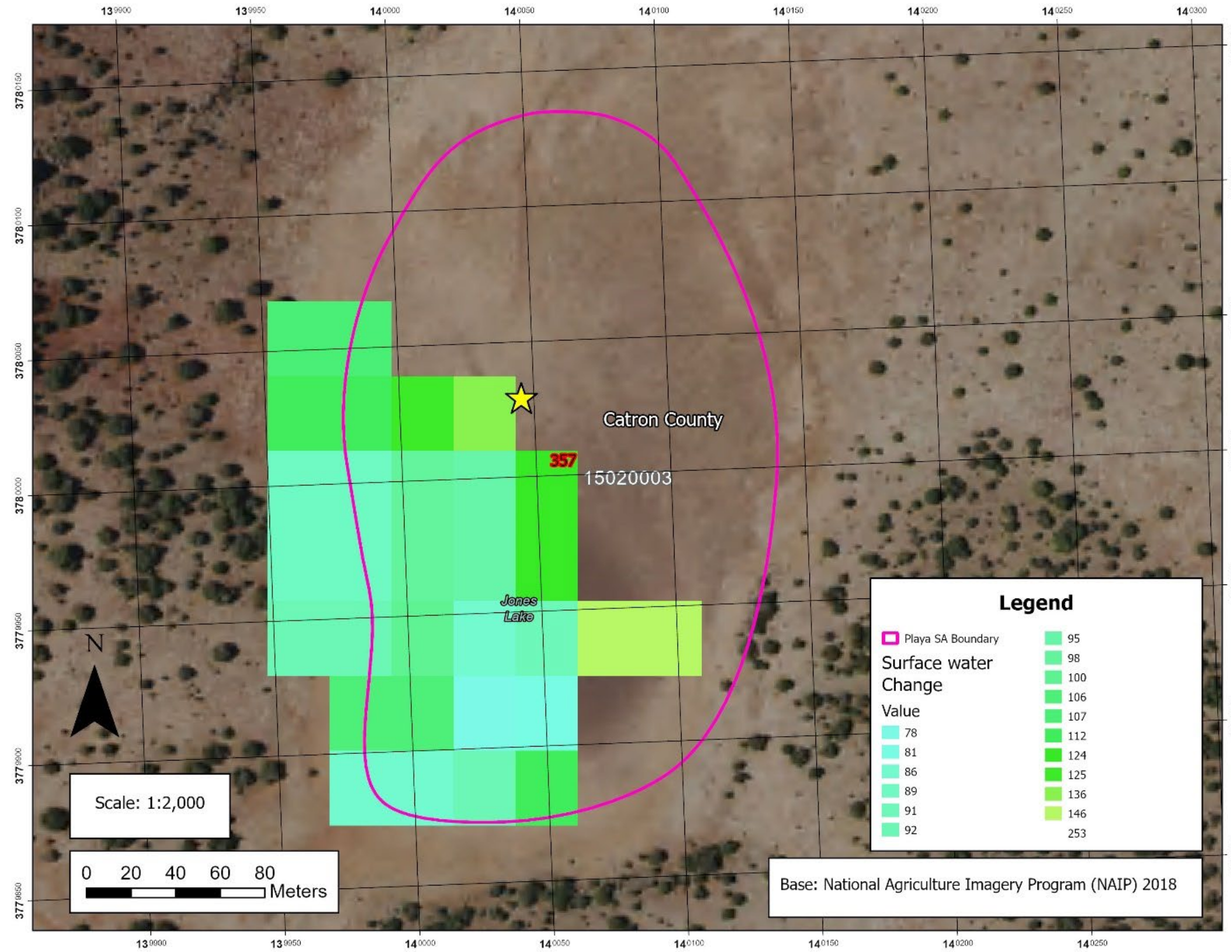


FIGURE 76 PLAYA 357 SURFACE WATER CHANGE INTENSITY (GSWE).

Playa 336

Playa 336 (Gabaldon Lake) is located in the northwest corner of the Gila National Forest. From the imagery, the excavated pit is approximately 10% of the original basin, showing extensive modification to the hydrology. The area is heavily used by cattle with deeply hoof punched soil and heavily cropped vegetation. There are defunct fences in the playa basin, numerous cattle trails, and an old road through the center of the playa. Overall, this is an extensively damaged site.

TABLE 46 PLAYA 336

Center UTM	739578.40E, 3780087.62N, 12S	Acreage	15.98
County	Catron	Wetland Y/N	Y
Watershed (Huc - 8)	15020003	Wetland Vegetation Presence	Y
Geologic Unit	Tuau	Wetland Soil Presence	N
Elevation (ft)	8433	Wetland Hydrology Presence	Y

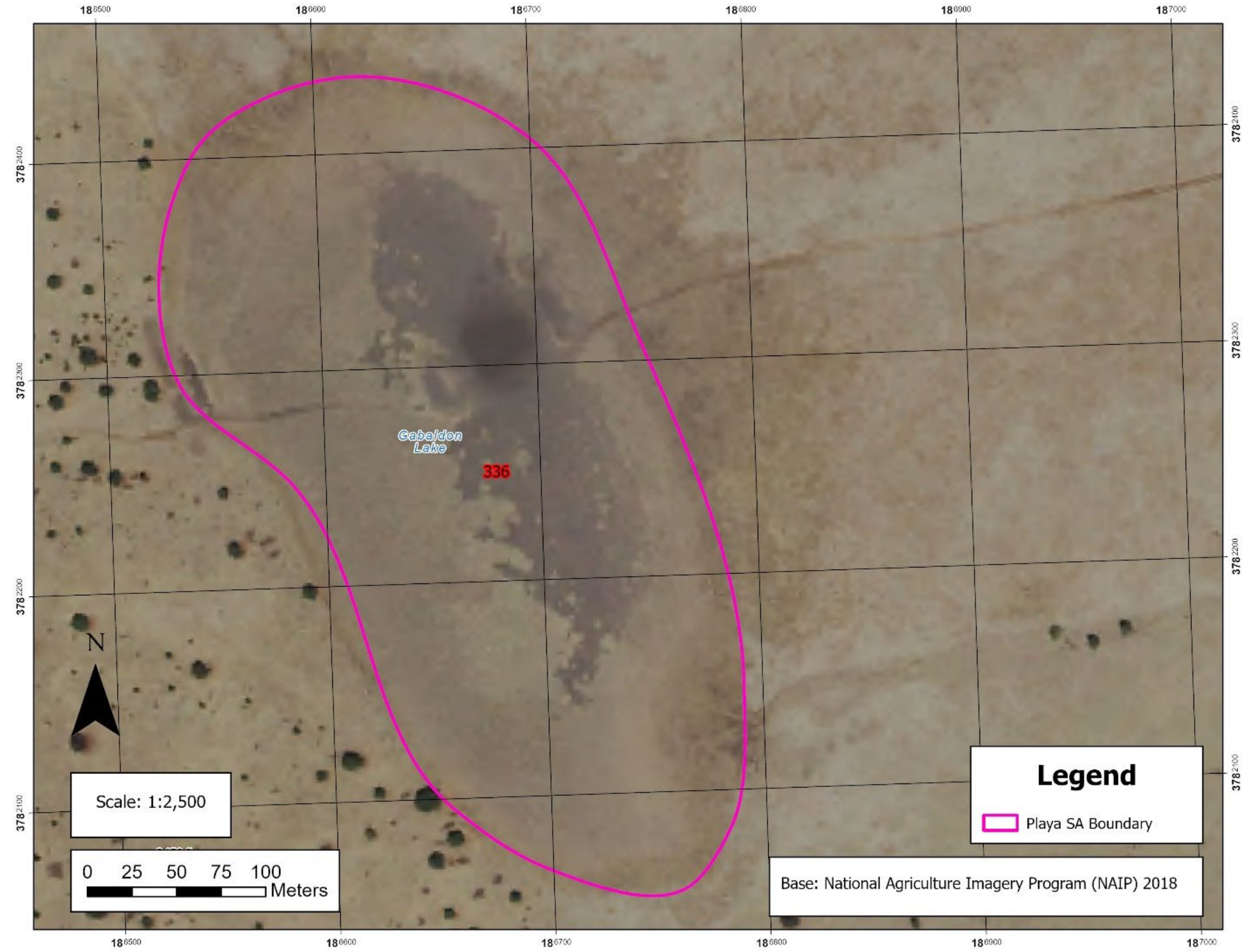


FIGURE 77 PLAYA 336 1:2,500 MAP.

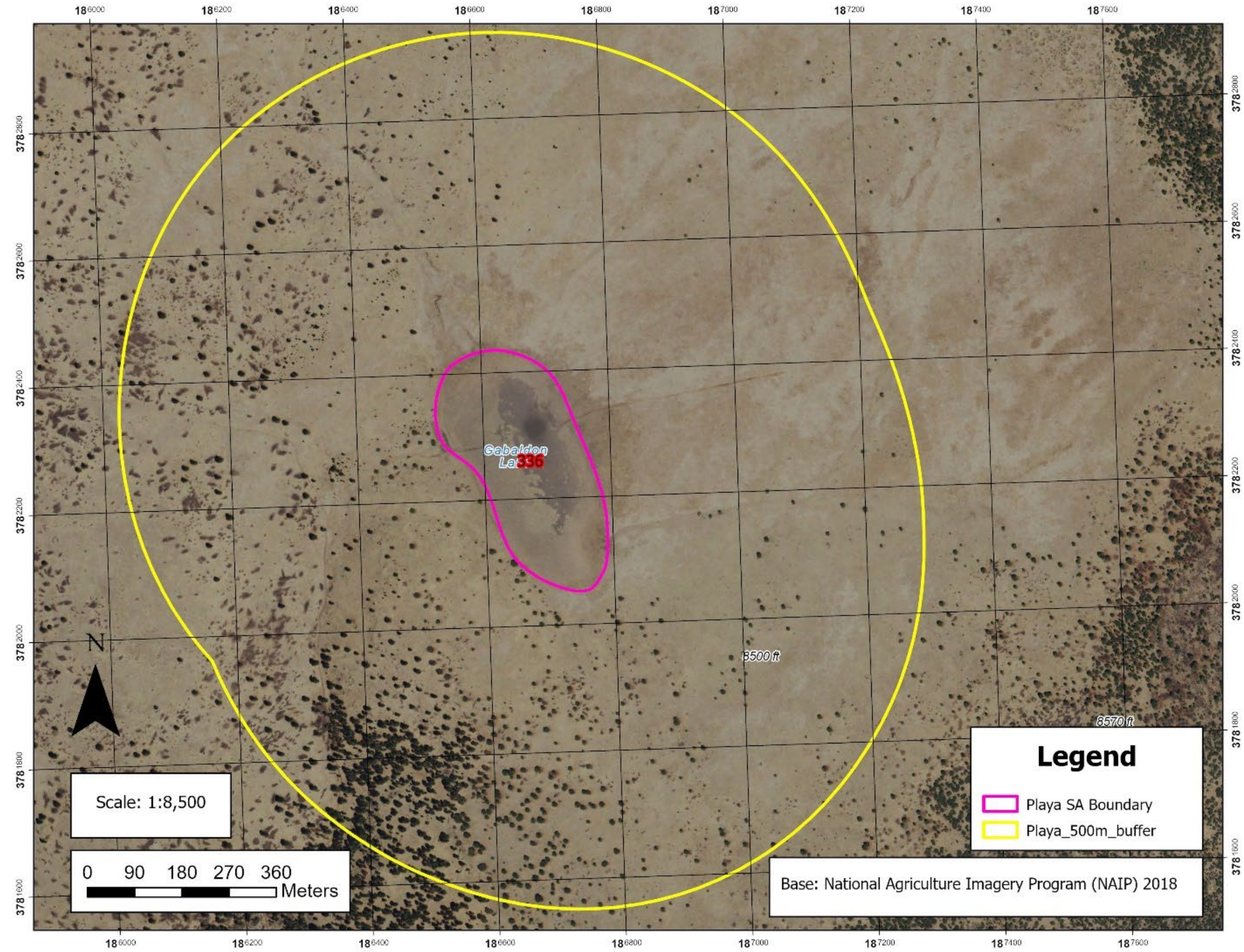


FIGURE 78 PLAYA 336 1:8,500 SURROUNDING LAND USE MAP.

VEGETATION

FIGURE 79 WESTERN WHEATGRASS AND DEEP HOOF PUNCHES IN THE OUTER EDGES OF THE BASIN PLAYA 336.

The site had three distinct vegetation zones with spikerush (FACW) dominating the center and 2nd ring. Western wheatgrass (FAC) covered around 40% of the outer and largest vegetation zone.

TABLE 46 PLAYA 336 VEGETATION

Scientific Name	Common Name	Indicator Status	Annual/ Perennial	Playa	% cover Center	% Cover 2nd ring	% Cover 3rd ring
Eleocharis spp.	spikerush	FACW	Annual	336	1	30	0
Pascopyrum smithii	western wheatgrass	FAC	Perennial	336	1	3	40
Rumex salicifolius	willow dock	FACW	Perennial	336	1	1	0
Polygonum arenastrum	prostrate knotweed	Up	Annual	336	1	0	1

Ambrosia acanthicarpa	Annual bursage	Up	Annual	336	0	0	1

Soils

The soil pit was dug near the excavated area. The soil was heavy wet clay but did not have hydric soil indicators at that location.

TABLE 47 PLAYA 353 SOIL DESCRIPTION

Layer 1	
1 depth	12
1 matrix color	2.5y 2.5/1
1 matrix percent	100
1 redox color	na
1 redox percent	na
1 redox type	na
1 redox loc	na
1 texture	clay

FIGURE 80 SOIL PIT PLAYA 353.

Hydrology and Hydroperiod

Several hydrology indicators were present including surface water, high water table, saturation, and surface soil cracks. Satellite imagery data from the center of the playa (not the excavated pit) shows that the playa has a near 50% surface water recurrence in the late spring through early winter with an approximate 5% recurrence other months, suggesting this playa is largely influenced by snow melt. Note that the area with the highest (near 100%) recurrence is that of the excavated pit. The data shows standing water in 27 of the recorded years with some areas showing a slight decrease in recurrence while other areas show slight increases.

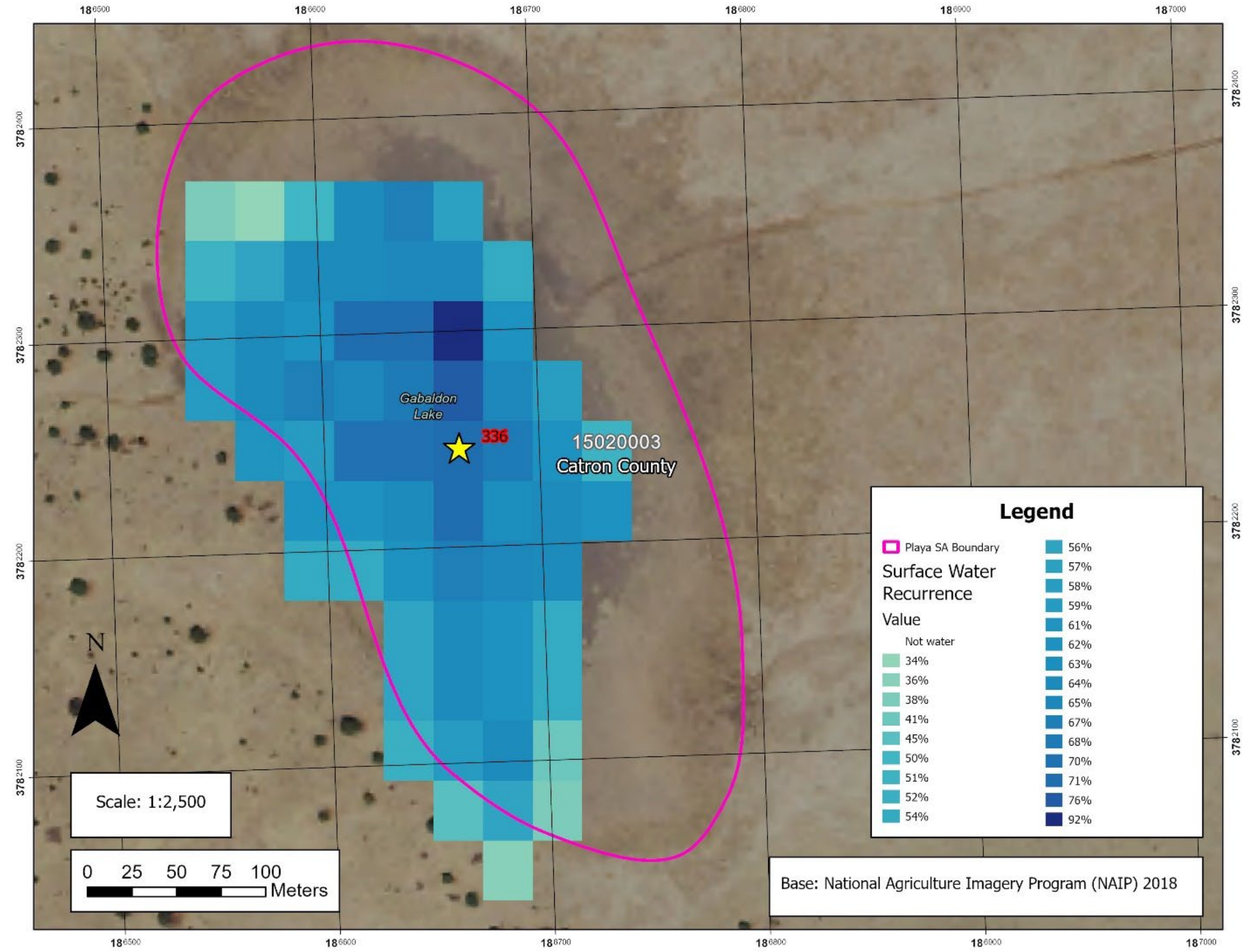


FIGURE 81 PLAYA 336 ANNUAL SURFACE WATER RECURRENCE (GSWE).

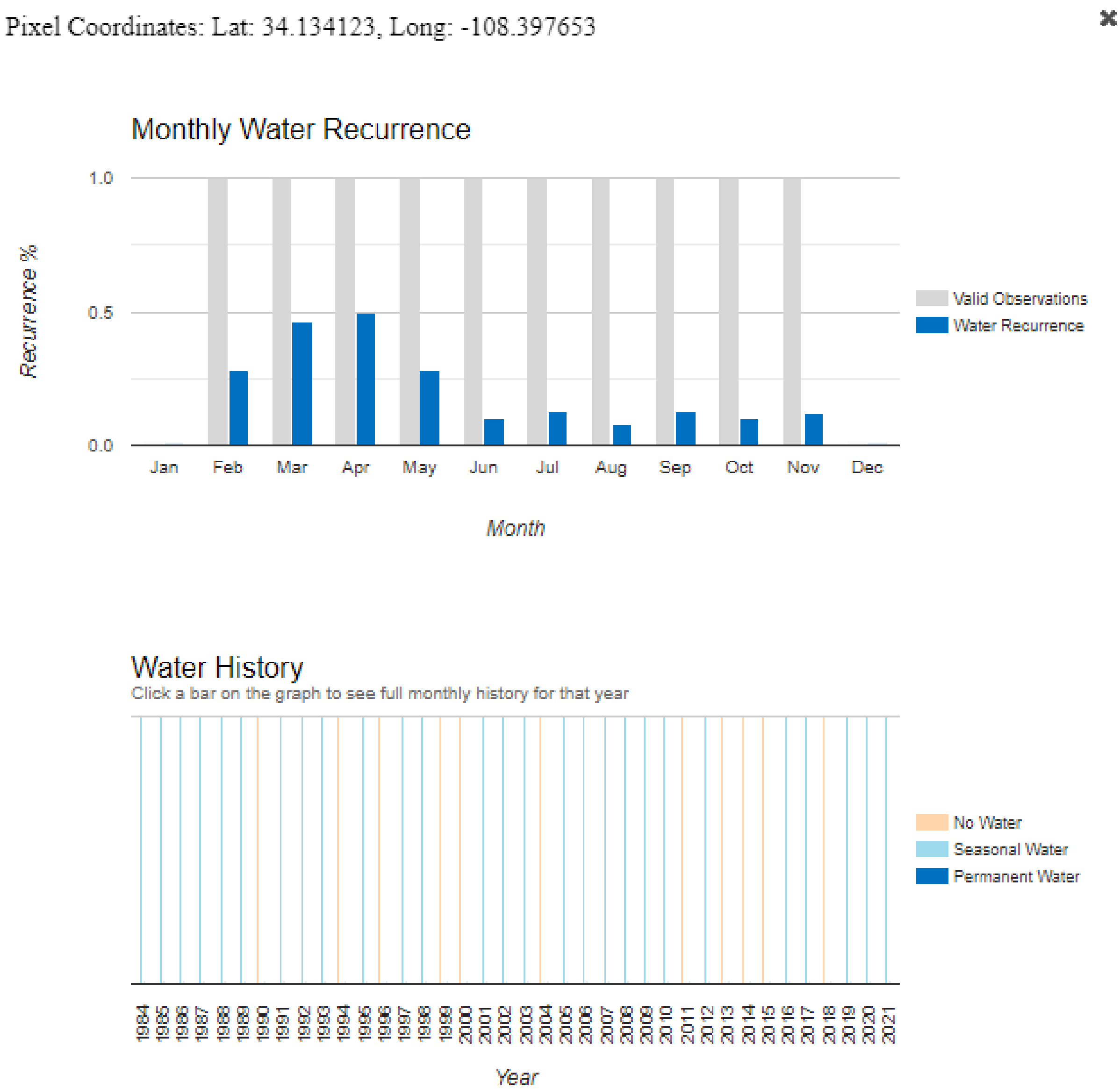


FIGURE 82 MONTHLY SURFACE WATER RECURRENCE (GSWE). THIS PLAYA IS AT A HIGHER ELEVATION AND SHOWS GREATER RECURRENCE IN THE LATE WINTER AND EARLY SPRING LIKE DUE TO SNOW MELT, WITH AN APPROXIMATE 15% RECURRENCE IN THE MONSOON SEASON.

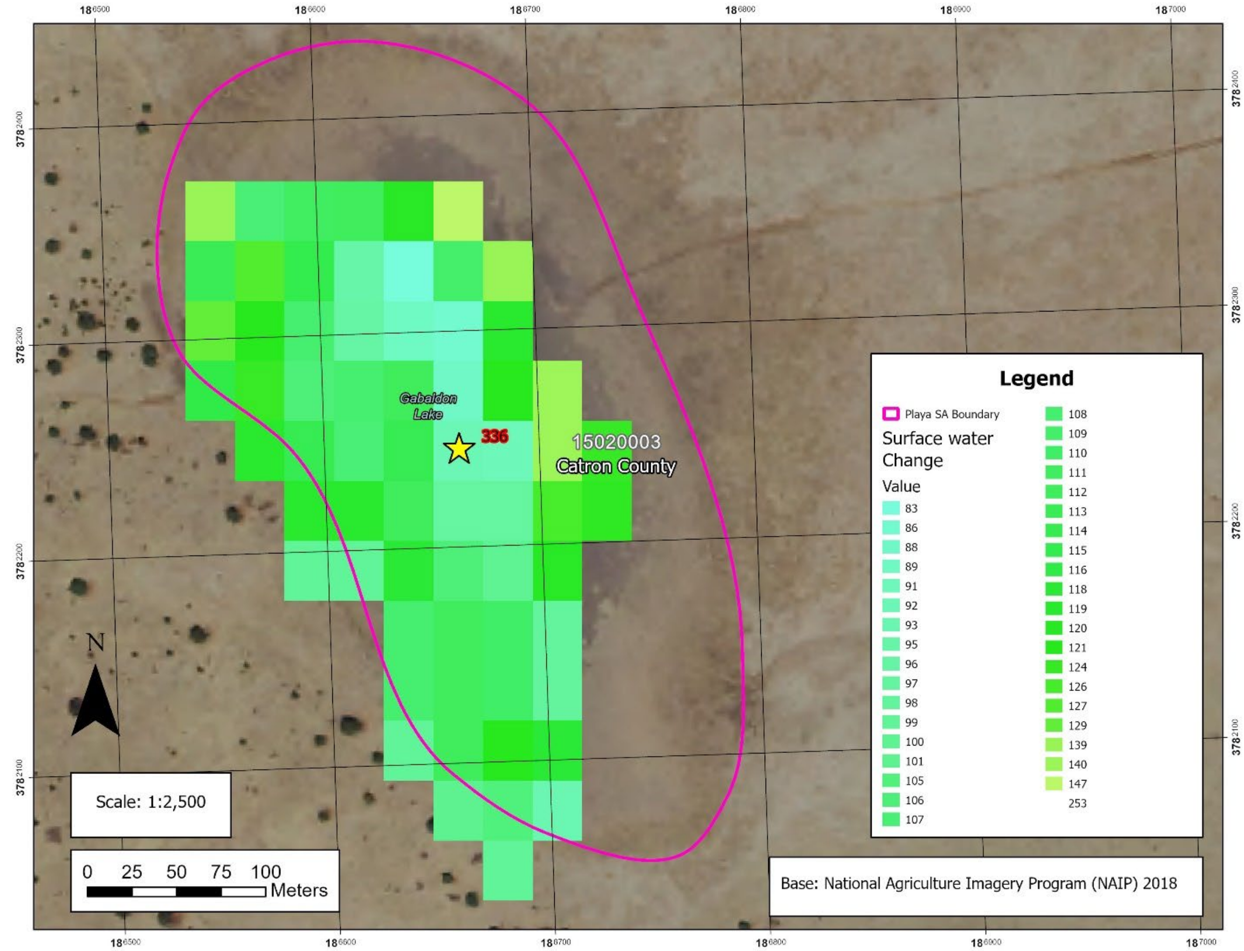


FIGURE 83 SURFACE WATER CHANGE INTENSITY (GSWE).

PLAYA 353

Pine Lake (Playa 353) is on Baca Mesa in the Gila National Forest just west of Gabaldon Lake. It is excavated on the northern end with spoils piles on either side of the pit, with the pit taking up less that 10% of the historic playa basin. This playa appears to be drier overall than Gabaldon. Cattle were present during the site visit, with extensive trampling, numerous trails, and heavily cropped vegetation.

TABLE 48 PLAYA 353

Center UTM	738983.12E, 3779663.82N, 12S	Acreage	23.72
County	Catron	Wetland Y/N	Y

Watershed (Huc - 8)	15020003	Wetland Vegetation Presence	Y
Geologic Unit	Tuau	Wetland Soil Presence	Y
Elevation (ft)	8426	Wetland Hydrology Presence	Y

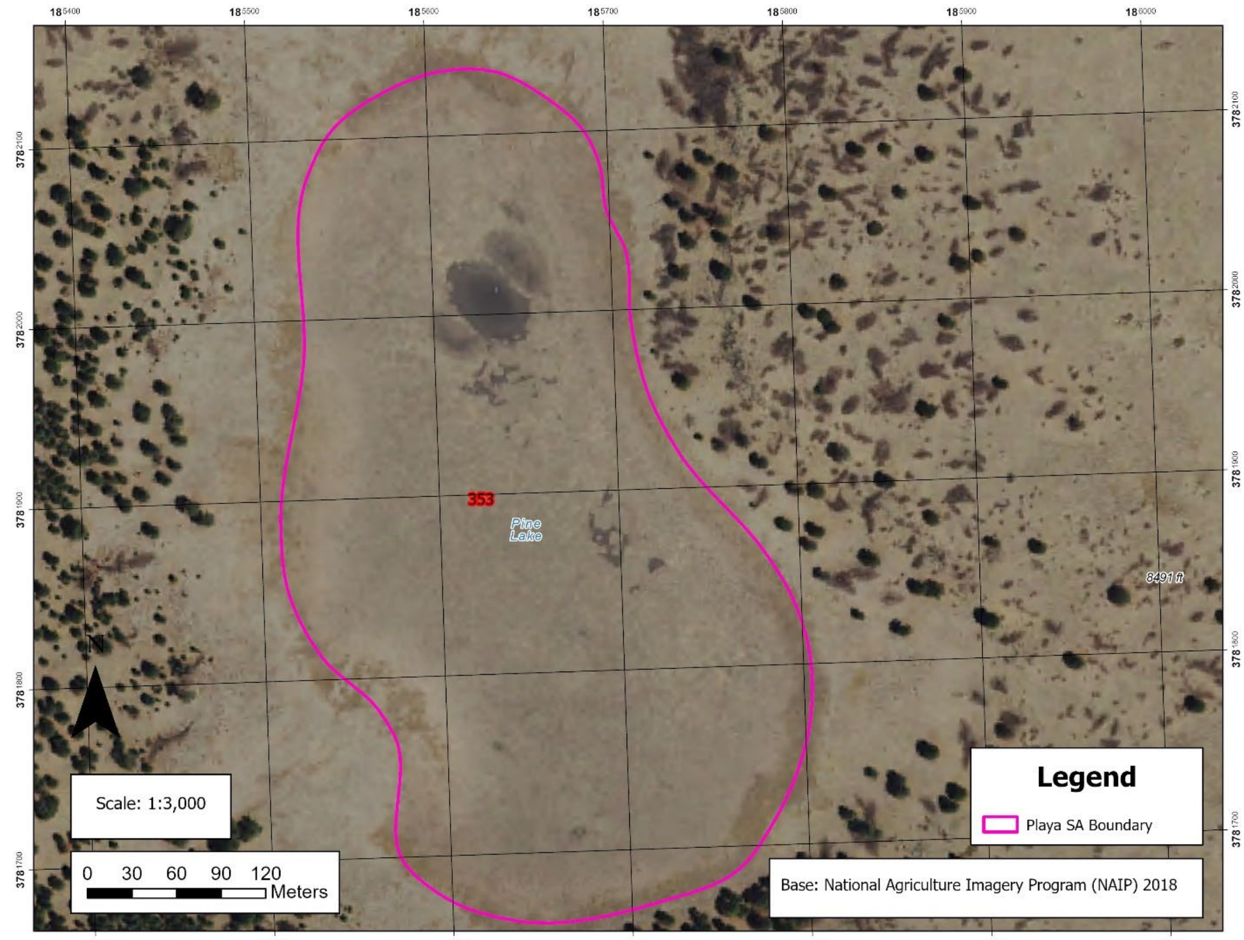


FIGURE 84 PLAYA 353 1:3,000 MAP.

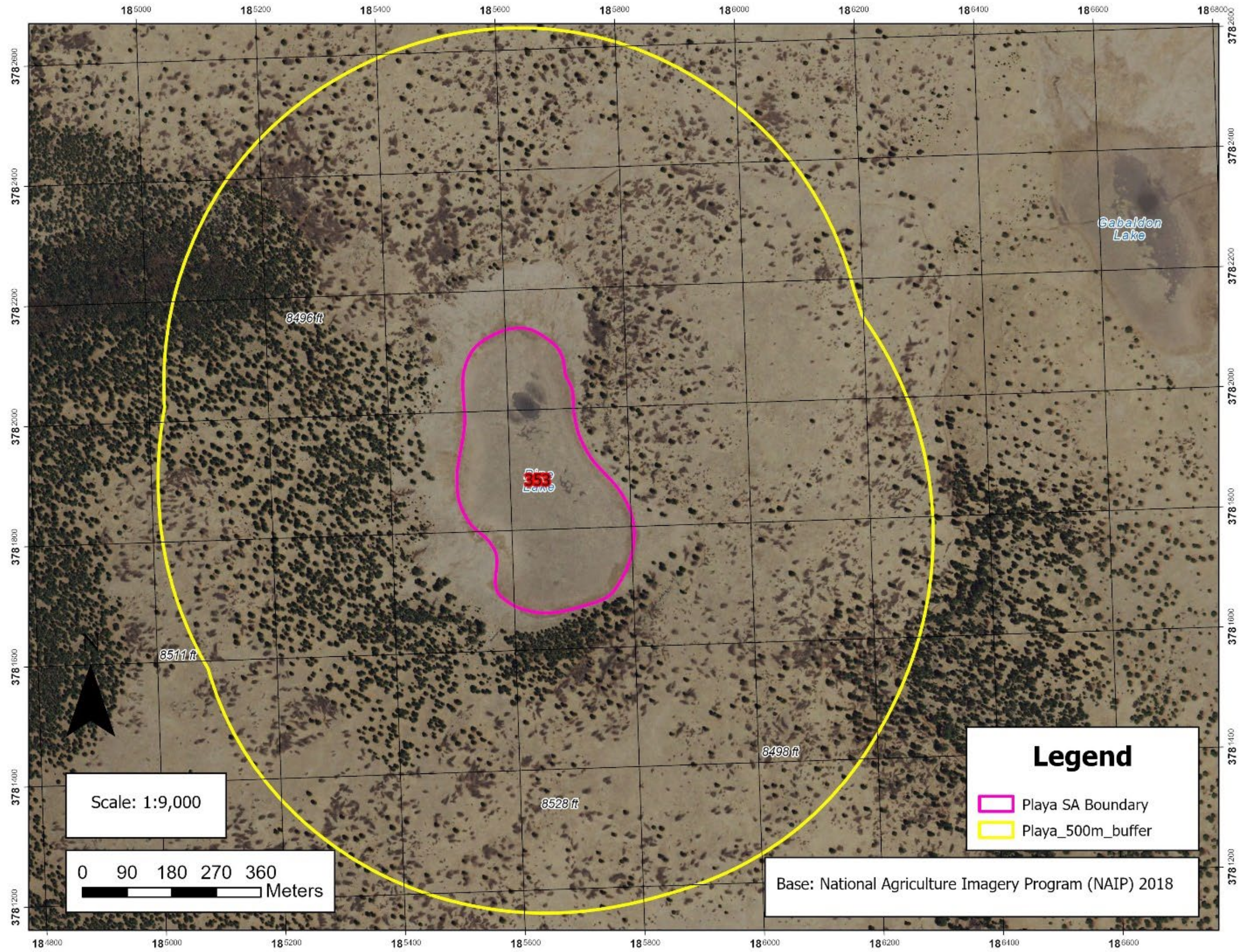


FIGURE 85 PLAYA 353 1:9000 SURROUNDING LAND USE MAP.

VEGETATION

Overall the vegetation was sparse throughout the basin, with two vegetation zones. The center had several FACW, FAC, and FACU species. The outer zone had a 50% cover of western wheatgrass (FAC).

TABLE 47 PLAYA 353 VEGETATION

Scientific Name	Common Name	Indicator Status	Annual/ Perennial	Playa	% cover Center	% Cover 2nd ring	% Cover 3rd ring
Poacea spp.	UNK grass	UNK	UNK	353	2	0	0
Rumex salicifolius	willow dock	FACW	Perennial	353	2	1	0
Elymus elymoides	bottlebrush squirreltail	FACU	Perennial	353	1	0	0
Pascopyrum smithii	western wheatgrass	FAC	Perennial	353	1	50	0
Suckleya suckleyana	poison suckleya	FACW	Annual	353	1	0	0

Eleocharis spp.	spikerush	FACW	Annual	353	0	1	0
Euphorbiacea spp	spurge	UNK	UNK	353	0	1	0
Polygonum arenastrum	prostrate knotweed	Up	Annual	353	0	1	0
Veronica peregrina	Purslane Speedwell	FAC	Annual	353	0	1	0

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Soils

The soil pit was dug near the excavation and showed the hydric soil indicator of redox dark surface in a heavy clay.

TABLE 50 PLAYA 353 SOIL DESCRIPTION

Layer 1	
1 depth	12
1 matrix color	2.5y 2.5/1
1 matrix percent	98
1 redox color	10yr 5/6
1 redox percent	2
1 redox type	C
1 redox loc	M
1 texture	clay

Hydrology and Hydroperiod

The playa had surface water, high water table, and surface soil cracks as indicators. This playa appears to be drier than the previous, with GSWE data showing surface water was observed in 24 of the 37 years recorded. This playa has a higher recurrence, up to nearly during late winter and early spring, with an approximate 15% recurrence in the monsoon season, suggesting that this playas hydroperiod is largely driven by snowfall.

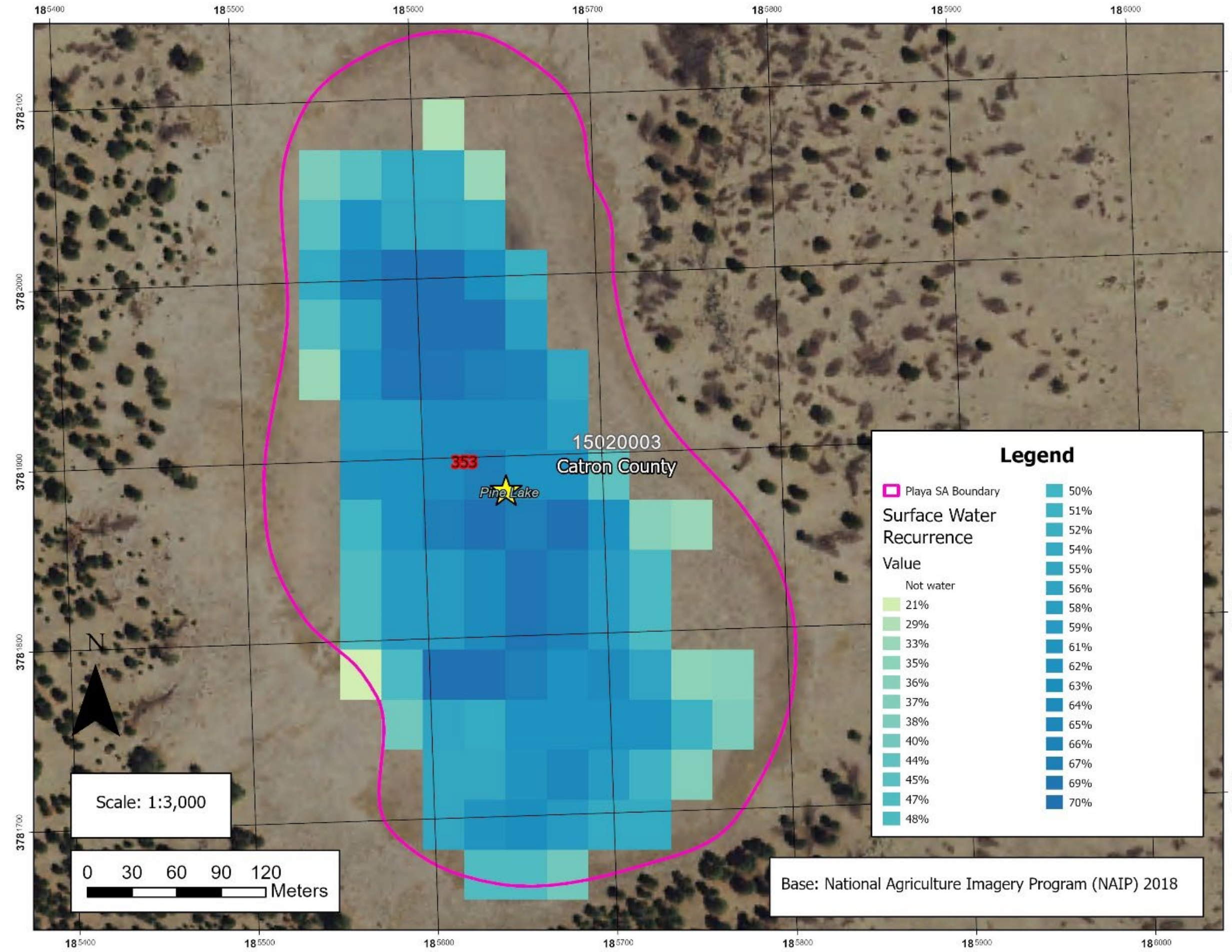

FIGURE 86 ANNUAL SURFACE WATER RECURRENCE (GSWE).

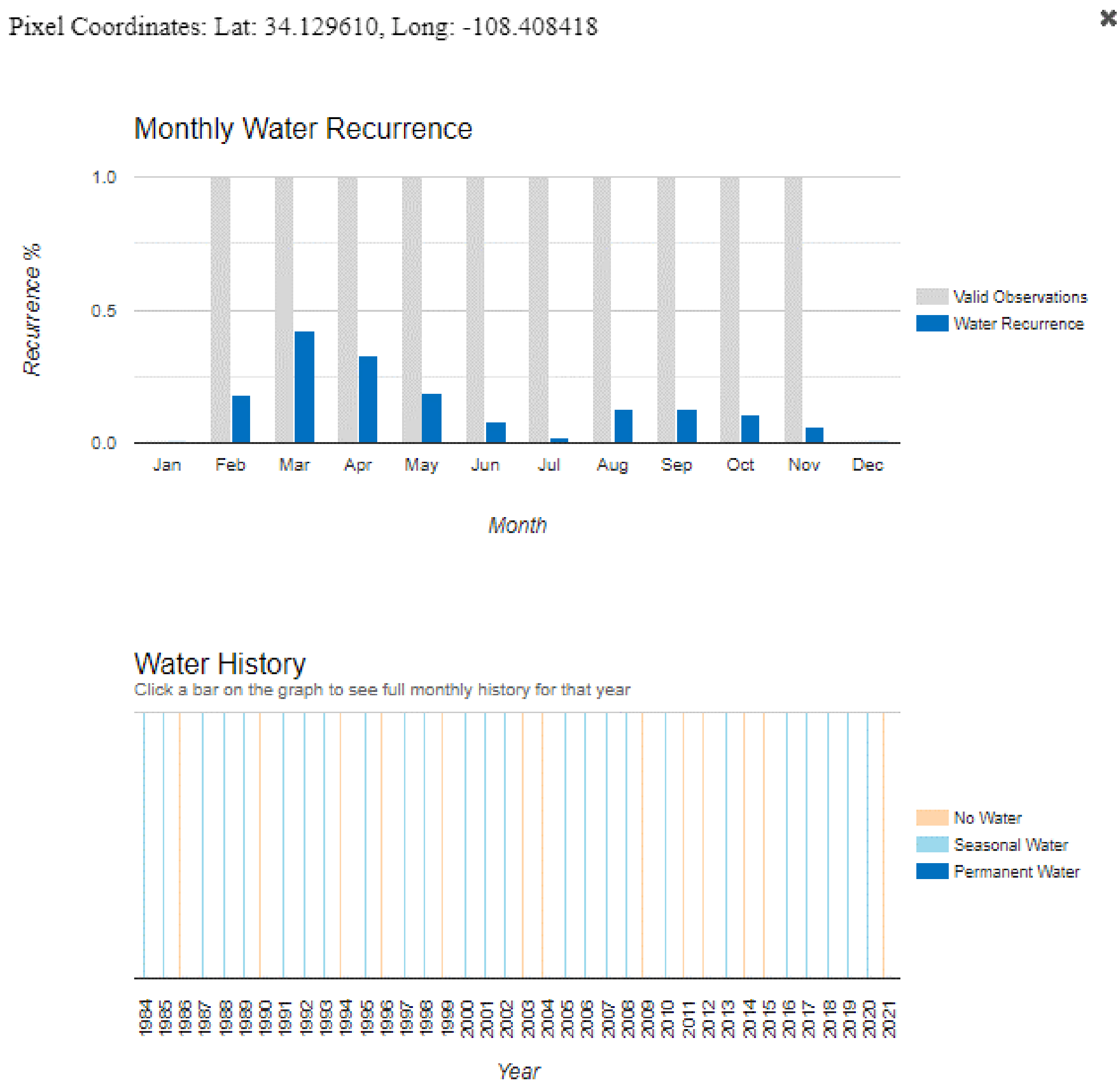

FIGURE 87 MONTHLY SURFACE WATER RECURRENCE (GSWE).

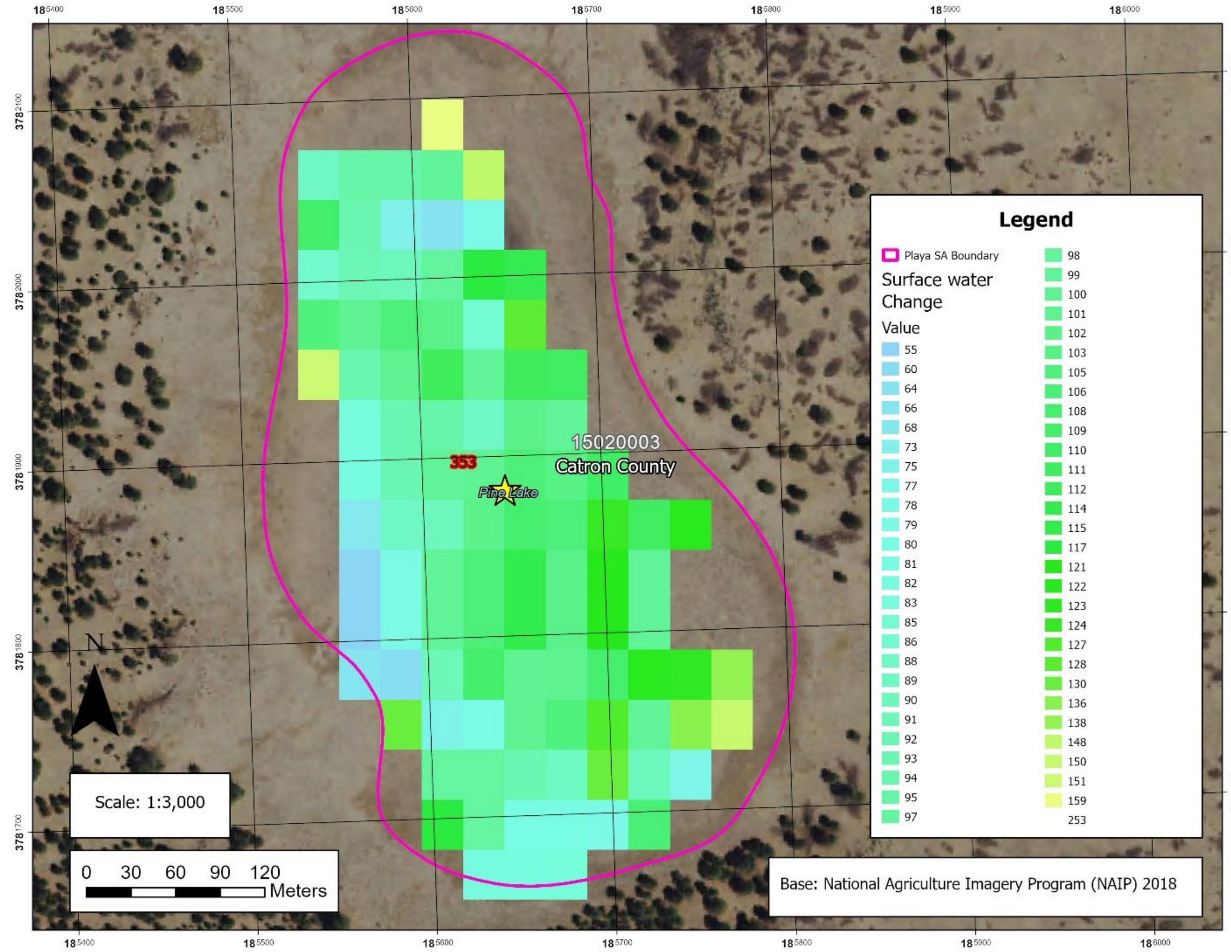

FIGURE 88 SURFACE WATER CHANGE INTENSITY (GSWE). SIMILAR TO GABALDON LAKE THIS PLAYA SHOWS AREAS WITH SLIGHT DECREASES AND AREAS WITH SLIGHT INCREASES IN RECURRENCE.

PLAYA 169

Playa 169 technically falls outside of the project area. It lies 200 meters into HUC – 8 1504004. It is just off FS Rd 93 near Playa 330. It is on a small hill west of the road surrounded by an evergreen forest. This was the only non-excavated playa on our site visit in Catron County. It did however have deep hoof punching and cropped vegetation, with numerous cattle trails.

TABLE 51 PLAYA 169

Center UTM	729059.96E, 3843267.465N, 12S	Acreage	9.69
County	Catron	Wetland Y/N	Y
Watershed (Huc - 8)	15040004*	Wetland Vegetation Presence	Y
Geologic Unit	Tuau	Wetland Soil Presence	N

Elevation (ft)	8633	Wetland Hydrology Presence	Y

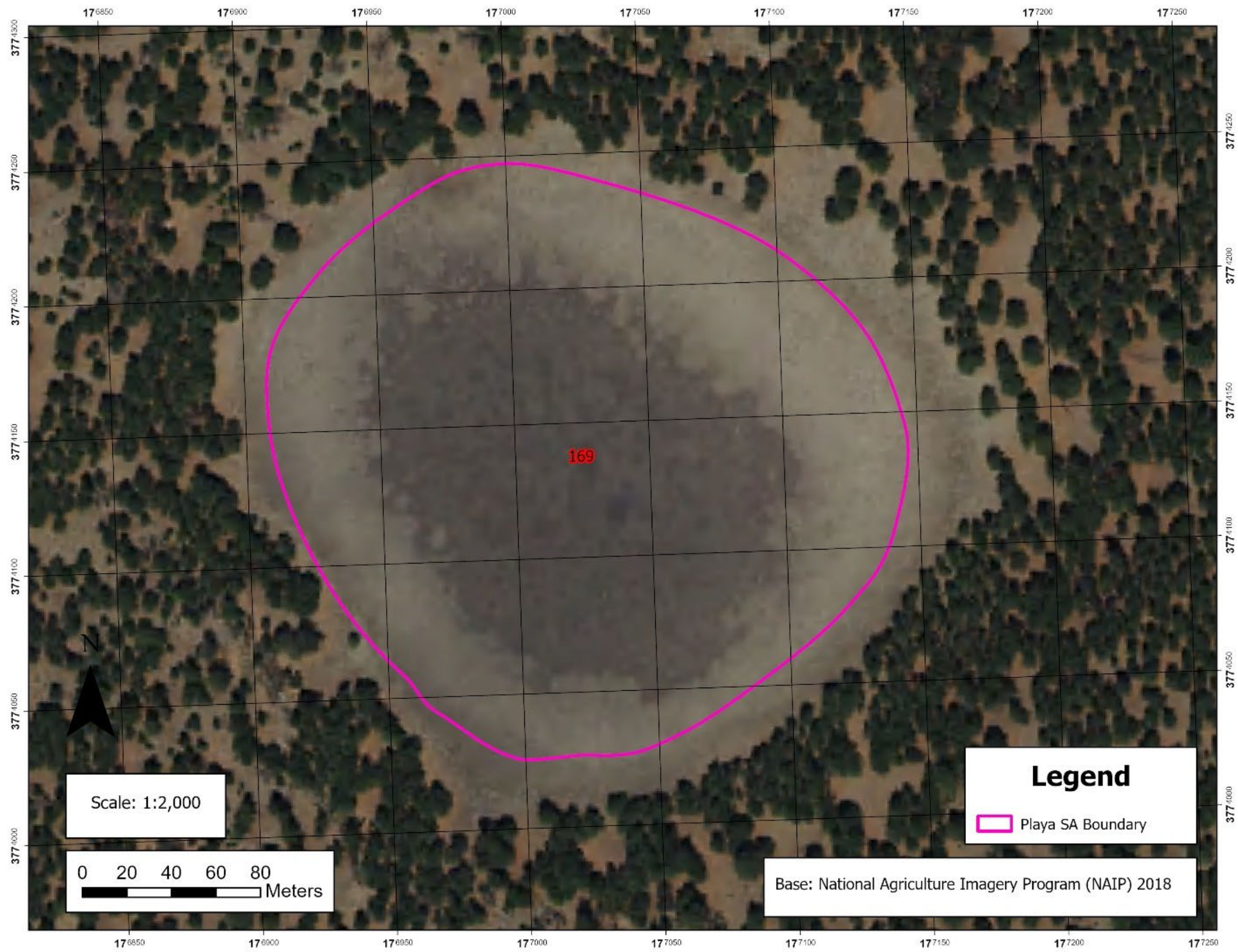

FIGURE 89 PLAYA 169 1:2,000 MAP.

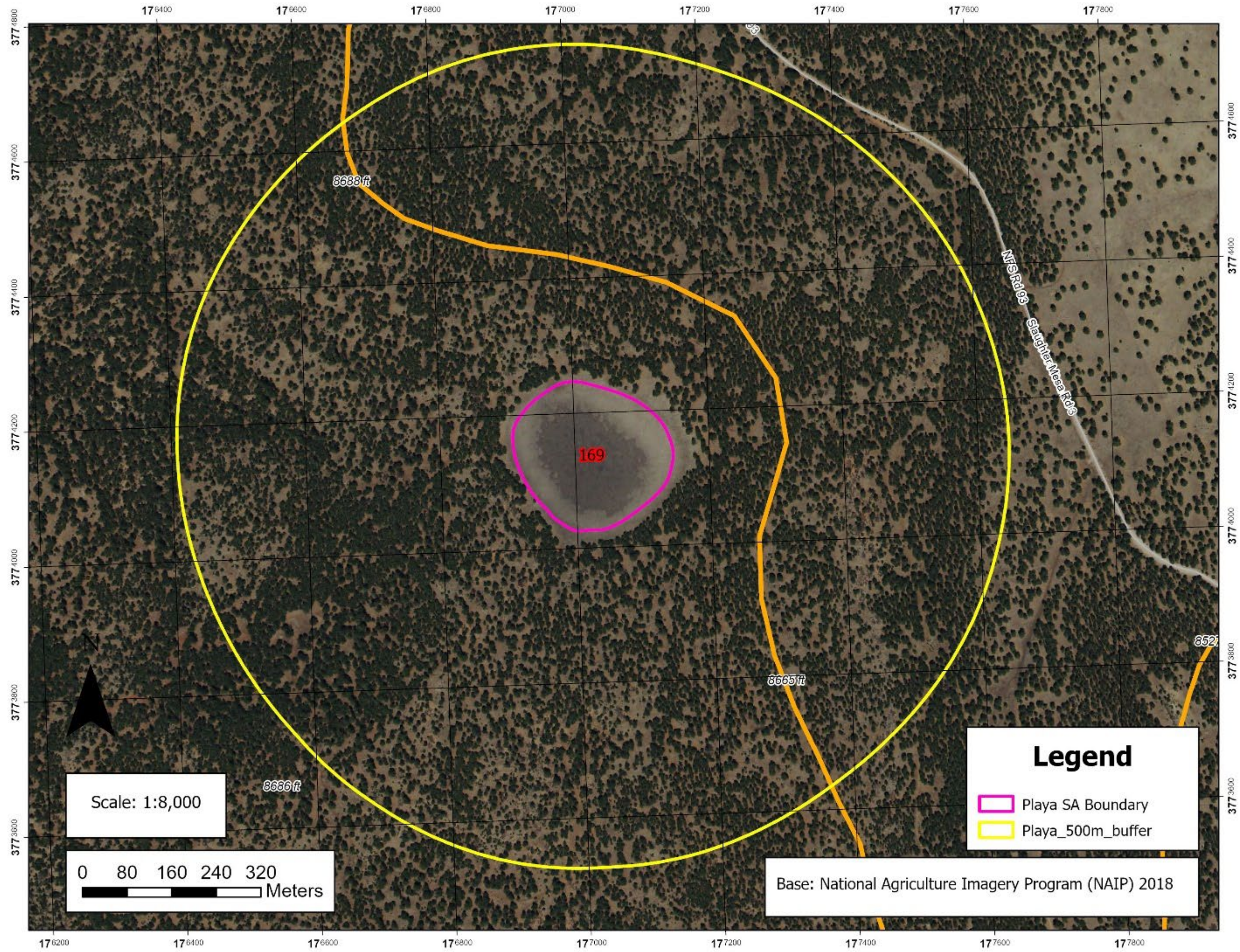

FIGURE 90 PLAYA 169 1:8,000 SURROUNDING LAND USE MAP.

VEGETATION

There were three distinct plant communities in this playa. The center ring had some standing water, surrounded by predominately bare soil and numerous wetland species. The second ring of vegetation was largely western and slender wheat grass, while the outer ring was mainly western wheat grass.

TABLE 52 PLAYA 169 VEGETATION

Scientific Name	Common Name	Indicator Status	Annual/ Perennial	Playa	% cover Center	% Cover 2nd ring	% Cover 3rd ring
Eleocharis spp.	spikerush large	FACW	Annual	169	10	0	0
Eleocharis spp.	spikerush dwarf	FACW	Annual	169	5	0	0
Rumex salicifolius	willow dock	FACW	Perennial	169	5	1	0
Polygonum arenastrum	prostrate knotweed	Up	Annual	169	1	0	0
Brassicacea spp.	UNK	UNK	UNK	169	1	0	0

Pascopyrum smithii	western wheatgrass	FAC	Perennial	169	0	20	30
Spaeralcea coccinea	scarlet globemallow	Up	Perennial	169	0	1	1
Erigeron Spp.	fleabane	UNK	UNK	169	0	1	1
Gutierrezia sarothrae	broom snakeweed	Up	Perennial	169	0	1	0
Elymus trachycaulus	slender wheat grass	FACU	Perennial	169	0	10	0
Asteracea spp	UNK	UNK	UNK	169	0	0	5
Scorzonera humilis	viper grass	Up	Annual	169	0	1	0

Soils

The soil pit was dug just outside of the standing water. This soil had a thick dark surface but was only dug to 12” and to this depth did not contain hydric soil indicators.

TABLE 53 PLAYA 169 SOILS.

Layer 1	
1 depth (in.)	12
1 matrix color	2.5y 2.5/1
1 matrix percent	100
1 redox color	na
1 redox percent	na
1 redox type	na
1 redox loc	na
1 texture	clay

FIGURE 91 PLAYA 169 SOIL PIT.

Hydrology and Hydroperiod

This site had hydrology indicators of standing water, high water table, saturation, and surface soil cracks. Satellite data shows that this playa had standing surface water in 26 of the 37 recorded years, predominately in the winter and early spring, with very low recurrence in the monsoon season. There is also a trending increase in water occurrence in the playa.

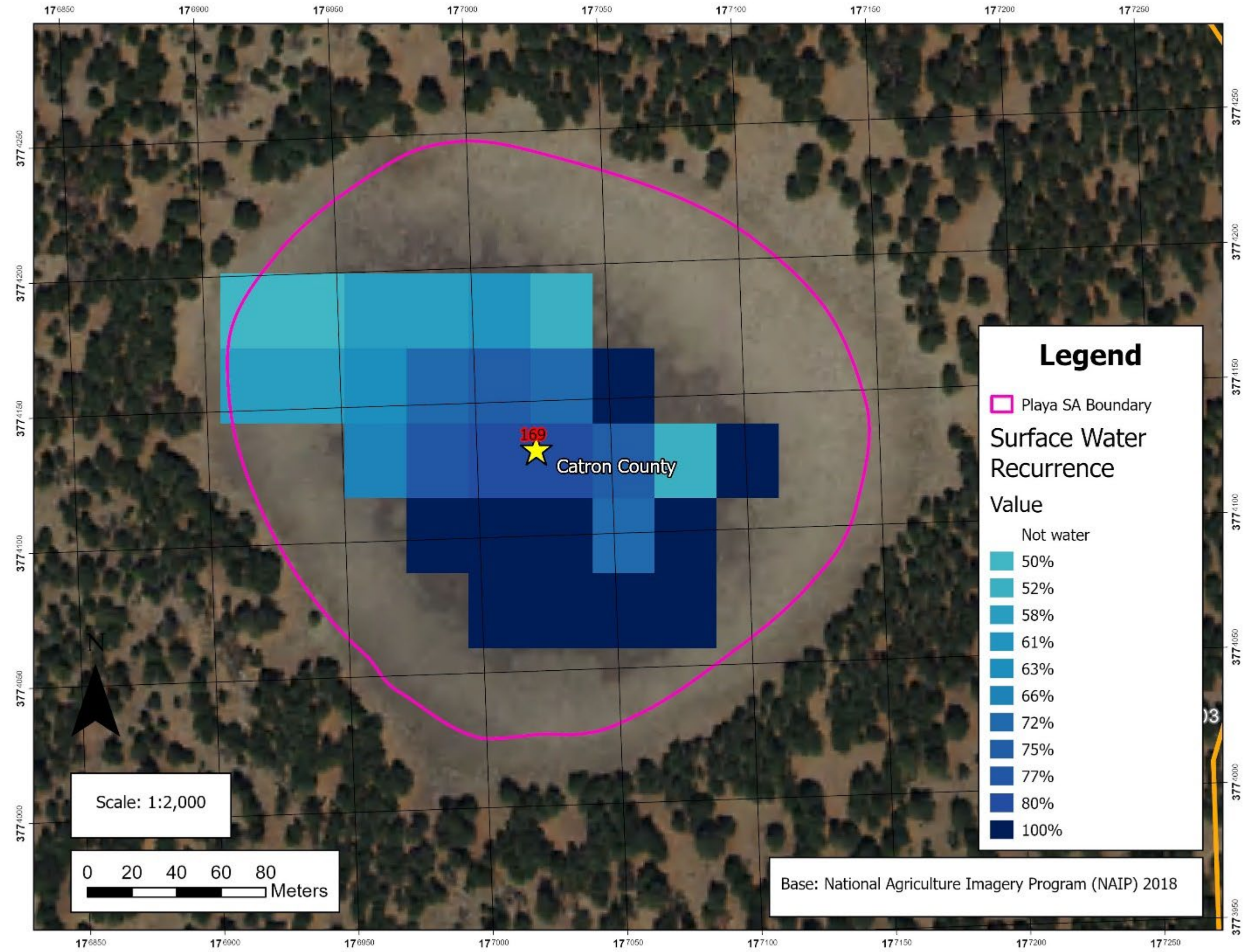

FIGURE 92 PLAYA 169 ANNUAL SURFACE WATER RECURRENCE (GSWE).

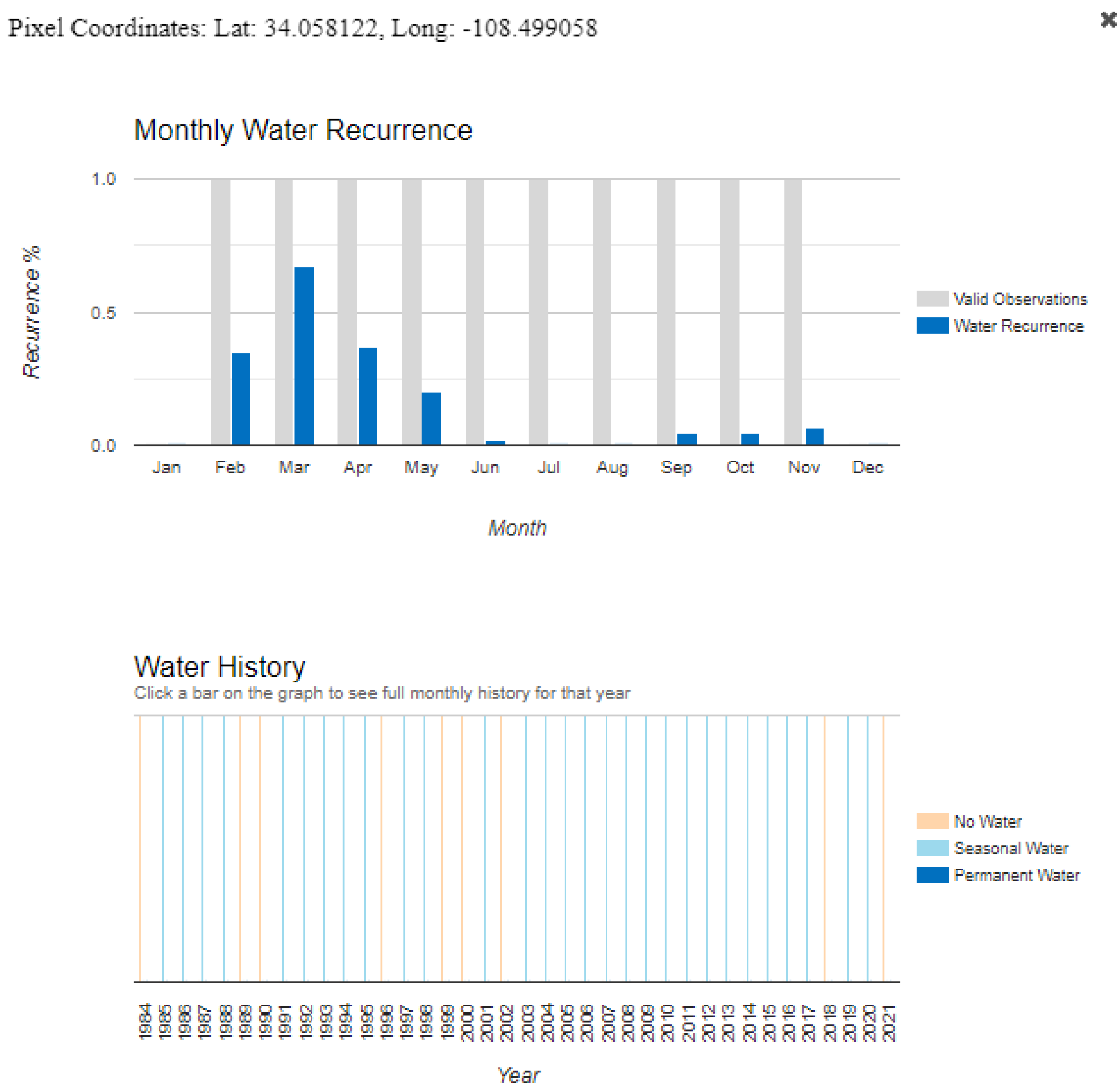

FIGURE 93 PLAYA 169 MONTHLY SURFACE WATER RECURRENCE (GSWE).

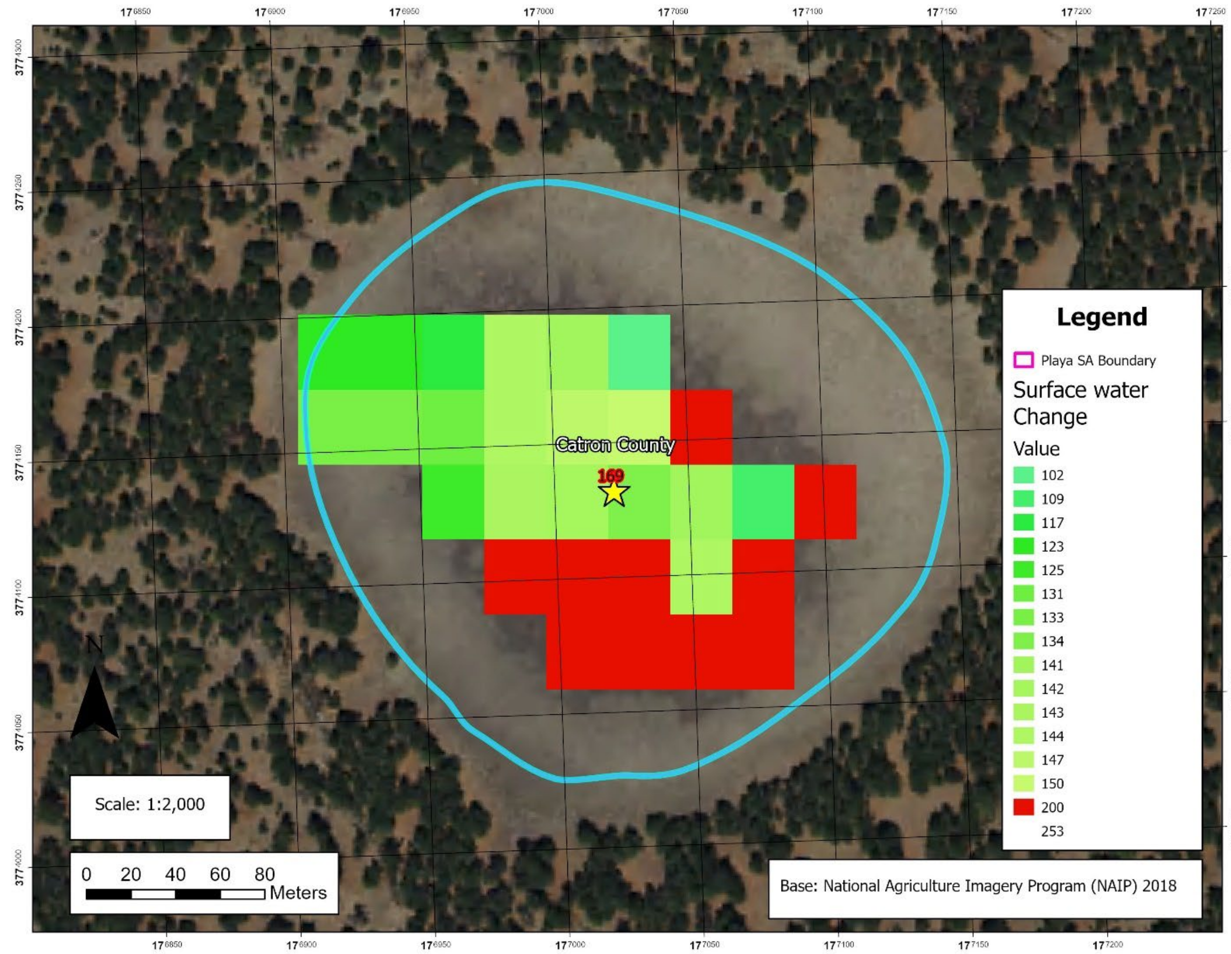

FIGURE 94 PLAYA 169 SURFACE WATER CHANGE INTENSITY (GSWE).

PLAYA 330

Playa 330 is a rounded triangular shaped basin off of FS Rd 132 in the Gila National Forest. The basin has two large ponds dug in it, with a berm in between. There was no evidence of cattle usage at this site.

TABLE 48 PLAYA 330

Center UTM	730057.65E, 3773253.96N, 12S	Acreage	10.07
County	Catron	Wetland Y/N	Y
Watershed (Huc - 8)	15020003	Wetland Vegetation Presence	Y
Geologic Unit	Turp	Wetland Soil Presence	N
Elevation (ft)	8641	Wetland Hydrology Presence	Y

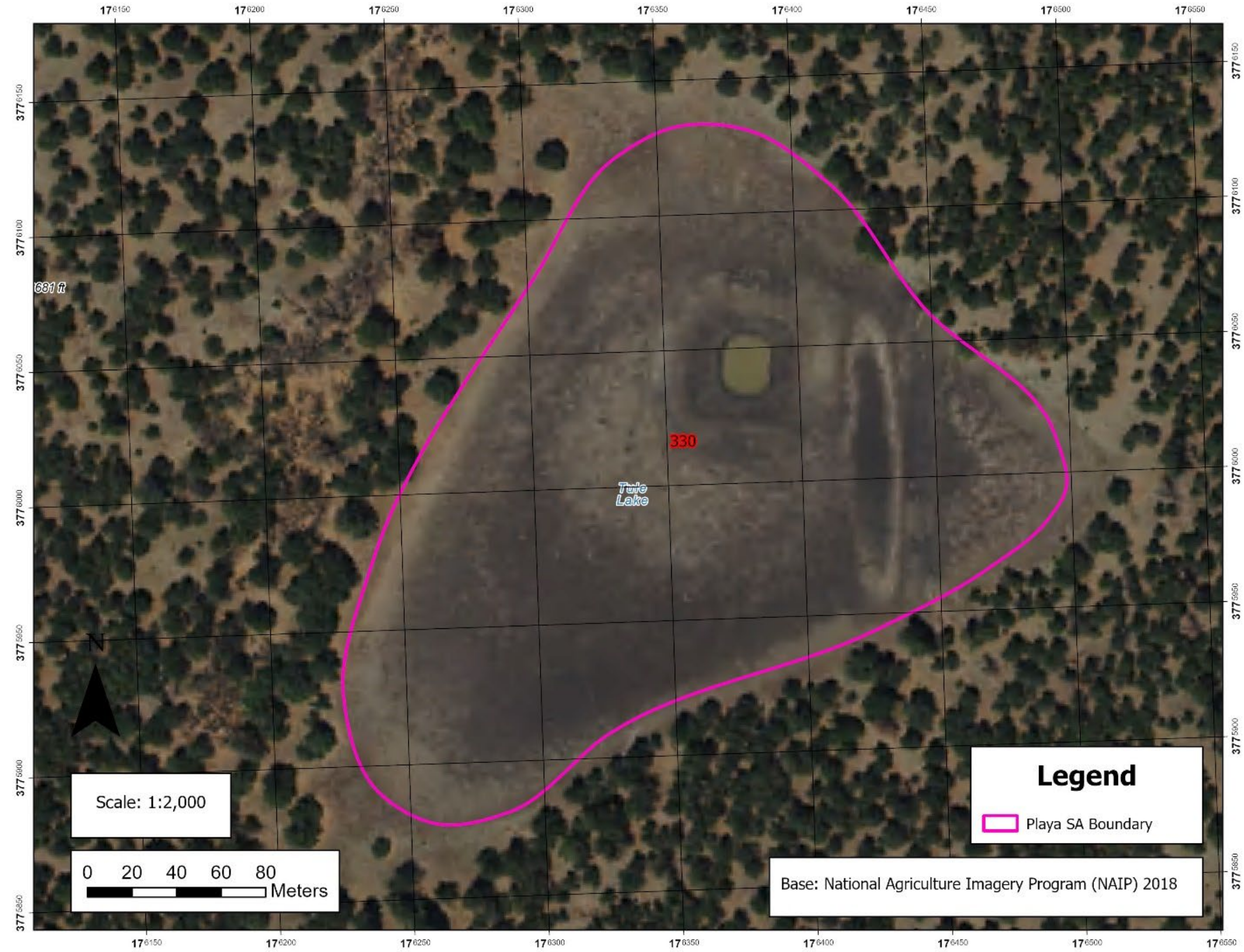

FIGURE 95 PLAYA 330 1:2,000 MAP.

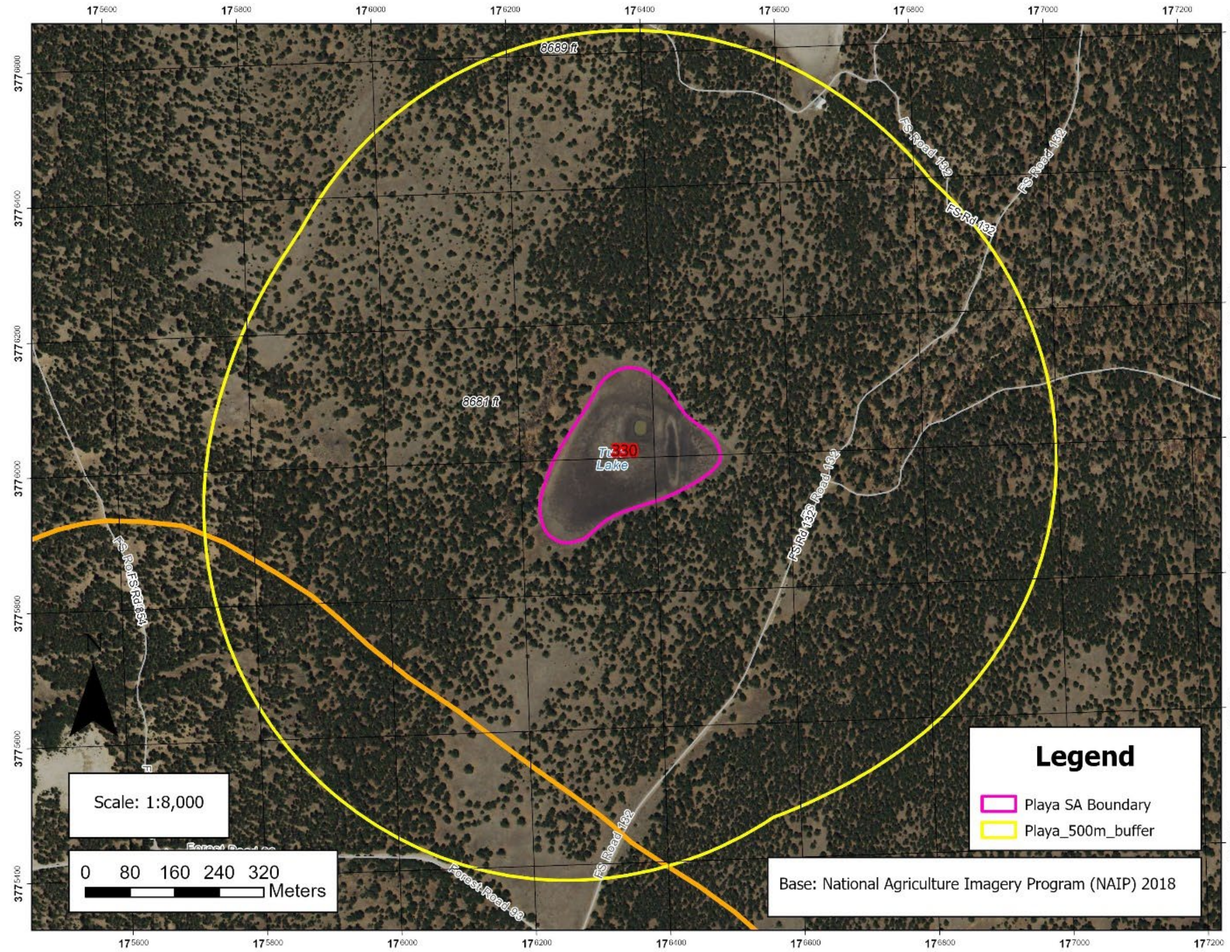

FIGURE 96 PLAYA 330 1:8,000 SURROUNDING LAND USE MAP.

VEGETATION

FIGURE 97 FRACTURED VEGETATION ZONES IN PLAYA 330 DUE TO PITS AND BERMS. VEGETATION ON BERMS WERE NOT NOTED.

Spikerush species (FACW) and other OBL, FACW, FAC species dominated the pond edges. Spikerush dominated in the second zone as well. The outer ring had 40% western wheatgrass (FAC).

TABLE 49 PLAYA 330 VEGETATION

Scientific Name	Common Name	Indicator Status	Annual/ Perennial	Playa	% cover Center	% Cover 2nd ring	% Cover 3rd ring
Eleocharis spp.	spikerush large	FACW	Annual	330	0	80	0
Eleocharis spp.	spikerush dwarf	FACW	Annual	330	0	5	0
Rumex salicifolius	willow dock	FACW	Perennial	330	0	1	0
Brassicacea spp.	UNK	UNK	UNK	330	0	1	0
Veronica catenata	Water Speedwell	OBL	Perennial	330	0	1	0
Polygonum arenastrum	prostrate knotweed	Up	Annual	330	0	1	0
Eleocharis spp.	spikerush large	FACW	Annual	330	90	0	0
Polygonum amphibium	water smartweed	OBL	Perennial	330	1	0	0
Polygonum arenastrum	prostrate knotweed	Up	Annual	330	1	0	0
Eleocharis spp.	spikerush dwarf	FACW	Annual	330	3	0	0

Hordeum jubatum	fox tail barley	FAC	Perennial	330	1	0	0
Eleocharis spp.	spikerush large	FACW	Annual	330	90	0	0
Eleocharis spp.	spikerush dwarf	FACW	Annual	330	3	0	0
Polygonum arenastrum	prostrate knotweed	Up	Annual	330	1	0	0
Myosurus minimus	Myosurus minimus	OBL	Annual	330	1	0	0
UNK Aquatic	UNK	UNK	UNK	330	1	0	0
Pascopyrum smithii	western wheatgrass	FAC	Perennial	330	0	0	40
Veronica catenata	Water Speedwell	OBL	Perennial	330	0	0	1
Taraxacum officinale	dandelion	FACU	Annual	330	0	0	1

Soils

A soil pit was dug near the berm between the two ponds. No hydric soil indicators were present in that pit. There are likely hydric soils on the pit edges.

TABLE 56 PLAYA SOIL DESCRIPTION

Layer 1	
1 depth (in.)	
1 matrix color	2.5y 2.5/1
1 matrix percent	99
1 redox color	10yr 5/6
1 redox percent	1
1 redox type	C
1 redox loc	M
1 texture	clay

Hydrology and Hydroperiod

Surface water, high water table and surface soil cracks were all present at the site. This is a highly modified playa with numerous excavated pits and berms. GSWE recurrence data shows patchy high-water recurrence in a few areas that likely correlate with the pits. The two pixels with 100% recurrence only have water observed in 2020, suggesting that was a high precipitation year. Surface water was seen in 29 of the 37 recorded years, with a greater than 50% occurrence in late winter and spring, with approximately 5% in the monsoon season. Occurrence change data shows a general increasing occurrence trend in the playa except at the north and wester margins, with two pixels showing 100% increase from a single year data, 2020).

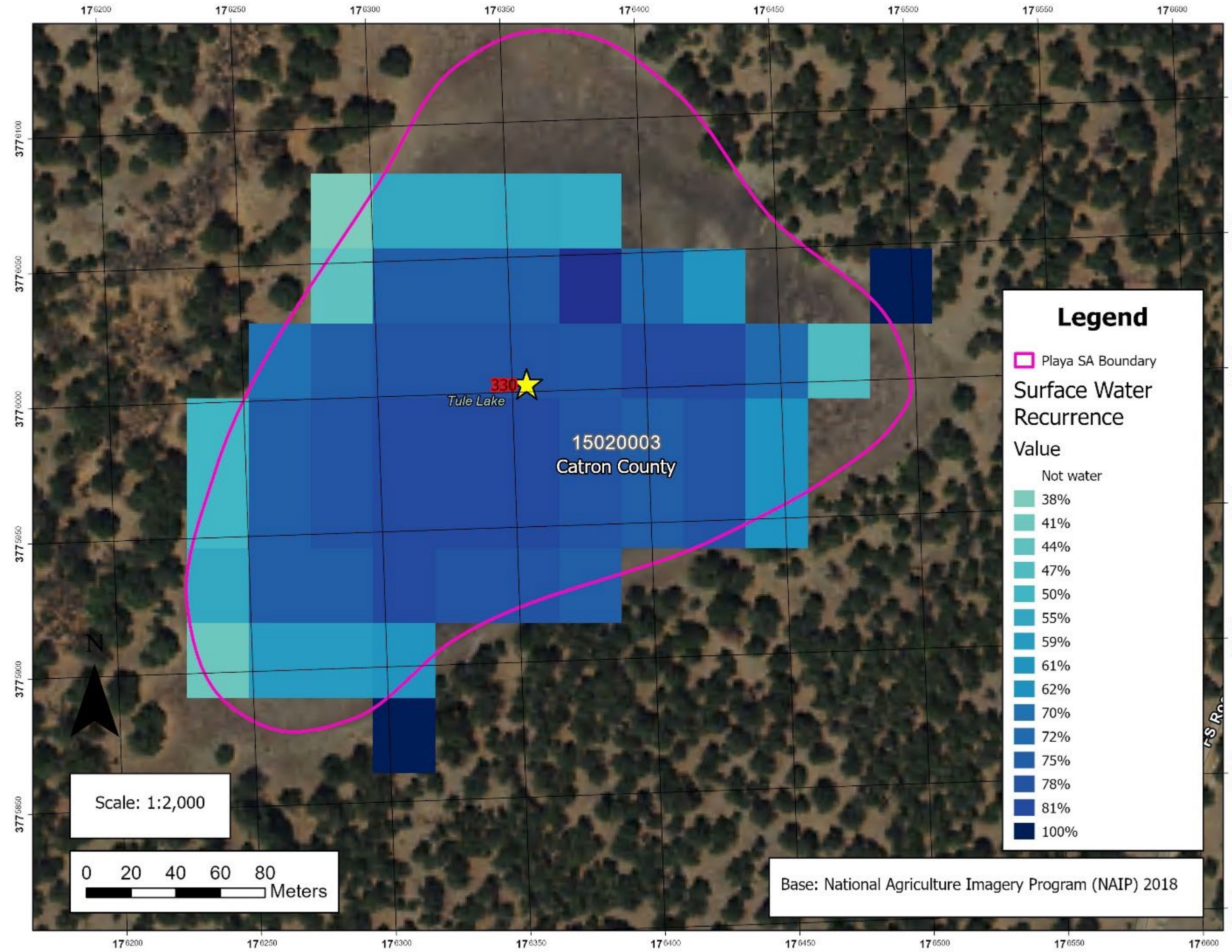

FIGURE 98 PLAYA 330 ANNUAL SURFACE WATER RECURRENCE (GSWE).

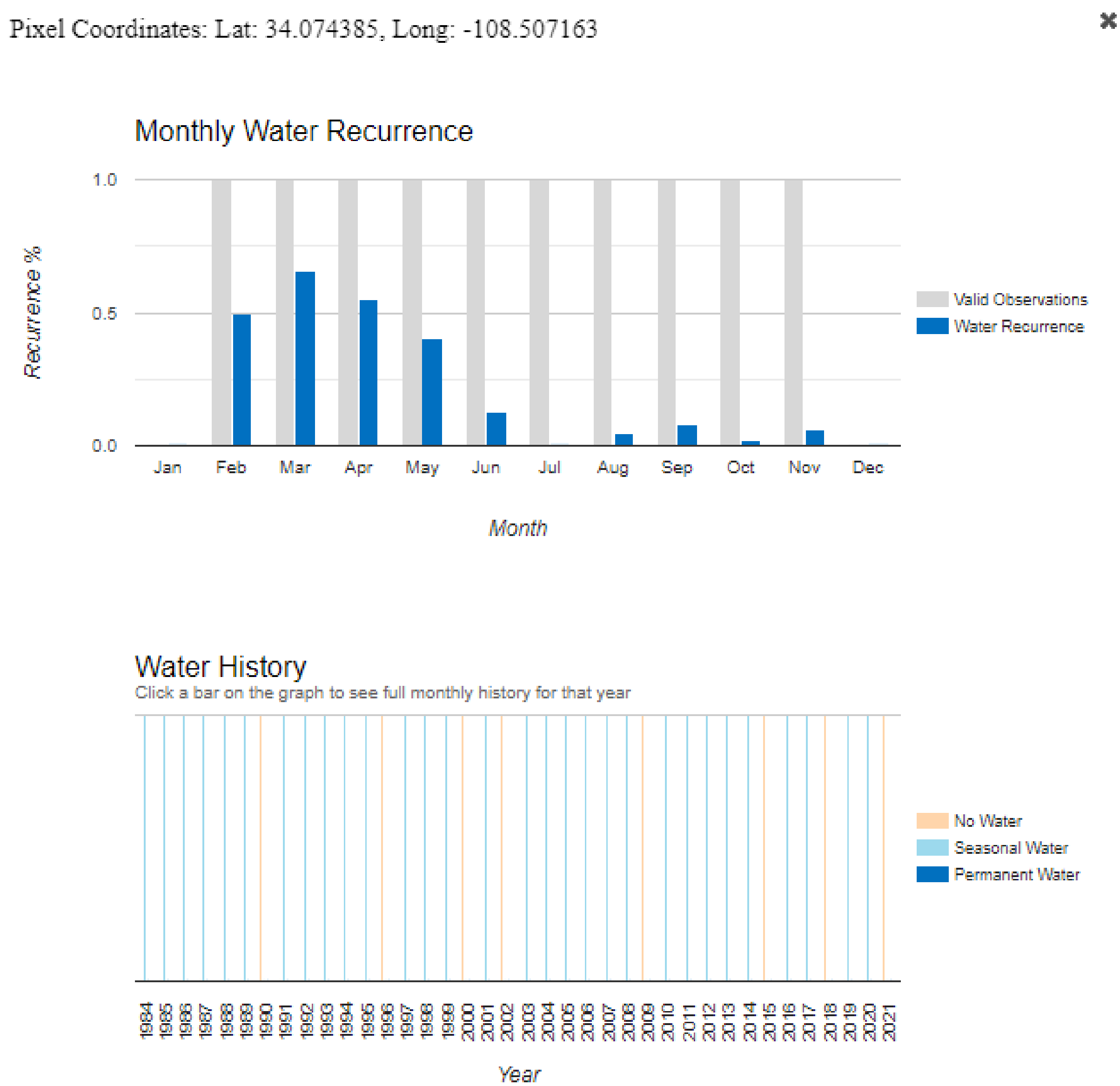

FIGURE 99 PLAYA 330 MONTHLY SURFACE WATER RECURRENCE (GSWE).

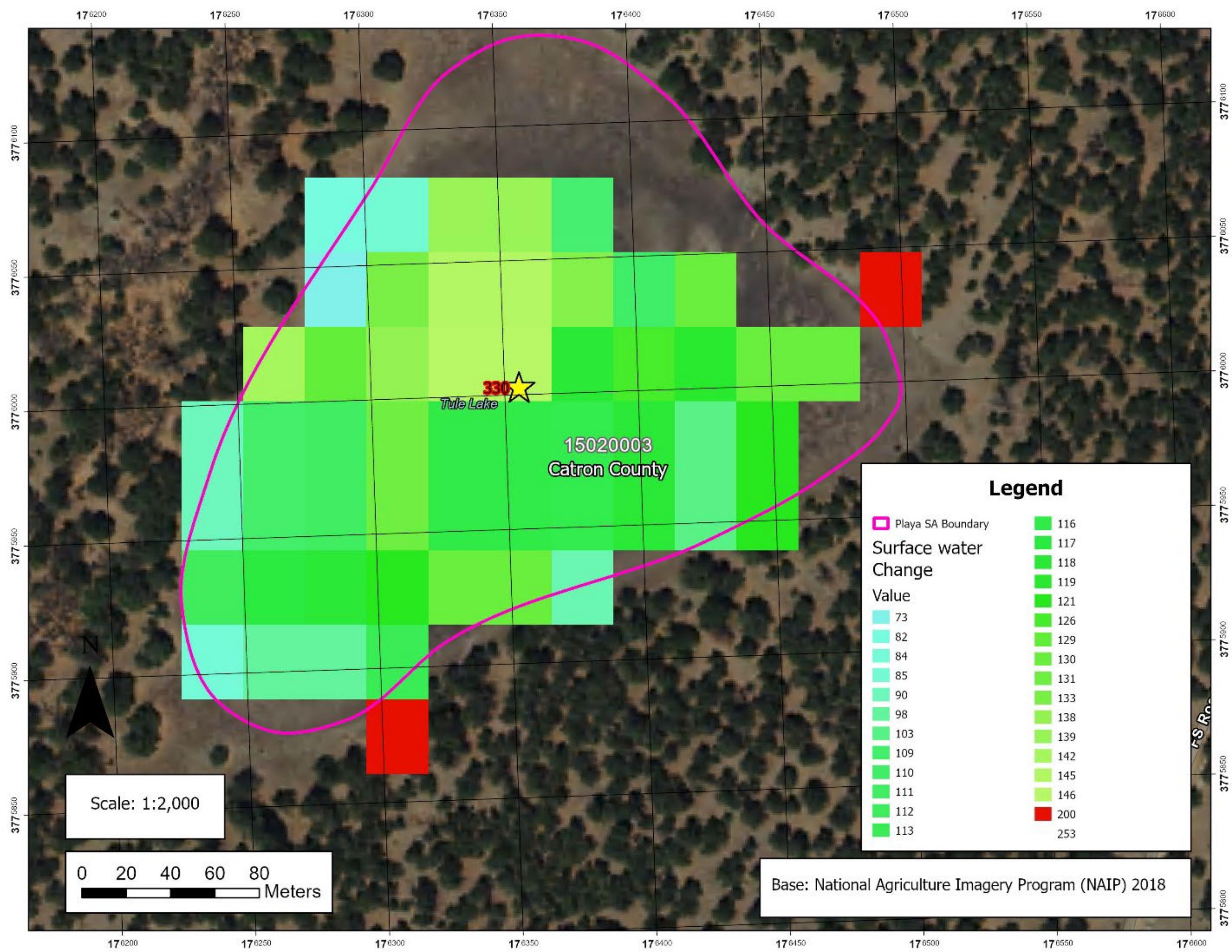

FIGURE 100 SURFACE WATER CHANGE INTENSITY (GSWE).

SUMMARY

For our June 2023 field visit the Wetlands Program staff took data at 18 depressions across Cibola and Catron Counties in a variety of Geologic units. The site visits were preliminary with a more rapid and often simpler version of the Army Corp wetland delineation protocol, along with photos and general observations of disturbance. Of those sites, four showed no wetland indicators of any type, suggesting that they are likely not wetlands as defined by the State. The remaining wetlands all had at least one wetland indicator, either vegetation, soils, or hydrology.

Playa wetlands are depressional wetlands that are known to have shrink-swell clay soils, and often support multiple concentric rings of wetland vegetation. All 14 of the wetlands had either surface or near surface clay layers with surface soil cracks. Four of the wetlands did not have hydric vegetation prevalence or dominance but were dominated by bare soil or annual vegetation. The site visit was between spring and the monsoon season in a dry year, so wetland vegetation may be more prevalent during wet years.

Assessment of western NM playa wetlands using the currently developed NMRAM

A secondary goal of this characterization of depressions in this volcanic area of Western New Mexico was to determine if these playas are similar enough to the playas of the Eastern Plains of New Mexico. The differences as noted in the introduction are largely land use, and geology, sedimentary versus volcanic. The surrounding land use can play a large role in the impacts to playas, the geology can play a role in soil formation, meaning soils that are volcanic in origin may have an impact on the clays in the playa bottom, and thus impact the shrink-swell nature of the clays and thus their infiltration and hydroperiods.

As for the rapid assessment of these western volcanic playas we can look at the currently developed NMRAM to determine if its metrics also apply across the board as it does to the playas of the Eastern Plains. The New Mexico Rapid Assessment Method Playa Wetlands (Muldavin et all 2017):

Size metrics

Absolute playa size

This metric is a current assessment of the current size of the playa annulus and basin and is valid for playas no matter the location.

Landscape Context Metrics

Surrounding land use

This metric examines the amount and intensity of human alteration. Recall that land use is one of the main differences between playas in the western volcanic regions and the Eastern Plains. Many of the scored land use elements such as urban development, city parks, agricultural fields, and dairy would not be selected. The area does contain paved and dirt roads that can occur near or though western playas, as can powerlines, wind turbines, trach, range land. Although the sites out west are not cropped, many are heavily used by livestock. This means that sedimentation due to overgrazing, cattle trails, ranch roads and other factors is the real threat to these playas. *More specific land use elements that cause impacts may be either added or weighted differently for western playas.*

Playa configuration

This metric assesses features that impinge the natural shape and boundary of the playas. Though surrounding land use is different in these playas, the listed features are adequate and can be used in the western playas.

Biotic Metrics

Exotic Annual Plant Abundance

Although these playas occur in differing habitat, ecologic units, geology and climate, the invasion of the playa by exotics is relevant to the playas no matter the location.

Wetland Species Index

This metric is an index of wetland condition based on the presence and abundance of dominant or co-dominant wetland species, best assessed during the growing season. The western playas are predominately in natural range land, and though species may vary from those in eastern NM, the abundance of the dominant wetland species is valid as created no matter the species or playa location.

Vertical Habitat Disruption

This is an assessment of the impact of vertical structures and woody vegetation that have encroached on the playa due to habitat alterations by humans, including both constructed features and the presence of tall woody species not historically associated with playa habitat. In the western playas that were visited, there was little evidence of vertical habitat disruption of playas, except for wind turbine development. No shrubs were seen near playas during the site visit. Additionally, the species of woody vegetation in western NM is largely different than that of eastern NM. *This metric may need to be revisited for playas in western NM.*

Abiotic Metrics

Playa Hydroperiod Disruption

This is assessing the degree to which the natural playa hydroperiod has been reduced by the existence of a pit excavation(s) in the playa floor that concentrates water and lowers flood height and aerial coverage. Excavation of the playa basin is very likely the largest driver of degradation in playas no matter the location. Excavation can potentially break through the clay floor disallowing the playa to hold water. To a lesser extent the excavation simply limits the ability of precipitation to wet the larger playa basin, shrinking the size of the wetland. Additionally, these pits are largely done for a livestock water supply, bringing livestock to the areas allowing for further degradation. In those respects, these playas have very similar threats. Excavations of playa basis were seen at numerous locations, and surface water change could be seen in satellite imagery. As such this metric is valid no matter the location of the playa.

Soil Condition Index

This is a soil-based index that assesses the alteration of the playa bottom soils by sediment accumulation due to anthropogenic impacts within the playa and in the surrounding watershed. Sedimentation is a problem no matter the location, as it can affect the playas hydroperiod and infiltration. A few of the sites that we visited had evidence of sediment accumulating on the playa floor. Though the clays may be different in the western playas due to influences of volcanic geology, especially further west in old volcanic geologic settings, sedimentation affects the functioning of playas no matter the location.

Water Source Augmentation

This assesses water source modifications that augment playa water supply and that may extend the hydroperiod, increase the frequency of wetting, or alter the extent of the playa when filled with water. Culverts, roads and trails near the playas and the like can greatly affect the playas' water inputs. Though there is less development in the western regions, water source augmentation can degrade a playa no matter the location.

Playa Watershed connectivity

This is an assessment of the degree of hydrologic connectivity of surface water flows from the watershed surrounding the playa. This metric focuses on detecting features that deplete the water supply to the playa in the land use zone. The items in the checklist can impact playas in the western regions similarly.

Stressor Checklist

Stressor checklists are designed to assess the intensity of stressors that occur within the SA and the LUZ. Stressors are anthropogenic disturbances which would be expected to have an effect on the condition of the SA. The purpose of the stressor checklists is to provide information that furthers the understanding of the current wetland condition. Stressors are not used in scoring and ranking the condition of the wetland. *This list could be modified to better represent common stressors in the rangeland setting of western New Mexico.*

Playa NMRAM Use in Western New Mexico Summary

Overall, as written the Playa NMRAM can be used to assess playas in Western New Mexico with a few caveats. The metrics are general enough to assess the ecological health and functioning of the playas in both regions. Due to differing land use, some of the metrics checklists and weighting may need to be reassessed, as urban and cropped agriculture are almost non-existent in the region. Furthermore, there is still a large unanswered question as to the clay soil minerology and thus their hydrodynamic effect on playas in the volcanic soils of western New Mexico. This could greatly affect vegetation community and hydrologic functioning of the playas.

Additional data needs

This report stems from desktop research and a single three-day field trip by NMED Wetlands Program staff. A more in-depth analysis of the vegetation could help answer if some of the playas indeed contain a prevalence or dominance of wetland species during the growing season and in wetter years. Furthermore, the Army Corps recommends soil pits to at least 20" to describe the soils and potential wetland indicators. Many of the soil pits did not show indications of hydric soils, however many of the pits were only dug to 12."

A final knowledge gap is the make-up of the clays in playa basins in volcanic soils. These playas can be delineated using Army Corp methodology and assess to a relatively to a high degree of success using the current NMRAM that was created through the evaluation of playas in the Eastern Plains. There is data to support the idea of varying hydrodynamics in playas based on the makeup of their clay bottoms. This means that some playas may form larger cracks, allowing for greater infiltration (thus less surface water retention in smaller precipitation events) than other playas. These playas may show fewer indications of hydrology or hydric soil indicators using traditional methods.

It would be a valuable exercise to work with NRCS staff, or other agencies and organizations to conduct more in-depth studies of these clays across varying volcanic geology settings, to be able to better manage playas across the state.

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Appendix A

Western Playas Dataforms

PLAYA 395

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: ______ City/County: ______ Sampling Date: 6/25/23
Applicant/Owner: ______ State: ______ Sampling Point: 001
Investigator(s): ______ Section, Township, Range: ______
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Convex Slope (%): ______
Subregion (LRR): ______ Lat: 34.77375 Long: -107.93527 Datum: ______
Soil Map Unit Name: Qa NWI classification: ______
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ______ No ______ (If no, explain in Remarks.)
Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ______ No ______
Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ______ No X	Is the Sampled Area within a Wetland? Yes ______ No ______
Hydric Soil Present?	Yes X No ______	
Wetland Hydrology Present?	Yes X No ______	

Remarks: PLAYA IN ALLUVIUM, CLAY BOTTOM, DOMINATED BY ANNUALS, CATTLE TRAMPLED, MUD CRACK. THREE VEGETATED ZONES; 1 = INTERIOR, 2 INTERMEDIATE, 3 OUTER SURROUNDED BY SAND SAGE & BLUE GRAMA

VEGETATION

	Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
	1.			
	2.			
	3.			
	4.			
	Total Cover:			
	Sapling/Shrub Stratum			
3,2	1. SAND SAGE	2,5		
3	2. ~~FOUR WING~~ SALTBUSH	3		
	3.			
	4.			
	5.			
	Total Cover:			
	Herb Stratum			
1,2	1. GRAMA (BOUTELOUA SIMPLEX)	100,30		
1,2	2. SCORPIONWEED (P. POPEI)	5,2		
1	3. ERIGERON	1		
	4. ASTRAGULUS (VETCH)	10		
3	5. TUMBLEWEED	10		
1,2,3	6. OENOTHERA	2,2,5		
2,3	7. AMARANTHUS	15,10		
2,3	8. SCARLET GLOBEMALLOW SPP.	1		
3	NEW MEXICO GUMWEED			
	Total Cover:			
	Woody Vine Stratum			
	1.			
	2.			
	Total Cover:			

% Bare Ground in Herb Stratum ______ % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: ______ (A)
Total Number of Dominant Species Across All Strata: ______ (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: ______ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	______	x 1 = ______
FACW species	______	x 2 = ______
FAC species	______	x 3 = ______
FACU species	______	x 4 = ______
UPL species	______	x 5 = ______
Column Totals:	______ (A)	______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%
___ Prevalence Index is ≤3.0[1]
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ______ No ______

Remarks:

2,3	BLUE GRAMA	5,10
2	SUNFLOWER	5
3	LOW WHOLLY GRASS	3
2	SNAKEWEED (GUTARAZEA)	2
1	GRINDELIA	

PLAYA 795

SOIL

Sampling Point: 001

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 3/1	100	—					
3-16	10YR 3/1	98	7.5YR 4/4	2	C	PL	Clay	
16-32	10YR 3/2						Sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes X No ___

Remarks:

SOIL SURFACE CRACKS, SOME ARE DEEP

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- X Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: