# NATURAL RESOURCE MASTER PLAN

MARICOPA COUNTY
PARKS & RECREATION

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# FORWARD

Maricopa County's regional park system was founded in 1954, and soon after that, the County began acquiring properties to meet the recreational needs of a "booming" population. In 1965, the Maricopa County Regional Park System Plan was developed to establish and guide a young park system in light of the county's continued growth, development, and urbanization. The County's population at this time was approximately 750,000. All major cities within Maricopa County combined totaled less than 100 square miles.

The plan identified the need for large regional parks to *"provide unspoiled preserves removed from the urban area(s) and protected from urban encroachment."* The project further identified the urgent need for these regional parks *"to function as a retreat, an escape from the bustle of modern living, a place to get away from it all in the quiet of solitude."*

Findings from the 1965 plan noted an abundance of healthy native plant and animal life in the parks but also cautioned that some species were disappearing or rapidly diminishing in some areas of the region as urbanization and development expanded.

The next significant planning effort for parks in Maricopa County culminated in 2009 with the completion of the Parks and Recreation Strategic System Master Plan. At that time, the County's population was 3.8 million, and the city of Phoenix alone was approaching 500 square miles, a staggering difference from the four decades prior.

The 2009 plan assessed the current conditions and identified elements needed to achieve a quality regional park and open space system. The plan notes:

> *"A quality Maricopa County park is a representative piece of Arizona's vast and diverse landscape large enough that the natural and cultural resource base can be protected, studied and used to provide an understanding of the history and natural systems"* of the region. Further, it states that a quality regional park system *"is a premier conservatory of properties, facilities, and programs that reflect unique and significant relevance to the Arizona story – the history and heritage, the land and wildlife and preserving the quality of our County's future."*

While the plan continued to emphasize the importance of outdoor recreation, it also recognized a significant shift in the importance of better conservation practices within our existing open spaces. This idea of conservation included protecting new lands to retain a representative slice of our natural heritage from an ecological and physiological well-being perspective. As a result, based on community input, the plan recommended acquiring additional open space lands and developing a comprehensive natural resource plan for the system as a whole and individual natural resource guides specific to each park within the system.

The 2009 Plan was reviewed and updated in 2014 to assess the strategic accomplishment completed over the previous five (5) years. This update also analyzed new trends for both

outdoor recreation and natural open space conservation. One such trend identified found that residents were increasingly valuing public open spaces. Several public opinion polls noted this trend and found that residents see the local natural beauty of open spaces as the state's greatest asset.

Since 2009, the department has partnered with the Central Arizona Conservation Alliance (CAZCA) to develop a Regional Open Space Strategy (ROSS) for Maricopa County. This regional effort is designed to engage the scientific community and natural resource managers in developing best practices to ensure a sustainable regional open space system that supports healthy ecosystems and communities.

Given the direction of the 2009 Plan, the 2014 update, and the ROSS insights, we must begin focusing on developing conservation strategies and management practices for the Maricopa County Regional Park System. This next step, a comprehensive Natural Resource Plan, will provide a system-wide view of our parks' current ecosystem and biological resource conditions, threats, and issues. Further, it will begin to outline practices, procedures, and strategies for stabilizing and restoring our natural assets. This undertaking will require a significant effort by our agency and local partners. It will require commitment and perseverance over an extended period. The task may appear daunting, but future generations will appreciate and cherish the desired outcome.

*R.J. Cardin*

R.J. Cardin
Maricopa County Parks Recreation Department Director

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# ACRONYMS

- **ADEQ**: Arizona Department of Environmental Quality
- **ADRP:** Adobe Dam Regional Park
- **ADWR:** Arizona Department of Water Resources
- **AMA:** Arizona Management Areas
- **ASLD:** Arizona State Land Department
- **ASU:** Arizona State University
- **AZGFD:** Arizona Game and Fish Department
- **BGA:** Bald and Golden Eagle Protection Act
- **BHRP:** Buckeye Hills Regional Park
- **BLM:** Bureau of Land Management
- **BYA:** Billions of Years Ago
- **C&R:** Conservative and Rare
- **CCA:** Candidate Conservation Agreement
- **CCRP:** Cave Creek Regional Park
- **CTO:** Challenges, Threats, and Opportunities
- **DOC:** Desert Outdoor Center at Lake Pleasant
- **EMRP:** Estrella Mountain Regional Park
- **ESD:** Ecological Site Descriptions
- **ET:**
- **ETR:** Endangered, Threatened, and Rare
- **GI:** Green Infrastructure
- **HRP:** Hassayampa River Preserve
- **LID:** Low-Impact Development
- **LPRP:** Lake Pleasant Regional Park
- **MBTA:** Migratory Bird Treaty Act
- **MCFCD:** Maricopa County Flood Control District
- **MCPRD:** Maricopa County Parks and Recreation Department
- **MMRP:** McDowell Mountain Regional Park
- **MYA:** Millions of Years Ago
- **NR:** Natural Resource
- **NRCS:** Natural Resource Conservation Services
- **OERT:** Online Environmental Review Tool
- **RC:** Rare & Conservative Species
- **SGCN:** Species of Greatest Conservation Need
- **SS:** Sensitive Species
- **SC:** Species of Concern
- **SCRCA:** Spur Cross Ranch Conservation Area
- **STMRP:** San Tan Mountain Regional Park
- **UMRP:** Usery Mountain Regional Park
- **USFS:** United States Forest Service
- **USFWS:** United States Fish and Wildlife Service
- **VMRA:** Vulture Mountains Recreation Area
- **WTMRP:** White Tank Mountain Regional Park

# NAVIGATION TIPS

This document contains Hyperlinks. A hyperlink will lead to another location (table, figure, or definition) or a webpage with the specific subject information. Links are underlined in Summer Night Blue, i.e., figure number, table number, or a word. Hyperlinks: click "here."

How to use hyperlinks when referencing the document are below:

- **Figures.** Press the control button on your keyboard and select the link with the figure identification number to view a figure. All figures are available in the Figure Section of this document.
- **Tables.** To view all tables, scroll to the Table Section of this document or use the hyperlinks by selecting ctrl and clicking on the hyperlink.
- **Definitions.** Located at the back of the document. If a term has a definition, it is underlined. Select control and select the word to go to its definition.

When there is a hyperlink, "click here," the reader will be redirected to the web source with that subject's information.

Once a link is selected, the reader can choose the back arrow to return to the previous location in the document. Please note that the hyperlink will change color once you click it.

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*Desert Defenders collect native seeds for wildfire revegetation programs, seed bombs, and more.*

# NATURAL RESOURCE PLAN 2023

## INTRODUCTION

The Maricopa County Board of Supervisors created Maricopa County's Regional Park system on March 12, 1953. Soon after, the County began acquiring properties to meet the recreational needs of the then-considered thriving population. The lands were considered pristine, and the County's primary objectives were land preservation and the creation of recreation areas.

The first Park System Master Plan (Master Plan) was approved in December 1965 and focused on regional park system planning and outdoor recreational development.

In 2009 and again in 2014, knowing that the 1965 Master Plan was outdated, the Maricopa County Parks and Recreation Department (MCPRD) updated the plan to emphasize the importance of outdoor recreation. The Master Plan also recognized a paradigm shift in conservation practices for our natural open spaces and remnant habitats. To preserve a slice of our natural heritage, we must go beyond acquiring and preserving natural open space and apply conservation management, restoration, and ecological habitat enhancements to disturbed areas. As a result, and based on community input, the 2014 Master Plan recommended that MCPRD acquire new open space properties and develop a comprehensive natural resource plan, along with individual plans for each Park.

*"Thousands of tired, nerve-shaken, over-civilized people are beginning to find out that going to the mountains is going home; that wildness is a necessity."*

*– John Muir*

Another discovery during the update was the people's increasing appreciation of our natural open spaces for outdoor recreation opportunities and unique beauty. This is supported by recent public opinion polls[1] noting this trend that residents see the natural open space and beauty as one of Arizona's greatest assets.

Currently, MCPRD is responsible for the recreation and conservation management of over 122,000 acres of primarily natural open space. These parks are rich in biodiversity with remnant habitats and natural ecosystems, connected to the immense surrounding wildlands and natural areas (also known as habitat blocks) through wildlife corridors that allow for the interchange and flow of wildlife and plant genetic materials.

Maricopa County Park's natural open spaces face many threats and challenges, but there are opportunities to offset them. Maricopa County is the fastest-growing County in the nation,[2] and the Phoenix metro area is at the forefront of expansive development, which will likely affect the entire park system.

The Natural Resource plan will focus on the five (5) major challenges, threats, and opportunities (Figure 1 – The five CTO's) that MCPRD has identified as affecting Maricopa County Park's natural resources. Threats and challenges coming from Maricopa County's explosive population growth may affect Maricopa County Parks' ecological function, biological diversity, sustainability, conservation, future preservation, and recreation potential. The five CTOs the MCPRD faces include:

1. protecting and improving the park's biodiversity conservation, ecological habitat enhancement, and managing invasive species
2. maintaining the parks' biological connectivity and corridors to the surrounding wildlands
3. planning for climate change and preventing wildfires, and
4. protecting natural and cultural resources,

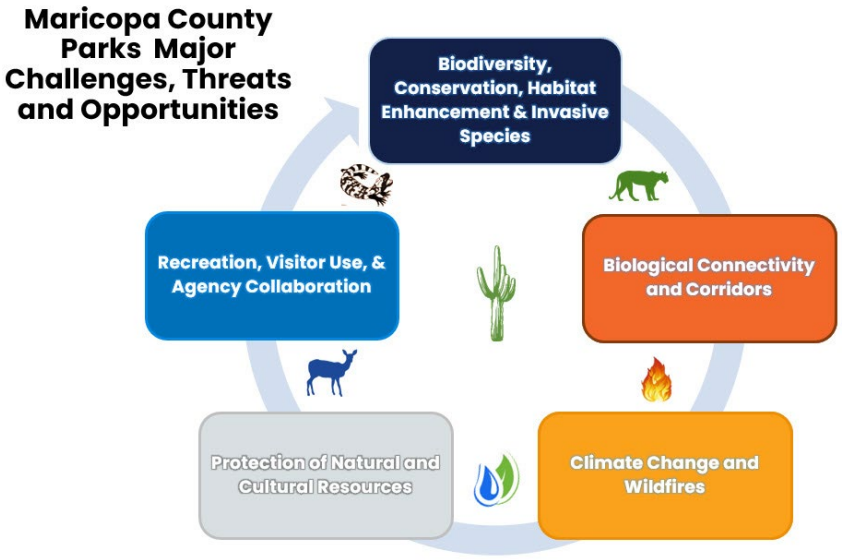



*Figure 1 - Maricopa County Parks Major Challenges, Threats, and Opportunities (Appendix pg. 70)*

[1] The Arizona We Want: The Decade Ahead, Center for the Future of Arizona. *Gallup* cfa_arizona_we_want_the_decade_ahead_digital.pdf (arizonafuture.org) Page 50

[2] Norman, B. (2019), Maricopa County leads nation in growth for third-straight year. *Chamber Business News*. https://chamberbusinessnews.com/2019/04/24/maricopa-county-leads-nation-in-growth-for-third-straight-year/.

5. providing recreation, understanding the Park's visitor use, and participating in agency collaboration and outreach with our partners and stakeholders.

## LANDSCAPE SETTING

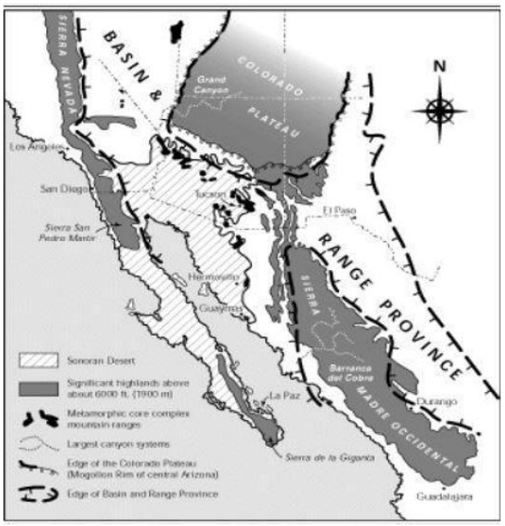



*Figure 2 - Basin and Range Providence*
*Graphic by The Sonoran Institute. (Appendix pg. 70)*

The landscape setting aims to provide an overview and background of the ecological and natural processes that have shaped today's desert landscape. Understanding the environmental foundation of the region is the first step in managing the park's natural resources.

### SOUTHWEST DESERT BIOMES

The Southwest is home to four (4) North American deserts, the Great Basin, Mohave, Chihuahua, and Sonoran, as shown in Figure 2.[3] Each is unique and defined by its aridity, temperature, and precipitation variances, which cause distinctly different ecosystems and biotic communities.

### SONORAN DESERT

The Sonoran Desert is one of the most diverse deserts globally and one of the most ecologically balanced.[4] It is home to at least 3,000 wildlife species and more than 2,000 plant species. The tremendous variability within Sonoran Desert life forms is even more striking, from columnar cacti to conifers, Gila monsters to the Elf and Burrowing Owls, and cyanobacteria soil crusts to native ferns.

The landscape diversity rivals that of any terrestrial ecoregion on Earth. Almost all of the planet's biomes are represented, ranging from cold conifer forests to hot deserts, where frost is practically absent and precipitation infrequent. The tremendous species and landscape variance result from a host of factors: the subtropical climate, continental physiography, physiography, a bimodal precipitation pattern, varied geology, and wide-ranging topography.[5]

The Sonoran Desert represents approximately 100,000 square miles (25,900 hectares), including the state of Sonora (Mexico), much of the southern half of Arizona, southeast California, most of the Baja California Peninsula, and the islands of the Gulf of California. The bimodal rainfall patterns and varied land formations cause the Sonoran Desert to be more diverse and lusher than other North American deserts. Its geological features and mild climate provide for the biota that evolved from the plant's ancestors in the tropics.[6] The dominant plant types within the desert include legume trees and columnar cacti.[7] The Sonoran Desert region

[3] Biomes & Communities of the Sonoran Desert Region, *Arizona-Sonora Desert Museum*. (desertmuseum.org).
[4] Sonoran Desert. *Center for Biological Diversity*. Sonoran Desert (biologicaldiversity.org).
[5] Sonoran desert network ecosystems. *National Park Service*. Retrieved from https://www.nps.gov/im/sodn/ecosystems.htm.
[6] Biomes & Communities of the Sonoran Desert Region (desertmuseum.org), *Arizona-Sonora Desert Museum.*
[7] Phillips, S.J., Wentworth, P.W., Dimmit, M.A., & Brewer, L. M. (2015). A natural history of the Sonoran Desert (pages 15-17).

encompasses diverse habitats, ranging from subalpine meadows in the highest elevations to deserts in the lower elevations; all of the world's biomes can be found in the Sonoran Desert.[8]

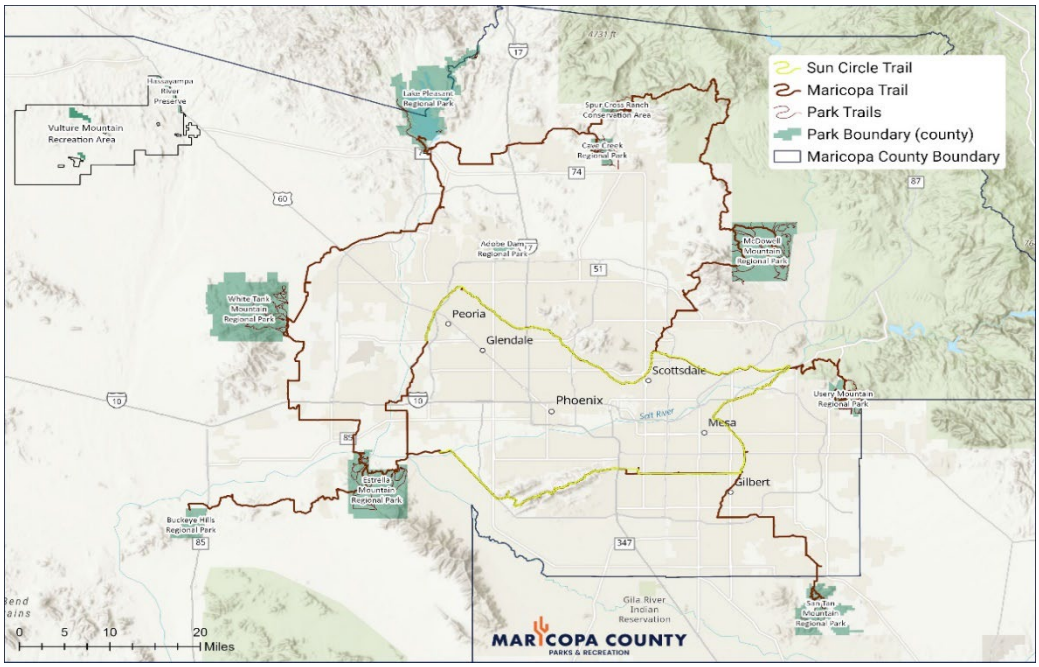
## MARICOPA COUNTY PARKS

Maricopa County Parks is home to one of the largest regional park systems in the nation, with approximately 122,000 acres of land. It includes more than 640 miles of trails, natural open space, recreational areas, river corridors, and one of the largest lakes in the state. To view the park locations, see Figures 3 and 4.

Planning for the future of regional parks and park visitors will be vital to strategizing conservation and preservation efforts to maintain healthy ecosystems that support sustainable habitats.

| MARICOPA COUNTY PARKS | ACRES | MAX ELEVATION ASL | MIN ELEVATION ASL |
|---|---|---|---|
| Adobe Dam Regional Park | 1,353 | 1,580 | 1,350 |
| Buckeye Hills Regional Park | 4,471 | 1,860 | 860 |
| Cave Creek Regional Park | 2,992 | 3,060 | 1,880 |
| Estrella Mountain Regional Park | 19,840 | 3,640 | 900 |
| Hassayampa River Preserve | 711 | 2,220 | 1,840 |
| Lake Pleasant Regional Park | 23,662 | 2,800 | 1,390 |
| McDowell Mountain Regional Park | 21,099 | 3,060 | 1,540 |
| San Tan Mountain Regional Park | 10,198 | 2,540 | 1,410 |
| Spur Cross Ranch Conservation Area | 2,154 | 3,920 | 2,200 |
| Usery Mountain Regional Park | 3,648 | 2,370 | 1,690 |
| White Tank Mountain Regional Park | 29,571 | 4,070 | 1,370 |
| Vulture Mountains Recreation Area (FY2025) | 1,046 | 3,650* | 2,100 |
| | | | |
| **OTHER PARKS** | | | |
| Black Mountain Summit Preserve | 247 | NA | NA |
| Paradise Valley and Golf Course | 106 | NA | NA |
| New River Kiwanis Park | 80 | NA | NA |
| **Total Acres** | 121,178 | | |

*Figure 3 – Maricopa County Parks*




*Figures 4 - Maricopa County Parks (Appendix pg. 71)*

[8] Dimmit, M.A. Biomes & communities of the Sonoran Desert region. *Arizona-Sonora Desert Museum*. Biomes & Communities of the Sonoran Desert Region (desertmuseum.org)

# BENEFITS OF CONSERVATION: ECONOMIC, SOCIAL (EQUITY), AND ENVIRONMENTAL

## NATIONAL ECONOMICS

Ecotourism is tourism that centers around awareness of the environment and the local community and can help boost the local and regional economies. For example, the Outdoor Industry Association reported that national outdoor recreation generates $887 billion in consumer spending annually, creating 7.6 million American jobs, generating $65.3 billion in federal tax revenue and $59.2 billion in state and local tax revenue,[9] see Figure 5.

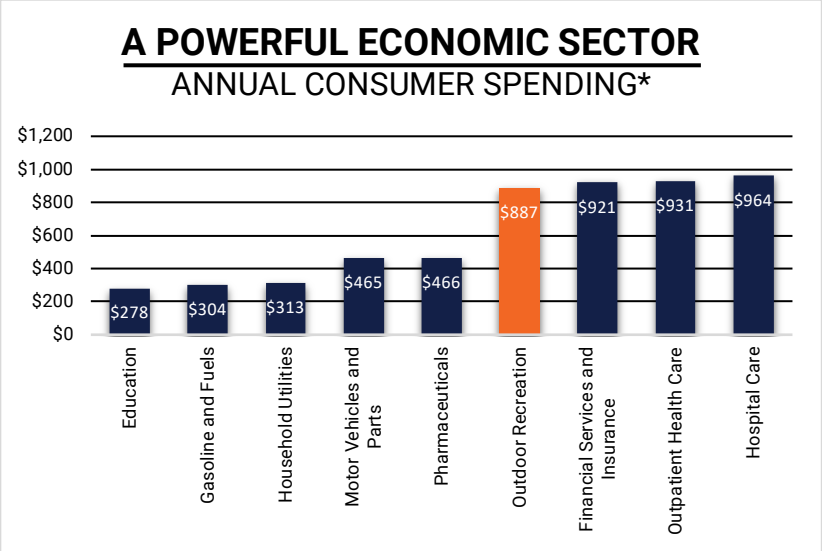



*Figure 3 - Annual Consumer Spending – Outdoor Recreation Drives Commerce - *Currency in the chart reflects billions of dollars. (Appendix pg. 72)*

*America's land and water underpin the American spirit. Investments in outdoor recreation on Public lands and waters earn compounding returns in the form of healthier communities, healthier economies and healthier people.*

*- Outdoor Recreation Association*

## ARIZONA ECONOMIC BENEFITS

The Outdoor Industry Association researched and found that 59 percent of Arizona[10] residents participate in outdoor recreation each year. In addition, more jobs depend on outdoor recreation (201,000) than the aerospace, defense, and technology sectors combined (184,000). Arizona's outdoor recreation generates $21.2 billion in consumer spending annually, $5.7 billion in wages and salaries, and $1.4 billion in state and local tax revenue.[11] This research also compared consumer spending in outdoor recreation to consumer spending in various sectors, such as education and pharmaceutical. The findings concluded that consumer spending on outdoor recreation was higher.

[9] The outdoor recreation economy (2017). *Outdoor Industry Association* - https://outdoorindustry.org/wp-content/uploads/2017/04/OIA_RecEconomy_FINAL_Single.pdf#:~:text=This%20%24887%20billion%20in%20annual,state%20and%20local%20tax%20revenue.&text=The%20livelihoods%20of%207.6%20million%20Americans%20depend%20on%20outdoor%20recreation.

[10] Outdoor recreation is a powerful economic engine (2017). *Outdoor Industry Association*. https://outdoorindustry.org/wp-content/uploads/2017/07/OIA_RecEcoState_AZ.pdf.

[11] Outdoor recreation economy generates - Full state report (2017). *Outdoor Industry Association.* - https://outdoorindustry.org/wp-content/uploads/2017/07/OIA_RecEcoState_AZ.pdf.

## MARICOPA COUNTY ECONOMIC BENEFITS

Amid the lush Sonoran Desert landscape is a rapidly growing population, especially in Maricopa County, with new subdivisions and communities expanding throughout the Phoenix metro area. Maricopa County's population is an estimated 4.4 million (2021), with an annual growth rate of 1.7 percent, with at least 200 people moving here daily.[12] Maricopa County has been the fastest-growing County in the United States for the last four (4) years (2017-2020), with an expected population of 7.6 million by 2055.[13] Phoenix metro area is attractive because it offers job growth, low property taxes, a warm climate, proximity to beautiful desert landscapes, and extensive recreation opportunities. For additional information on population growth, visit the Maricopa Association of Governments Community Data Explorer.[14]

In 2019, Maricopa County Parks commissioned Arizona State University (ASU) to perform an economic impact study. ASU surveyed visitors at eight (8) of the County's most popular parks to understand the parks' economic benefits to surrounding communities. The survey noted, "Maricopa County Parks are a significant driver of economic activity within the region and are robust instruments in economic activity."[15]

## SOCIAL (EQUITY) BENEFITS

Researchers are now amassing evidence proving that nature is good for us and has long and short-term mental and physical health benefits.[16] Being in nature can help reduce anger, fear, stress, anxiety, and depression.[17] [18] For example, a Stanford-led study found quantifiable evidence that walking in nature could lead to a lower risk of depression.[19] In addition, spending time in nature contributes to physical well-being, reducing blood pressure, heart rate, muscle tension, and stress hormone production.[20]

## ENVIRONMENTAL BENEFITS

Maricopa County Parks' ecological habitats are remnant natural ecosystems supporting diverse wildlife and plant species and connect with large wildland areas. Wilderness and wildlands have recently been at the forefront of many studies, with findings that these areas buffer species

[12] Maricopa County Added Over 222 People Per Day in 2016 (census.gov).

[13] Maricopa Association of Governments-Region-Infographic-Jan2020 (azmag.gov).

[14] Maricopa Association of Governments. *Census* 2020. https://azmag.gov/Programs/Maps-and-Data/Community-Profiles.

[15] Economic impact of the Maricopa County Parks Recreation System (2019). MCPRD System Report. https://www.maricopacountyparks.net/about-us/department-studies/

[16] Petersen, H. & Busa, M. (July 3, 2019). Health benefits of nature. American Society of Landscape Architects. https://www.asla.org/healthbenefitsofnature.aspx

[17] Nelsen, A. (March 21, 2017). Access to nature reduces depression and obesity, finds European study. The Guardian. https://www.theguardian.com/society/2017/mar/21/access-nature-reduces-depression-obesity-european-report

[18] Delagran, MA, MEd, L. (July 3, 2019). How does nature impact our wellbeing? University of Minnesota. https://www.takingcharge.csh.umn.edu/how-does-nature-impact-our-wellbeing

[19] Bratman, G.N., Hamilton, J.P., & Gross, J.J. (June 29, 2015) Nature experience reduces rumination and subgenual prefrontal cortex activation. Stanford Study Proceedings of the National Academy of Sciences of the USA | PNAS. https://www.pnas.org/doi/10.1073/pnas.1510459112.

[20] How Does Nature Impact Our Wellbeing? | Taking Charge of Your Health & Wellbeing (umn.edu)

against extinction. Wilderness areas can reduce the threat of extinction by more than half.[21] They not only provide populations of wildlife species habitat and layover habitat, but they also sustain native flora and fauna and provide shelter, food, and water.[22] Natural open space also provides a host of ecosystem services critical to all life, including hydrological services, carbon sequestration, improved air quality, heat mitigation, crop pollination, disease regulation, and resilience to environmental shocks such as floods and drought.[23]

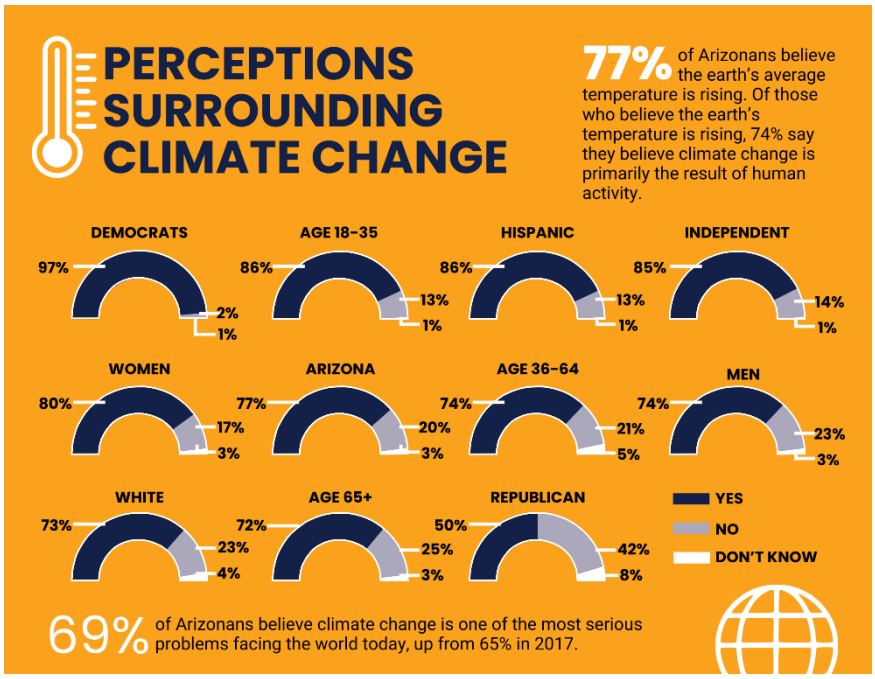



*Figure 4a - 2017 and 2020 Nina Pulliam Charitable Trust ASU survey (Appendix pg. 73)*

## ENVIRONMENTAL PUBLIC OPINION

In March 2017 and January 2020, the Nina Mason Pulliam Charitable Trust enlisted an independent survey with ASU. The survey utilized a representative sample of registered Arizona voters to gauge attitudes toward and about the environment.

The survey concluded that Arizonans rank the environment as one of the top three (3) policy priorities. It also included protecting the environment as the third highest priority after education and health care. Sixty-four percent (64%) of Arizonans stated that protecting the environment should be given priority, even at the risk of slowing the economy. In addition, 75 percent of Arizonans believe parks, preserves, forests, and open spaces are significant (Figures 6a and 6b).

To note, Arizona's top environmental concerns were:

1. pollution in rivers, lakes and reservoirs (91%),
2. air quality (89%),

[21] Cannon, J. (September 26, 2019). Wilderness cuts the risk of extinction for species in half. Mongabay News and Inspiration From Nature's Frontline. https://news.mongabay.com/2019/09/wilderness-cuts-the-risk-of-extinction-for-species-in-half/.

[22] DiMarco, M., Ferrier, S., Hardwood, T.D., Hoskins, A.J., & Watson, J.E. (October 2018). Wilderness areas halve the extinction risk of terrestrial biodiversity. Nature Research. https://www.nature.com/articles/s41586-019-1567-7.epdf?referrer_access_token=hlSmIIog6f1FuJgHoIM5XtRgN0jAjWel9jnR3ZoTv0OtMxA6PGfsWz4UUmx5IgVrCvMmUgEOIlirhlogOYWP_d7AtG2P4zmhPfLkrGepIYpoSn4423jwRbMa5rNmz2gY6cA5O2H-MBhgVBNxQr2jFMvIp6RQBh-YVyW8ceWvp41WnW2xvu4sr_OhlLYfzur5hC9n6D769gLjgrxYpEx7O1UjHILM4LVsO04DL5letd3sfOJZVpjFaJ0cp6OgSnDdGN1zV5UTx-aNSTOGIDsgc9QwnQA7ffYLBKfIDxpLtjE%3D&tracking_referrer=news.mongabay.com7.M.SiMArco%20et%20al%202019

[23] Wall, D. H. & Nielsen, U. N. (2012) Biodiversity and ecosystem services: Is it the same below ground? Nature Education Knowledge 3(12):8 https://www.nature.com/scitable/knowledge/library/biodiversity-and-ecosystem-services-is-it-the-96677163/

3. protection of the state's wildlife (86%),
4. vehicle emissions (84%),
5. land-use policies (75%),
6. greenhouse gas emissions from coal-fired power plants (73%), and
7. pollution from concentrated animal feeding operations (64%).

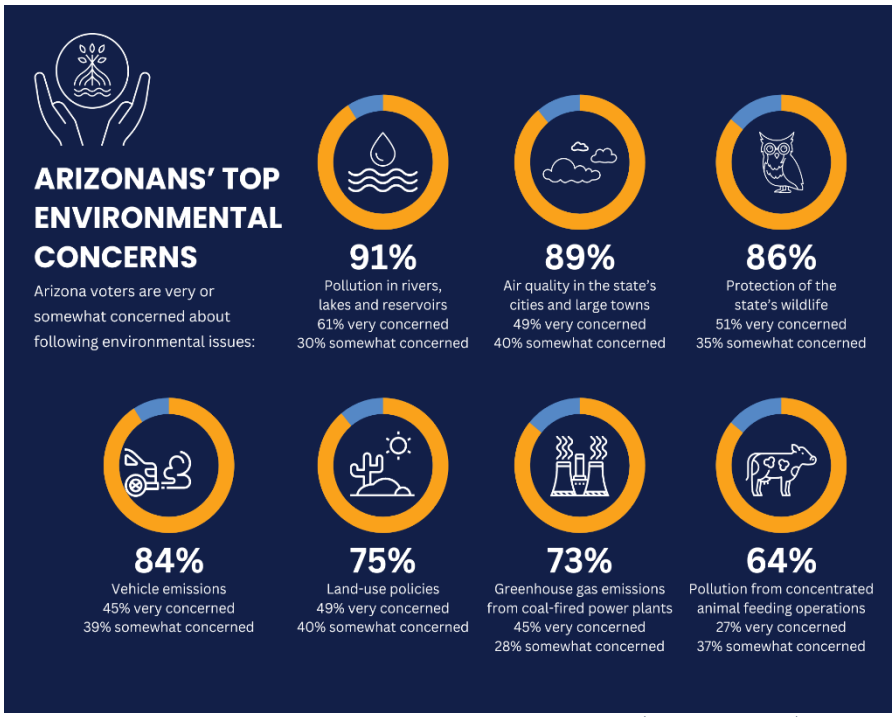



*Figure 6b - 2017 and 2020 Nina Pulliam Charitable Trust ASU survey (Appendix pg. 73)*

Seventy-seven percent (77%) of Arizonans understand the Earth's average temperature is rising, of which 74 percent (74%) know the cause of climate change is primarily the result of human activity. Sixty-nine percent (69%) of Arizonans believe climate change is one of today's most serious issues.[24] To review the survey results, please visit the source link provided in the footnotes.

# CHAPTER ORGANIZATION

The department consulted with many regional experts to develop this plan as listed within the (acknowledgments page); the steering committee provided subject matter input while creating each chapter. This plan provides staff and partners with current conservation practices to effectively preserve, conserve, and manage our natural areas.


The plan chapters will focus on the five (5) CTO's biodiversity/conservation, corridors, climate, protection, and coordination.

Each chapter/section will be of this format:

1. **Overview** – identifying MCPRD's current natural resources, conditions, and issues

[24] Daugherty, D., Schlinkert, D., Olsen-Media, K. & Yoon, H.R. (May 2020). Attitudes and opinions about environmental issues in Arizona 2020 survey results. Arizona State University Morrison Institute for Public Policy. https://www.ninapulliamtrust.org/wp-content/uploads/2020/09/WEBSITE-Pulliam-AZ-Enviro-Survey-Report-2020-5-15-2020-1.pdf

2. **Challenges, Threats, and Opportunities** – identifying and detailing based on ecological principles
3. **Goals, Objectives, and Strategies** – implementation plan

Below, you will find a narrative section explaining the foundation of the 5-CTOs, along with the Goals, Objectives, and Strategies.

# OVERVIEW

It is essential to understand current conditions to properly plan for the future and support the parks' natural resources. Staff and partners can identify gaps, evaluate resources, and examine the options to sustain and preserve the parks' ecological function and biological diversity amidst climate change, population expansion, and future development.

## NATURAL RESOURCE CHALLENGES, THREATS, AND OPPORTUNITIES

This section will help explain the natural resource CTOs. Maricopa County Parks face many threats and challenges that may alter the ecological balance of these remnant habitats, high-quality natural areas, open spaces, and their connection to the surrounding wildlands and habitat blocks. In addition, many opportunities can help mitigate these threats and challenges.

The 5-CTOs will correspond with the following Chapters. Recognizing these 5-CTO's is the first step in bridging Maricopa County and its partners to developing management plans that mitigate the threats and challenges. All will benefit from opportunities to improve the parks and the region's natural areas' ecological health.

## IMPLEMENTING ECOLOGICAL PRINCIPLES: GOALS, OBJECTIVES, AND STRATEGIES

The goals, objectives, and strategies will help implement natural resource priorities while minimizing environmental impacts to retain native biodiversity and sustainable ecosystems. This section discusses goals, objectives, and strategic ways to minimize these challenges and threats, their potential environmental impacts, and opportunities to reduce those impacts or sustain native biodiversity and the overall health of the land and surrounding communities.

- **Goals** are the desired results we want to achieve. They are broad goals with general guidelines that explain what we want to achieve.
- **Objectives** define implementation steps to attain the identified goals. An objective is specific, tangible, and measurable.
- **Strategy** is an action that will help achieve goals and objectives and yield tangible results. They can be short-term (0-3 years) or long-term (4-10 years).

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*Invasive species invading natural desert landscapes throughout Maricopa County.*

# CHAPTER 1

# BIODIVERSITY, CONSERVATION, HABITAT ENHANCEMENT, AND INVASIVE SPECIES

*MCPRD has researched and compiled data for the Natural Resource Plan using scientific data and professional expertise that identify critical elements of our natural resources, including species biodiversity, conservation management, ecological habitat enhancement, and invasive species management, addressing the issues currently affecting the parks today.*

Biodiversity is short for "biological diversity," a broad and complex concept that refers to the volume of life on Earth, all living things within a community or ecosystem. Another definition is all variety of life on the planet at all levels, from genes to ecosystems, and often encompasses evolutionary, ecological, and cultural processes that sustain life. It includes all living things in the environment and ecosystems, including plants, bacteria, animals, and humans, and their interactions. We rely on biodiversity to survive, as we are part of this intertwined natural system, and each element supports and allows us all to thrive.[25]

Natural Resource and Conservation management entails managing how people and natural landscapes interact;  combining land use planning with managing our natural heritage, hydrology, and waterways; preserving native biodiversity; balancing ecosystem health to ensure sustainability; maintaining biological resources; and protecting and restoring healthy, flourishing

[25] Pavid, K. (2020, May 2). What is biodiversity and why does its loss matter?  https://www.nhm.ac.uk/discover/what-is-biodiversity.html

ecosystems. Conservation may involve ecological habitat enhancement or restoration; each is based on the severity of the disturbance. Ecological habitat enhancement includes managing habitats that have had disturbances that are not as severe, from short-term overgrazing, unauthorized trail use, invasive species establishment, encroachment, and low -moderate severity wildfires. Restoration is required with extreme disturbance and disturbed/destroyed system function, for example, a changed stream/creek flow, developed land, or agricultural areas. Restoration is much more costly than ecological habitat enhancement and may require additional permits.

Maricopa County Parks manages 120,000 acres of Sonoran Desert land representative with a mix of high-quality or remnant natural areas, degraded natural areas, and recreation areas. Managing remnant and degraded habitats may differ from managing developed sites such as campgrounds and picnic areas. Staff will apply the current and most effective conservation methodologies to preserve the parks' natural heritage, species biodiversity, and functioning ecosystems through ecological habitat enhancement, restoration, and invasive species management.

# BIODIVERSITY (BIOLOGICAL RESOURCES)

Until recently, the parks did not have natural resource biologists, scientists, or research-oriented staff to compile, research, and document the species' biodiversity. Understanding the species.' biodiversity and wildlands is the first step to protecting these resources. Maricopa County Parks developed an ecological database where all biological data is stored, from research reports documenting plant and animal species and quantifying species abundance to species. The data was compiled from AZGFD reports, Inaturalists (research grade), and all scientific reports completed within the parks.

## OVERVIEW

Maricopa County Parks provide habitat to over 690 wildlife species, including mule deer (*Odocoileus hemionus*), javelina (*Pecari tajacu*), coyotes (*Canis latrans*), Harris's antelope squirrels (*Ammonspermophilus harrisii*), bobcats (*Lynx rufus*), Gila woodpeckers (*Melanerpes uropygialis*), Anna's hummingbirds (*Calypte anna)*, red-spotted toads (*Anaxyrus punctatus*), ornate tree lizards (*Urosaurus ornatus*), and 40 conservative, rare and listed species including; American peregrine falcon (*Falco peregrinus anatum*) bighorn sheep (*Ovis canadensis mexicana)*, ringtails (*Bassariscus astutus),* desert tortoise (*Gopherus morafkai*),

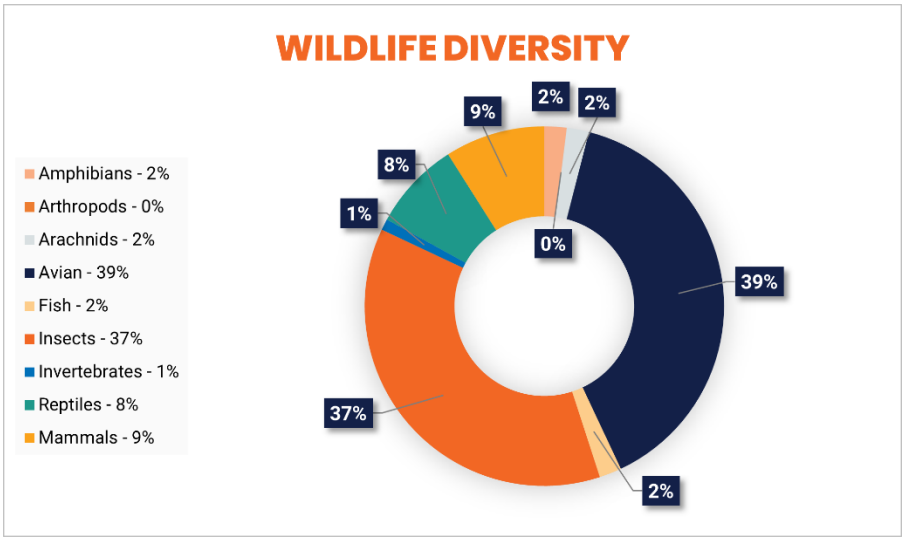


*Figure 7. Parks' Wildlife Diversity*

bald eagles (*Haliaeetus leucocephalus*), Yellow-billed Cuckoos (*Coccyzus americanus*), Southwestern Willow Flycatchers (*Empidonax traillii extimus*) and Gila topminnows (*Poeciliopsis occidentalis*). Although insects are likely the largest wildlife group, they are challenging to find and study. This is reflected in the data stored in the Eco-database. The most studied species, birds, are the largest group at 39 percent (39%), followed by insects at 37 percent (37%). Reptiles and Amphibians make up 10 percent (10%), and Mammals represent nine percent (9%) of wildlife groups. The other wildlife groups include fish at two percent, arachnids at two percent, and invertebrates at one percent, as shown in Figure 7.

Many species require specific habitat or plant communities to support them, which Maricopa County Parks provide. In addition, the County is also an essential stopover for many migrating wildlife species. Therefore, the Parks provide shelter, water, and food for spring and monsoon-season migration. For a complete list of Maricopa County Parks' biological species, see Appendices Table 2 and Table 3.

Over 833 plant species populate Maricopa County Parks, of which 689 are native plant species, including Saguaro cacti, barrel cacti, hedgehog cacti, Palo Verde, Creosote, wolfberry, brittlebush, American threefold, and sweet bush.

The parks provide natural biological services, including a host of eco-services critical to all life, such as hydrological (stormwater drainage, flood prevention, groundwater recharge, and water purification), carbon sequestration, improved air quality, heat mitigation, disease regulation, and resilience to environmental shocks such as floods and drought.[26] However, climatic and anthropogenic forces continually alter the Sonoran Desert's ecological balance. Significant threats to ecosystem function include habitat loss, habitat fragmentation, anthropogenic disturbances, and invasive species incursions. Protecting wildlife species from becoming endangered or extinct will be critical for safeguarding entire ecological systems, connectivity, and corridors; preventing them from becoming fragmented landscapes is vital.[27] This data provides insight to better understand these plant communities and their microclimates.

# ENDANGERED AND THREATENED SPECIES (ET)

The Endangered Species Act of 1973 is the primary law for protecting imperiled or listed species. Federally Threatened and Endangered Species are provided protection by the United States Fish and Wildlife Service (USFWS) and the United States Department of Interior - the petition or candidate assessment must first designate a species. For more information, you can find the description of listings here. For a species to be determined endangered or threatened, these factors must be met:

- the present or threatened destruction, modification, or curtailment of its habitat or range.
- overutilization for commercial, recreational, scientific, or educational purposes.
- disease or predation.
- the inadequacy of existing regulatory mechanisms; or
- other natural or anthropogenic factors affecting its survival.

[26] Wall, D. H. & Nielsen, U. N. (2012) Biodiversity and Ecosystem Services: Is It the Same Below Ground? Nature Education Knowledge 3(12):8. https://www.nature.com/scitable/knowledge/library/biodiversity-and-ecosystem-services-is-it-the-96677163/

[27] Bloch, J.B. (1992). Preserving biological diversity in the United States: The case for moving to an ecosystems approach to protect the nation's biological wealth, page 175. Environmental Law Review. https://heinonline.org/HOL/Welcome?message=Please%20log%20in&url=%2FHOL%2FPage%3Fhandle%3Dhein.journals%2Fpenv10%26id%3D181%26collection%3Djournals%26index%3D.

The Maricopa County Parks have seven (7) **Federally Endangered and Threatened** species:

- Federally Endangered species (LE-5) include the Southwestern willow flycatcher, Desert pupfish, Bonytail chub, Gila topminnow, and the Razorback sucker.
- Federally Threatened species (LT-2) include the Yellow-billed cuckoo and the Northern Mexican garter snake.

# RARE AND CONSERVATIVE SPECIES (RC)

1) The Bald and Golden Eagle Protection Act (BGA), enacted in 1940, prohibits anyone without a permit issued by the Secretary of Interior from "taking" bald or golden eagles or their parts.
   a) Maricopa County Parks has known populations of bald eagles, and there have been reports of golden eagle sightings.
2) The Arizona Game and Fish Department has a Candidate Conservation Agreement (CCA) with the USFWS to protect desert tortoises. The AZGFD has desert tortoise handling guidelines, Desert Tortoise survey guidelines, and mitigation measures. To learn more about the CCA Program, click here.
   a) Maricopa County Parks has known desert tortoise populations at most parks.
3) The United States Forest Service (USFS) has identified Species of Concern (SC) or species at risk. The Bureau of Land Management (BLM) has also identified Sensitive Species (SS), taxa occurring on national forests in Arizona considered sensitive by the Regional Forester. It requires particular management emphasis to ensure their viability and preclude trends toward endangerment that would result in federal listing. These species do not have the protections of ET species; however, they are species of concern, and protecting their habitat will be essential to prevent them from becoming ET-listed species.
   a) The parks have twenty-two (22) Species of Concern (SC) and five (5) Sensitive Species(s).
4) In addition, AZGFD has added tiered lists with Species of Greatest Conservation Need (SGCN); the species on the AZGFD lists were ranked as vulnerable under one or more of the vulnerability criteria: extirpated from Arizona, Federally or state-listed, declining status, demographic status, concentration status, fragmentation status or distribution status.
   a) Maricopa County Parks has twenty-nine (29) SGCNs. To learn more about SGCN, click here.
5) To learn more about Maricopa County's regional park's ET and RC species, the AZGFD has an Online Environmental Review Tool (OERT) that the park natural resource specialist and another qualified biologist use to determine if there is a potential for ET, and RC species present or absent.
6) To view the Maricopa County Parks' current ET and RC species list, including ET, BGA, CCA, SC, SS, and SGCN in Table 1.
7) The Migratory Bird Treaty Act 1918 (MBTA) prohibits taking (including killing, capturing, selling, trading, and transporting) protected migratory bird species without the U.S. Department of Interior authorization. The park's natural resource specialist or qualified biologist can help with compliance. This list of protected migratory birds was last updated in 2020 and can be found here.

# CHALLENGES, THREATS, AND OPPORTUNITIES

With the rapid and projected rate of development, it will be challenging to preserve the native biodiversity and natural biological services within the park system. All planned construction and expansion within the park systems have the potential to impact these ET SC, SGCN, and CCA and should be avoided. Adhering to all federal and state compliances can help mitigate impacts.

Protecting the park's biodiversity, ET, and RC species within the park's systems will be challenging. Any new construction or development that may cause any impacts on native species should begin with the staff natural resource biologist utilizing the USFWS IPac (Information for planning and consultation) and the AZGFD Arizona Online Environmental Tool and HabiMap. In addition to reviewing the park's eco-database, staff should comply with all federal and state guidelines to protect the park's natural resources and S, SC, SGCN, RC, and ET species. Mitigation efforts will begin with the AZGFD OERT tool and USFWS iPac, and if listed species are known in the project area, the staff biologist shall work with USFWS and AZGFD to determine the best mitigation efforts. The natural resource biologist will work closely with staff on these projects to ensure we comply.

Retaining the region's hydrological function, naturally occurring throughout the landscape and beyond the parks' boundaries, will be incredibly challenging. Therefore, preventing and minimizing developmental impacts on natural areas and environmental systems is increasingly essential to protect the parks from landscape-scale development that will continue to creep. Appropriate planning using LID, G.I., and nature-based solutions is necessary, from conception to the planning stages, and will require collaboration and coordination from partners. As habitat loss and fragmentation begin to affect the wildlands, the first species to be lost are the Endangered, Threatened (ET), and Rare and Conservative (RC) species.

Development threatens the native biodiversity within the parks' natural and remnant habitats as growth continues to encroach the natural open space, building high-impact subdivisions that pinch them off from the larger mosaic landscape, preventing wildlife movement and genetic flow from occurring. The ET and CR will eventually become extirpated or extinct. Even common and keystone species in the region could become endangered without continued protection of remnant habitats, preservation of habitat connectivity, ecological habitat enhancement, restoration of disturbed habitat, and increased buffering from the surrounding development. A recent report titled "Wilderness areas halves the extinction risk of terrestrial biodiversity" means that the extinction rate would double without wildlands and wilderness areas. This highlights the global importance of conserving wilderness areas to prevent the extinction of wildlife species.[28] We know these wildlife species live within Maricopa County Parks and use park lands to interconnect with larger habitat blocks, making them a vital link to the surrounding wildlands. For a complete list of Maricopa County Park's listed species, see appendices Table 1 and Table 3.

[28] DiMarco, M., Ferrier, S., Harwood, T.D., Hoskins, A.J., & Watson, J.E.M. (September 2019) pg. 582. Wilderness areas halve the extinction risk of terrestrial biodiversity. Mongabay News & Inspiration from Nature's Frontline. https://www.nature.com/articles/s41586-019-1567-7 OR https://news.mongabay.com/2019/09/wilderness-cuts-the-risk-of-extinction-for-species-in-half/.

Maricopa County Parks are home to many conservative plant species and highly safeguarded plants under the Native Plant Law. Yet, despite the law's language, there are minimal protection mechanisms. Some opportunities could help mitigate habitat loss and fragmentation and ultimately prevent the reduction of ET and conservative species. To start with, collaborations with partners and developers to strategize community development planned within the footprint of the parks and immense mosaic wildlands to incorporate natural and hybrid flood control, LID, G.I., nature-based solutions, and preservation of natural habitat connections. In addition, staff has an opportunity to manage the parks while recognizing our ET and RC species and performing ecological habitat enhancement to maintain and improve species' habitat.

# GOALS, OBJECTIVES, AND STRATEGIES

## GOAL 1.1. PROTECT MARICOPA COUNTY PARKS BIODIVERSITY

1) **Objective 1.** Identify and protect the park's biodiversity.
    a) Short-Term Strategy
        i) Create baseline data for natural areas to identify and preserve the native plant communities and assemblages.
            (i) Develop an environmental review guide/checklist for new construction projects to ensure staff protects the ET, RC, and SGCN species while working within federal and state guidelines. The NR Biologist will complete an environmental review to determine if the project may impact listed and or sensitive species. The Park NR biologist will work together with staff to ensure we protect these species.
        ii) Before any construction in the parks, the natural resource specialist or qualified botanist will provide a natural resource review, including a review of the native flora and fauna, and complete an AZGFD ORET, USFWS iPac, and other natural resource information to facilitate the process will minimize impact to the native wildlife species and ET species.
        iii) Develop a Floristic Quality Assessment, with the support and input from leading local botanists and ecologists, to help prioritize management.
        iv) Develop an I-Naturalist program to improve and provide current data for the parks' ECO database and engage the public to use, learn about, and better understand the parks' plant and animal communities.
        v) Develop a site prioritization plan that scores the natural areas based on their biodiversity and landscape features.
        vi) Develop individual park Natural Resource Plans (based on site prioritization score and level of current management efforts), including tangible action or annual schedule to improve native habitat biodiversity and minimize invasive species and other disturbances.
        vii) Budget for and secure natural resource staff to manage invasive species and ecological habitat enhancement projects and hire additional natural resource staff (seasonal crew or part/full-time staff) to improve the park's natural resource management.
        viii) Budget for contractual ecological habitat enhancement projects and invasive species management.

b) Long-Term Strategy
   i) Develop a land evaluation scoring system to prioritize public lands for future land acquisition to help prioritize high-quality natural landscapes (Acquisition policy).

## GOAL 1.2. PRESERVE HABITAT FOR ENDANGERED, SENSITIVE, AND CONSERVATIVE SPECIES.

1) **Objective 1.** Conserve and protect natural habitats for listed and sensitive species.
   a) Short-Term Strategy
      i) Pre-construction that includes creating new roads, trails, structural or any disturbance/development in the parks, plans should be reviewed by a parks natural resource specialist or another qualified biologist to determine if an environmental review or additional permits may be needed.
      ii) Potential impacts to any listed, protected, or conservative species will be evaluated before park construction activities by checking the park geodatabase and AZGFD OET, USFWS iPac to determine if the species has been documented in the area. If not, the biological surveys should be completed to determine the presence or absence of ET, RC, and SGCN.
      iii) Develop species awareness strategies for listed and conservative species and develop citizen science programs that align with national programs to monitor endangered/conservation species.
      iv) Develop a land stewardship program that helps with ecological habitat enhancement and citizen science species monitoring.
      v) Develop a GIS-based app to map all conservative and sensitive species within the parks.
      vi) Continue working with partners to understand better listed and sensitive species' habitat needs and awareness of current research. Regularly monitor listed and conservative species and their habitats, analyzing trends over time and adapting management as needed.
      vii) Develop a public awareness program to showcase conservative species within the park system.

# CONSERVATION, HABITAT ENHANCEMENT, AND INVASIVE SPECIES

## OVERVIEW

Native desert plants have coexisted for thousands of years (since the Holocene).[29] As a result, each species within the community occupies its ecological niche. Informally, a niche is the "job" or "role" a species performs within nature. Unfortunately, new invaders and invasive species alter these niches, and as humans intentionally and inadvertently bring in more and more invasive species, the native vegetation is often being outcompeted, transforming the landscapes.

[29] Van Devender, T.R.. The deep history of the Sonoran Desert. The Desert Museum. - https://www.desertmuseum.org/books/nhsd_deep_history.php

Protecting natural resources amid booming development is discussed throughout this plan. It includes preserving the park's ecosystem health and native biodiversity, maintaining viable wildlife populations, preventing unauthorized trails and encroachments, and preventing wildfires. Protecting wildlife biodiversity through conservation, ecological habitat enhancement, and restoring habitats are vital to conserving biodiversity and wildlife habitat. Understanding the parks' historical biodiversity and natural heritage and monitoring and researching the species' habitats and behaviors will guide the conservation efforts and are necessary to repair ecosystem health.

Ecological habitat enhancement and restoration in natural areas will be based on a value-driven prioritization program, using a scorecard that considers each park's current conditions, native biodiversity, level of invasive species threat, and other environmental and recreation factors. Identifying the individual parks' habitat enhancement and restoration needs and prioritizing them will be the first step in restoring their natural ecosystems. Locating and mapping distributed areas and unauthorized trails, old homesteads, farms, and cattle areas will be a task that will be completed while developing each park's natural resource plan. These areas will be restored with similar methods used in treating invasive species treatment areas, as discussed below. However, these areas may require extensive restoration efforts, including soil augmentation or using appropriate soils or other natural materials to restore the habitat.

Ecological habitat enhancement planning will include monitoring current conditions, understanding past disturbances, and using the Maricopa County Parks Integrated Pest Management Plan (IPMP) to address invasive species issues. Using the NRCS (National Resource Conservation Services)  Ecological Site Description as a guide to understanding historical plant diversity species will provide us a baseline for ecological habitat enhancement and assist in selecting species to harvest and plant in the habitat enhancement and invasive treatment areas. As part of the environmental habitat enhancement process, seed collection, planting, and monitoring are essential within the larger disturbed areas. Smaller areas often seed themselves from the surrounding native plants.

Invasive species management is a significant component of conservation management. Invasive species can become problematic after invading an area and require effective management to preserve the landscape's native biodiversity. Invasive species are becoming more prevalent throughout the region for several reasons.

- First, world trade and commerce have increased; non-native species frequently "hitch a ride" with imported products.
- Second, humans use them in our suburban landscaping, agriculture, and farming.
- Thirdly, understanding invasive species' effects on landscape communities and their plant biology is vital for proper management.
- Fourth, some invasive species are allelopathic and use underground chemical warfare to prevent seed germination of native plants.

– Finally, many invasive species form monocultures and invade native desert habitats, outcompeting the native desert plants and forming dense mats. The USFWS has estimated that non-native and invasive species have invaded more than 100 million acres of public and private lands.[30]

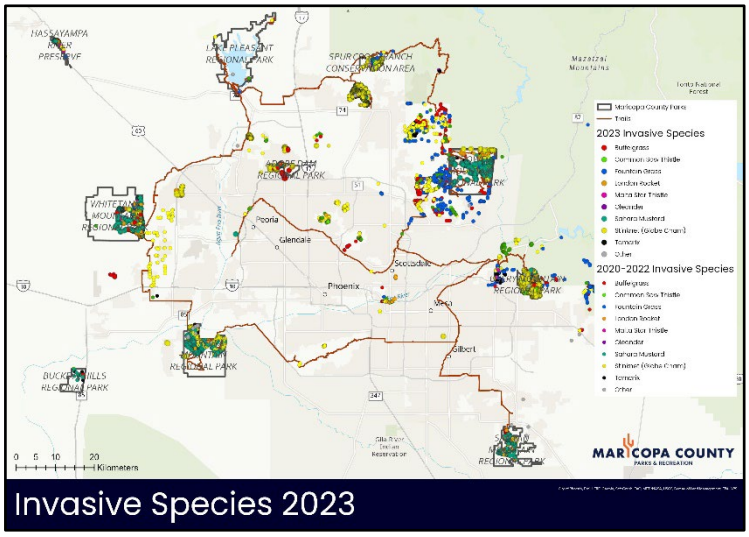


*Figure 8. Maricopa County Parks: Invasive Species Mapping 2023. (Appendix pg. 74).*

In addition, some invasive plant species are growing in the washes and rivers, altering the hydrology, causing flooding, and overtaking native riparian vegetation.

Arizona has 123 invasive plant species according to the United States Department of Agriculture (USDA), of which 42 plan species have been documented within Maricopa County Parks (Table 4A). Dominant invasive plant species include buffelgrass (*Pennisetum ciliare*), fountain grass (*Pennisetum setaceum*), London rocket (*Sisymbrium irio*), red brome (*Bromus rubens*), Sahara mustard (*Brassica tournefortii*), Malta star-thistle (*Centaurea melitensis*), Stinknet/globe chamomile (*Oncosiphon piluliferum*) and salt cedar (*Tamarix spp.*). A complete list of invasive species within Maricopa County can be found in Table 4A (plants). Figure 8 shows the mapped invasive species.

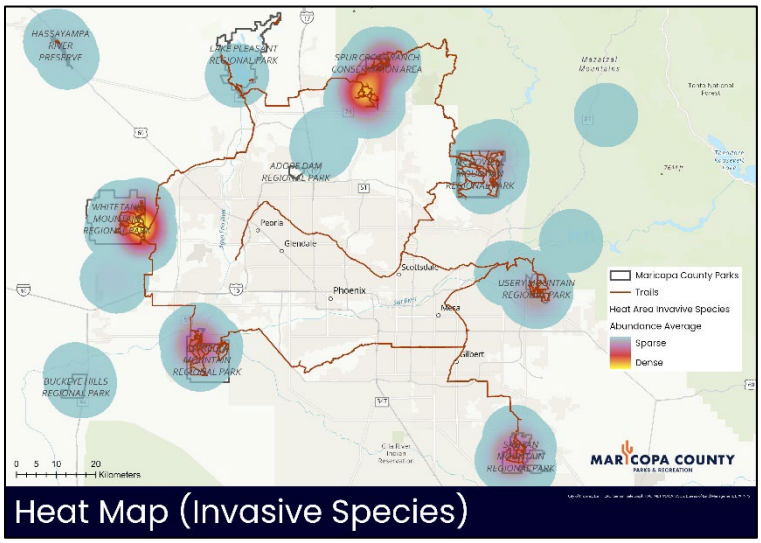


*Figure 9. Maricopa County Parks: Invasive Species Hot Spots 2023. (Appendix pg. 75)*

Invasive species tend to be found in higher numbers in areas adjacent to the parks' trails, riparian zones, and developed areas, as these are vectors of movement by humans and wildlife. Strategic ecological habitat enhancement and management of these areas will help reduce the spread of invasive species, especially after several years of consistent invasive species management.

[30] Ager, A. A., A. M. G. Barros, H. K. Preisler, M. A. Day, T. A. Spies, J. D. Bailey, and J. P. Bolte. 2017. Effects of accelerated wildfire on future fire regimes and implications for the United States federal fire policy. Ecology and Society 22(4):12. https://doi.org/10.5751/ES-09680-220412.

Annual mapping of invasive plant species within the parks is incorporated into the Desert Defenders program. Figures 8 and 9 show invasive species mapped in 2020-2023, including the heat map depicting the average abundance of invasive species and the top invasive species; Stinknet, Buffelgrass, and Sahara mustard are the dominant species at most parks.

Neighboring states released the tamarisk beetle as a biological control for salt cedar; these beatles have been documented in Maricopa County; for more information, click here.

*A balanced Sonoran Upland Desert Community VS. Disturbed habitat invaded with Buffelgrass*

Some of the most detrimental invasive species to our natural areas are invasive animals. Arizona has 91 known invasive animal species, according to Arizona's Natural Heritage Program-Heritage Data Management System (HDMS). Nineteen of these invasive animals, including mammals, insects, and invertebrates, have been documented in Maricopa County; for a current list, see Table 4B.[31]

The parks' invasive animals include the Quagga mussel, which invades aquatic systems like lakes and rivers, including Lake Pleasant. They are prolific reproducers, laying up to one million larvae in a single year, and they deplete resources that native fish and other aquatic species need to survive. AZGFD has a "Don't Move your Mussel" (www.azgfd.com/fishing/invasivespecies/quaggamussels/) program to counteract this aggressive species. Crayfish are invasive animals that are voracious eaters of snails, tadpoles, and native fish eggs. They have been found at HRP and could be at other parks with riparian habitats, such as EMRP and SCRCA. Bullfrogs are insatiable predators of butterflies, dragonflies, native frogs, fish, turtles, birds, and even small mammals and reptiles; two (2) listed species (the Chiricahua leopard frog and the Mexican garter snake) are in danger of becoming eliminated in Arizona because of the bullfrogs. Common (red-eared) sliders are another invasive species found at HRP.[32]

Other invasive animals currently at parks include wild burros regularly spotted at Lake Pleasant and managed by BLM. There are concerns about management efforts; if the herds are left unmanaged, they can double in size in four (4) years. When the population size is larger than the appropriate Management Level, they can damage natural resources, outcompete native wildlife

[31] Data received from AZGFD as part of their HDMS program.

[32] Dolan, C. & Mannan, B., Invasive wildlife. University of Arizona Arizona Cooperative Extension. https://extension.arizona.edu/sites/extension.arizona.edu/files/pubs/az1481e.pdf

species, and become a safety concern relating to vehicle collisions.[33] Some other invasive animals recorded include the brown-headed cowbird and European starling. The cowbird is a brood parasite, meaning it lays eggs in other bird species' nests, and the host bird then incubates the cowbird's eggs. The cowbirds often push out the host bird's egg or eggs, which decreases the survival of the host bird's offspring. Starlings are also aggressive birds known to destroy other birds' eggs and kill native birds' nestlings.[34]

# CHALLENGES, THREATS, AND OPPORTUNITIES

Understanding the park's biodiversity and the species that inhabit our parks has been challenging since no biologist was staffed before 2018. However, understanding these species that currently and historically inhabit our natural areas and their needs is critical to understanding how to preserve, conserve, and manage these natural areas. Monitoring and research by the AZGFD and local Universities have filled some gaps, but real-time data, population abundance, species inventories, and behavioral research information are needed.

Another enormous challenge the parks face is invasive plant species management; these species negatively affect the native biodiversity by reducing native species. In addition, invasive species are the primary fuel source for spreading wildfires into the upland desert landscape. Without invasive species management, these invasives will severely and forever alter the upland desert habitat, negatively impacting keystone species such as Palo Verde, Saguaro, and other cacti species.[35] [36] [37]

Research suggests invasive species, especially grasses, that have "browned out" or senesced can become dry, cured fuels that allow the spread of wildfires. The threat of more frequent and significant wildfires could devastate the Upland Sonoran Desert, which is not a fire-adapted community. We know this because Saguaros and Palo Verdes are "thin-skinned" and photosynthesize through their outer layer; fire-adapted species have a thicker outer layer or bark, as well as from the historical fire records.

Another threat to the park system is the introduction of invasive and domestic animals released into the system by the public. The parks work with partners to manage invasive animals, and AZGFD is the authority to manage most of these species.

Maricopa County Parks currently provides over 640 miles[38] of trail use. However, the threats from unauthorized trails, as shown in Figure 10, cause degradation of our natural habitat. Continued usage of unauthorized trails impacts the cryptobiotic crust, causing soil erosion and compaction, nitrification, hydrological changes, trail widening, roots, rocks, and bedrock exposure. It also causes damage to plants, affecting microbial and biological functions. The

[33] Maintaining Range and Heard Health. US Department of the Interior Bureau of Land Management. https://www.blm.gov/programs/wild-horse-and-burro/herd-management/maintaining-range-and-herd-health

[34] Dolan, C. & Mannan, B., Invasive wildlife. University of Arizona Arizona Cooperative Extension. https://extension.arizona.edu/sites/extension.arizona.edu/files/pubs/az1481e.pdf

[35] Wilson, R.C., Narog, M.G., Corcoran, B.M., & Koonce, A.L. Postfire Saguaro injury in Arizona's Sonoran Desert. California State University San Bernardino. https://www.fs.fed.us/psw/publications/4403/PostfireSaguaro.pdf.

[36] USDA Forest Service Proceedings: *Burned Saguaro: Will they live or die?* RMRS-P-67 2013

[37] Arizona State University: *Fire and Reseeding on Arizona Upland Plant Community Composition* by K Barron, December 2008.

[38] Maricopa County Parks and Recreation Department: Trail System - https://www.maricopacountyparks.net/things-to-do/activity/faqs/#:~:text=How%20many%20miles%20is%20the,System%20is%201%2C521%20miles%20total.

harm to plants includes reducing vegetation height and biomass, species composition, and the spread of weeds and pathogens.[39]

In addition, sites become more problematic with storm events, which can cause erosion along the wash/trails. Preventing unauthorized trails will require outreach, education, and ecological habitat enhancement. Conservation management must minimize these challenges and threats to conserve our natural resources. The management practices may include preventing the creation and use of unauthorized trails, restoring areas within the parks that have been disturbed and altered, and preserving archeological sites while still providing recreational opportunities. As invasive species' vector of movement occurs through equipment and on visitors' bikes, shoes, etc., reducing the spread of these invaders will be challenging.

Wandering cattle into the parks from adjacent ranches threatens the park's ecosystem health. Staff will need to address these issues from time to time. The cattle can wreak havoc on the park ecosystems in a short amount of time; by continually traversing through native habitats, they trample the vegetation, especially in the washes, loosening the soil, which can cause erosion; they easily trample the biocrust; they also may carry disease/parasites that can spread to native wildlife species, they fed on the vegetation densely in areas that will also lead to erosion. By law, it is the park's responsibility to keep the cattle out.

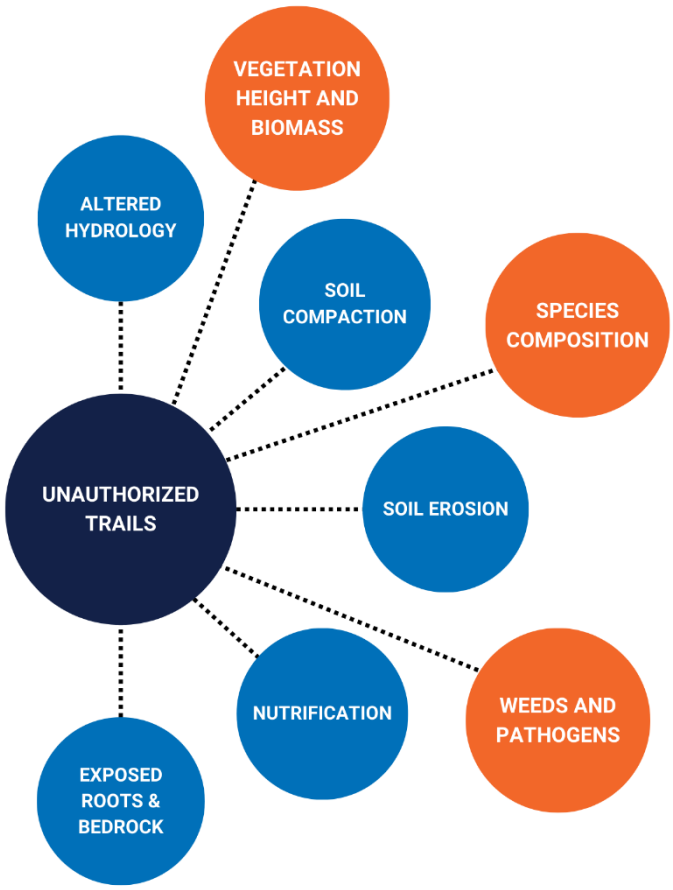


*Figure 10. Unauthorized Trail Effects*

After invasive species treatment or a wildfire occurs, the parks have an opportunity to perform ecological habitat enhancement to help the areas recover. Such as planting native plant species within the recently disturbed areas, helping enhance or increase biodiversity while preventing future infestation of non-native and invasive species. When performing ecological enhancement or restoration, the disturbed areas will ideally be returned to their natural conditions or as close as possible.

There are opportunities to work with our partners and universities to provide research and monitoring of native and invasive species so we can better understand the flora and fauna behaviors and relationships, work with our partners on best management practices, and learn what is working for them.

[39] Journal of Environmental Management: *Comparing hiking, mountain biking, and horseback riding impacts on vegetation and soils in Australia and the United States of America* by C. M Pickering et al. in September 2009—vol 91 issue 3.

In addition, there are opportunities to improve our volunteer stewardship program, increase natural resource volunteering, and increase the park's biodiversity using information garnered from research.

# GOALS, OBJECTIVES, AND STRATEGIES

## GOAL 1.3. GATHER BASELINE DATA AND PRIORITIZE PARKS TO IMPROVE THE HEALTH, BIODIVERSITY, AND SUSTAINABILITY

1) **Objective 1.** Improve biodiversity information and identify natural and developed areas.
   a) Short-Term Strategy
      i) Develop an Eco-database to store the parks' current and future plant flora and fauna data.
      ii) Develop a site prioritization scoring program prioritizing each park based on its natural quality, diversity, and other habitat features (size, invasive species invasions, etc.).
      iii) Using staff knowledge, current data, radar, or other technology, map the disturbed parks, including invasive species, overgrazed areas, and unauthorized trails and old roadways.
      iv) Select priority areas and begin ecological habitat enhancement, including invasive plant species management.
      v) Improve the current Scientific Research permitting process to ensure that all data collected within the parks is provided to us in a report.
   b) Long-Term Strategy
      i) Improve the native plant and wildlife biodiversity through ongoing and comprehensive management of the natural resources.

## GOAL 1.4. PROTECT AND SUSTAIN NATIVE BIODIVERSITY

1) **Objective 1.** Collect and update species abundance and biodiversity data.
   a) Short-Term Strategies:
      i) Develop a comprehensive wildlife list and understanding of relative abundance at each park.
      ii) Develop a list of threatened, endangered, and conservative wildlife species within the parks and work with federal, state, local, and conservation agencies to protect/enhance their habitat.
      iii) Work with partners to obtain information on species abundance through ongoing research projects, bird counts, wildlife Citizen Science Programs, BioBlitz, and university projects.
      iv) Work with local universities and conservation agencies to promote wildlife monitoring within the parks.
      v) Develop a more cohesive and comprehensive animal camera program that provides consistent data for the parks, systematically populating the data into the Eco-database.
      vi) Using the forest health councils' principles for integrated wildlife habitat and biodiversity and community protection to guide wildlife habitat improvements.
      vii) Protect the habitat of keystone species by enhancing, restoring, and maintaining natural areas that provide wildlife food and shelter.

viii) Build the Natural Resource Section staffing by allocating funding to procure 3-4 staff persons in the NR budget to perform wildlife and plant monitoring, survey treatments and effectiveness, and improve parks knowledge of paks species trends.

b) Long-Term Strategy
   i) Improvements to native habitats should increase wildlife species diversity and quantity; comparative analysis of butterfly, bird, and other wildlife species should be performed regularly before, during, and after habitat enhancement and restoration efforts.
   ii) Incorporate research projects, including citizen science monitoring programs, to show changes over time.

## GOAL 1.5. INVASIVE SPECIES MANAGEMENT, HABITAT ENHANCEMENT, AND RESTORATION OF NATIVE HABITAT IN DEGRADED AND DISTURBED REMNANT HABITAT

1) **Objective 1.** Prioritize and develop a plan to enhance ecological habitats and disturbed areas.
   a) Short-Term Strategies:
      i) Ensure all park system projects comply with the Integrated Pest Management Plan.
      ii) Develop a plan to enhance and restore areas within a realistic timeframe.
      iii) Develop a volunteer stewardship program to assist in restoration management projects, citizen science programs, and monitoring biodiversity programs.
      iv) Develop a plant and seed program, locate areas with high quantities of native seed and great diversity, and host native seed collection and planting workdays.
      v) Create seed propagation garden(s) for species that are more conservative or harder to locate in the parks, especially pollinator species.
      vi) Use native seed to plant in areas of recent invasive species removal and other prioritized disturbed regions.
      vii) Use cactus and other native species that proliferate to block unauthorized trails and prevent erosion.
      viii) Develop a Cryptobiotic crust awareness campaign such as the National Forest "Don't bust the crust" program, such as "Tiptoe around the Crypto," including park signage and brochures.
      ix) Develop an "in the field" checklist for staff and contractors to prevent Invasive species from spreading through the roadways and trail system.
      x) Park staff and supervisors must be conscious and aware of trespassing cattle. Removing these cattle will require staff to develop good relations with local ranchers and contact the owners immediately whenever cattle enter the park to ensure they are swift.
      xi) Contact cattle owners/ranchers immediately whenever cattle enter the park to ensure they are swiftly removed before damaging the natural and cultural resources.
      xii) Staff will need to Install or improve (wildlife-approved) fencing to prevent future cattle from entering the park.

   b) Long-Term Strategy
      i) Continue to prioritize and enhance natural areas within the park system.

## GOAL 1.6. PREVENT EROSION, ESPECIALLY WITHIN NATURAL HABITATS

1) **Objective 1.** Locate and mitigate unauthorized trails and disturbed areas that have the potential for erosion.
   a) Short-Term Strategies:
      i) Identify and map erosion areas and install temporary or permanent control measures. Restore eroded areas by planting native vegetation.
      ii) Regularly monitor trails, map, and repair trails as needed.
      iii) Post wildfires, immediately monitor trail areas and install temporary and permanent erosion measures to prevent excessive runoff.
      iv) Minimize soil disturbance while conducting research or land management work.

## GOAL 1.7. IMPROVE THE KNOWLEDGE AND MANAGE ANIMAL AND PLANT INVASIVE SPECIES ABUNDANCE

1) **Objective 1.** Continue regional animal and plant invasive species mapping and removal efforts.
   a) Short-Term Strategy
      i) Develop a GIS-based mapping program and strategy for all invasive species.
      ii) Develop GIS-based collector/field apps to help document species locations and abundance, map invasive species, determine hot spots, and prioritize areas.
      iii) Allocate funding and hire three to four natural resource staff to perform ecological habitat enhancement, invasive species management, native seed harvesting and planting, and other natural resource duties.
      iv) Treat invasive species within the priority areas using the BMPs and guidance Integrated Pest Management Plan (IPMP).
      v) Continue working with the Desert Defenders' partners to map and share data on invasive species.
      vi) Allocate funding, budget for, and locate grants to begin comprehensive invasive species/habitat enhancement projects at high-priority parks.
      vii) Prevent the spread of new species by supporting and participating in the New Invaders Program or Early Detection and Rapid Response programs to help improve new invaders' knowledge and perform early response detection responses to eliminate new species to prevent invasions.
      viii) Develop a volunteer stewardship program to assist in ecological habitat enhancement and conservation management projects, citizen scientist programs, and monitoring biodiversity programs.
      ix) Incorporate research projects, including citizen science monitoring programs, to show changes over time.
   b) Long-Term Strategy
      i) Allocate funding, budget, and grants to continue invasive species/ habitat enhancement projects at high-priority sites.
      ii) Adapt ecological habitat enhancement and invasive species management programs for long-term management within the park system.

# GOAL 1.8. ESTABLISH INTACT NATIVE PLANT COMMUNITIES

1) **Objective 1.** Manage Invasive Species and restore native habitats.
   a) Short-Term Strategies:
      i) Use GIS technology to map all invasive species, removal, and trends over time.
      ii) Develop a strategic invasive species treatment plan, focusing on recreation areas, trail edges (30 ft on each side), and hot spots.
      iii) Host invasive species removal events at each park annually to help minimize the invasive species infestation.
      iv) Obtain grants to offset contractual costs, increase treatment sites/areas, allocate funding to increase the number of contractually invasive species, and grant match biannually.
      v) Develop a Natural Resource Section and allocate funding to procure three to four staff persons in the NR budget to manage the current grant project's five-year maintenance requirement and to expand the invasive treatment to other parks. Ideally, it would increase managed areas by 10 percent (10%) more than the original 100 acres yearly.
      vi) Plant native seeds in removal areas to prevent invasive species' return and improve native biodiversity.
      vii) Measure success in habitat enhancement and improved biodiversity using comparative analysis of plant composition, butterflies, birds, and other wildlife species regularly, before, during, and after habitat enhancement efforts.

*A number of native species found in Maricopa County's regional parks rely on corridors to traverse the desert.*

# CHAPTER 2

# BIOLOGICAL CONNECTIVITY AND CORRIDORS

The County Parks exist within a large-mosaic landscape comprised of many different land ownership and land use types, including urban, suburban, rural, residential, commercial, and industrial land uses. Nature-dominated lands are typically sources for wildlife that support them throughout their life cycles. At the same time, human-dominated urbanized areas and roadways can be wildlife sink areas that contribute to the reduction and loss of wildlife species. Previously, most of the landscape was nature-dominated. But now, especially over large metropolitan, industrialized, and dense residential areas, they are becoming human-dominated matrixes with isolated islands of parks and natural areas becoming cut off from the wildlands, instead surrounded by development. Development generally negatively impacts wildlands – domestic/feral cats hunt birds; night lights disrupt nocturnal behaviors; walls fragment territories and block wildlife movements; cars take their toll on the natural world, including wildlife, and increase wildfires.

*Camelback Mountain with encroaching subdivisions*

Despite the environmental protection statutes passed in the 1960s and the 1970s, including the National Wilderness Act (1964), National Environmental Policy Act (1969), Clean Air Act (1970), Clean Water Act (1972), and Endangered Species Act (1973), the world populations' continual

growth results in people moving into areas that were once wilderness. This often leads to natural areas reaching their conservation thresholds. Although previous regional leadership had the foresight to preserve large tracts of land preservation, more than setting aside land is now required. Protecting and preserving the ecological function of wildlands is the most effective and least expensive method to maintain these vital natural areas.[40]

In the 1970s through the 1990s, the City of Phoenix Parks had great foresight in preserving large open space natural areas and mountain parks for recreation. Since then, rapid and dense development has engulfed these urban mountain parks. As a result, the species richness and biodiversity of these parks have significantly decreased as the surrounding communities develop and the landscape becomes fragmented. According to the city of Phoenix staff, many Phoenix parks no longer have mule deer roaming them.

Habitat blocks are large contiguous protected natural areas unfragmented by roads, development, or agriculture and are considered wildlife sources. Habitat blocks provide suitable environments for wildlife, including regional parks, national forests, and the surrounding wilderness. Wildlife corridors (or linkages) are swaths of natural habitat that connect to these habitat blocks. Many wildlife corridors can be vegetated along drainages, floodplains, or riparian areas. Wildlife corridors may fluctuate in width to accommodate a suite of species; logically, larger mammals require wider corridors with critical habitat features.[41]

# CONNECTIVITY AND CORRIDORS

## OVERVIEW

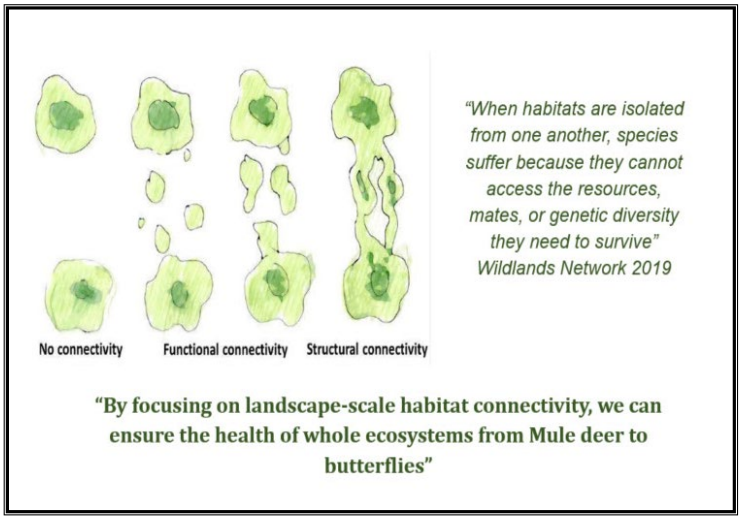


*Figure 11. Differing Levels of Connectivity*

Maricopa County Parks currently have natural corridors and wildlife linkages connecting them to the larger habitat blocks of federal, state, and public land, allowing the flow of genetics, biodiversity, and wildlife to move between them. However, future development will disconnect many of these natural linkages and connections (Figures 11 and 12). Without proper planning, developments could forever change the natural areas and the wildlife inhabiting them. The threats and challenges may affect Maricopa County Parks' ecological function, biological diversity, sustainability, conservation, future preservation, and recreation potential.

[40] Environmental Benefits (September 16, 2013). Chicago Metropolitan Agency for Planning. https://www.cmap.illinois.gov/about/2040/supporting-materials/process-archive/strategy-papers/parks-and-open-lands/environmental-benefits.

[41] Arizona's State Wildlife Action Plan. Arizona Game and Fish Department. https://www.azgfd.com/wildlife/actionplan/.

In short, elements of our natural heritage may be in peril. Without adequate ecological connectivity between habitat blocks, species will begin disappearing from these natural landscapes, often starting with the larger mammals such as bighorn sheep and mule deer.[42] Figure 11 shows the differing levels of connectivity, where the structural connectivity would benefit a greater diversity of species. Structural connectivity can be achieved with proper urban planning through partnerships and communications, including preserving natural areas such as washes, bajadas, and riparian habitats. When the connectivity demises to no connectivity, the natural habitat will suffer adverse impacts such as altered biotic communities, altered surface hydrology, reduced water quality, altered sediment transport, diminishing water reservoirs, habitat loss and loss of biodiversity, and even the introduction of pollutants into the waterways.

Small, medium, and large wildlife species must move across the landscape as part of their life cycles and between generations. Corridors benefit all types of wildlife: mammals, reptiles, amphibians, fish, insects, and even birds and plants. Corridors are a relatively new concept, yet they are critical to sustaining healthy wildlife populations; they must be planned for and implemented across many ownerships and jurisdictions. As described above, animals need to move between parks. Even plants must move across the landscape over generations to adapt to changing environments, climates, and catastrophic events.

What size should the wildlife corridors be? As challenging as this seems, the minimum viable width varies by species, corridor length, and the habitat quality of the corridor; ideally, a variety of corridor widths work best and offer a diversity of options to a more extensive suite of species.

The AZGFD recommends that wildlife corridors align with existing washes coming in diverse widths to allow a suite or variety of wildlife species to transverse through these corridors. Still, for large mammals such as mule deer and big horn sheep, a quarter mile width (400 m) is recommended for the majority of the length of the corridor. AZGFD has also stated that these large mammal corridors incorporate a 0.12 mile (200 m) buffer with minimal development and minimal artificial light using or berms, sound walls, and dense native vegetation plantings to block noise and light pollution. Landscaped parks, sports fields, golf courses, and other artificial landscapes will not provide effective corridors for most wildlife species; however, aligning these amenities with adjacent corridors will allow some wildlife species to utilize resources available in the areas while traversing the corridors.

Where are the priority corridors needed? In investigating the location of the county's parks about proposed future developments and other preserved natural areas, wildland blocks, and natural features, including rivers, washes, and mountains, it emerges that four (4) primary and several minor wildlife corridor projects are essential for the future health and long-term vitality of the parks. The four (4) major corridors identified below currently connect to the county's regional parks.

[42] Kenneth, D.A, D.F. Dock, K.E. Hodges, L.R. Pugh, W. Fagan, C.H. Sekercioglu, S.H.M. Buchart, and M. Kauffman (2017. 26:115-127). Global ecology and biogeography: A global analysis of traits predicting species sensitivity to habitat fragmentation.

# MAJOR CORRIDORS:

1. Connectivity between the WTMRP, across the Hassayampa River Plain, to the large BLM landholdings to the west and northwest, including the Belmont Mountains, the Big Horn Mountain Wilderness, and the Vulture Mountains.
2. Connectivity between Buckeye Hills, Eagletail Mountain Wilderness to Hummingbird Springs/Big Horn Mountains Wilderness area to Harquahala Mountains and Vulture Mountains.
3. Connectivity between BLM's Gila Bend Mountain complex (Woolsey Peak and Signal Mountain Wilderness areas) and the BHRP. This corridor includes Sierra Estrella Regional Park, part of the larger Sierra Estrella Mountain range block.
4. The Cave Creek Corridor connects two (2) County parks – SCRCA and CCRP – extending from the Tonto National Forest to the northeast to the Phoenix Sonoran Preserve/ Cave Buttes Recreation Area to the southwest. A Cave Creek riparian greenway continues along the creek further to the south, into the City of Phoenix, connecting to a string of urban parks and the Sun Circle Trail just east of I-17.

In addition to these significant corridor projects, several minor corridors would be beneficial for the County, including:

5. The lower Gila River corridor.
6. Maintain connectivity with Tonto National Forest (TNF) to the east side parks, including MMRP, UMRP, and SCRCA.
7. The Agua Fria River corridor connects LPRP with the Sierra Estrella and follows the Sun Circle Trail.
8. The County Parks Department should help ensure that all County parks, including the MMRP, UMRP, LPRP, and STMRP, remain connected and integrated into other conservation areas and parks.

Notably, these linkages are not a "one size fits all"; some species may need wider corridors as they are less likely to utilize the space with human presence. Retaining natural wash corridors, expanding buffer areas around these wash corridors, employing soft development (such as hiking and biking paths) alongside wash corridors, and preventing unnecessary trails that can cause extensive edge effects (such as light and noise pollution) can effectively sustain regional biodiversity and ecosystem functionality. Wildlife corridors in urban areas can create urban greenbelts, which expand equitable access to nature by reducing travel distances to open space and providing recreational linkages.[43]

In addition to wildlife corridors, roadways can act as a barrier for wildlife. Wildlife crossings must be addressed and included in the initial phases of roadway development and roadway expansions. Wildlife species and human lives are lost daily by motor vehicle accidents, so preventing these accidents yields positive results for both human and wildlife species. Maricopa County Department of Transportation (MCDOT) has and continues to have roadway improvement projects planned throughout the County. Therefore, working with partners to consider wildlife crossings when any new roadway or large-scale construction projects occur and incorporating them into the planning is critical. It is also crucial that these wildlife linkages

[43] 2011. The Maricopa County Wildlife Connectivity Assessment: Report on Stakeholder Input, 2011, Arizona Game and Fish Department. http://conservationcorridor.org/cpb/Arizona_Game_and_Fish_Department_2012-Maricopa.pdf.

strategically align with riparian areas and current/planned wildlife corridors and wildlife roadway crossings.

# CHALLENGES, THREATS, AND OPPORTUNITIES

Keeping our parks' natural areas wild will be challenging as they become surrounded by development that will reduce or diminish connectivity and wildlife linkages. Creating fragmented habitat blocks will increase encroachments, unauthorized trail use, and other illegal activities. Resulting in minimizing the parks' species' biodiversity, food availability, shelter/privacy, available habitat, and the mating ability for wildlife species. In addition, when wildlife habitat areas become fragmented because their connectivity or corridor is eliminated, it reduces foraging and shelter for the species, which reduces hunting opportunities.

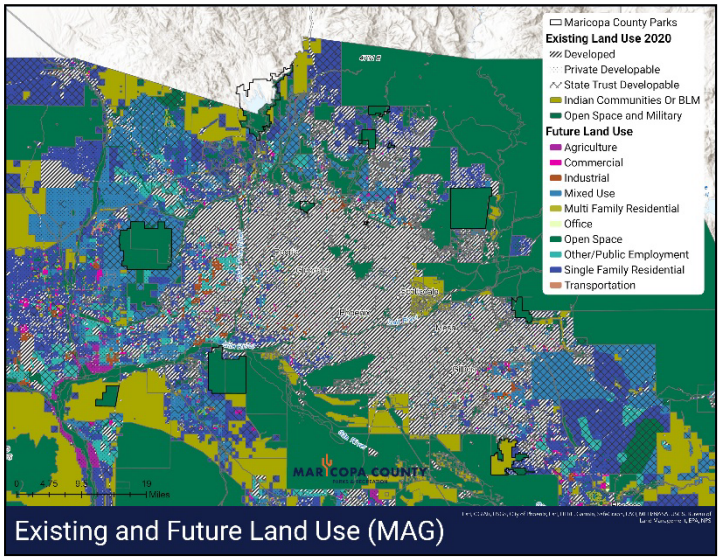


*Figure 12. Maricopa Association of Government- Existing and Planned Development. (Appendix pg. 76)*

Large, contiguous natural regions are necessary to maintain species richness. As the landscape is subdivided into smaller pieces, fragmented by development, those segments can support fewer species.[44]

Development poses a threat to wildlife habitats and their connectivity. Creating fragmented landscapes could lead to island biogeography, including significant biodiversity loss. It is difficult and often impossible to restore a degraded or fragmented landscape to its pre-impact state, and restoration efforts can take decades or longer and be very costly.

[44] Wilson, M.C., X. Chen, R.T. Corbett, R.K. Dedham, P. Ding, R.D. Holt, M. Holyoake, G. Hu, A.C. Hughes, L. Jiang, W.F. Laurence, J. Liu, S.L. Pym, Robinson, S.K., Russo, S.E., X. Si, D.S. Welcome, J. Wu, and M. Yu. 2016. Habitat fragmentation and biodiversity conservation: key findings and future challenges. Landscape Ecology 31(2):219-227.

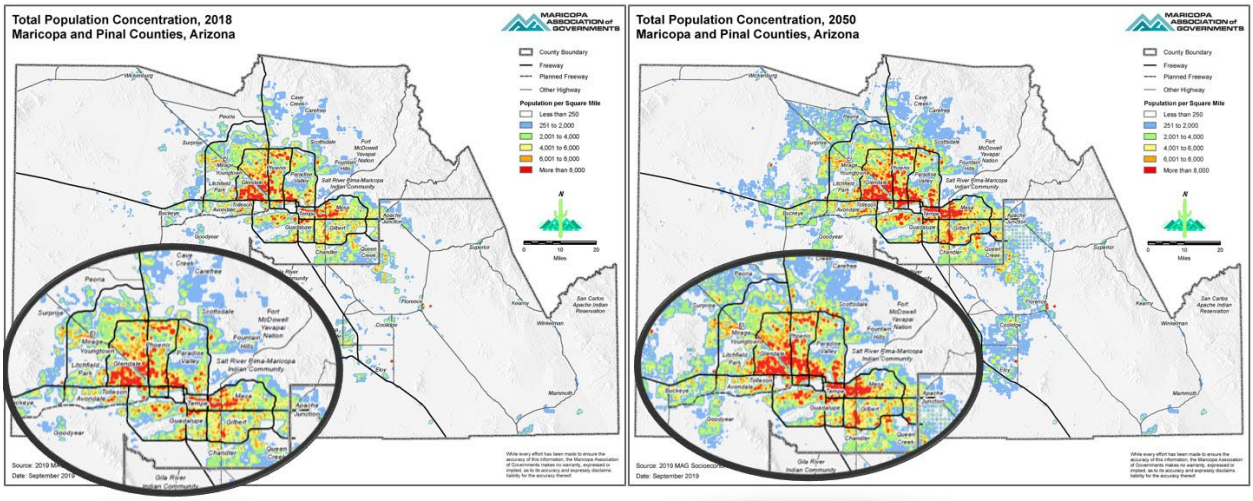


*Figure 13. Maricopa Associations Of Government (MAG) 2018Population and 2050 Predicted Populations*

Development is inevitable, and incorporating conservation strategies, wildlife habitat, and landscape assessments early in the planning efforts will position Maricopa County for a healthier state post-development. Using conservation methodology to protect and restore these high-quality natural areas and retain the wildlife corridors is necessary to preserve biodiversity and suitable habitats. Sustainable development practices can help keep healthy landscapes while proactively reducing the time and money spent re-establishing connectivity, reclaiming open space, and restoring landscapes. In addition, planning for wildlife linkages can reduce the adverse effects on wildlife. AZGFD and stakeholders have identified essential wildlife linkages throughout the County, including most of Maricopa County Parks. Click here for more information.

Maricopa County Parks, along with our partners at AZGFD, conservation agencies, state and city partners, and others, have the opportunity to preserve existing natural landscapes, which should be explored in the early planning stages, as preservation is typically much less costly, more efficient, and more effective than restoration. Working together, we have opportunities to maintain landscape connectivity and wildlife corridors using natural and hybrid flood control, and nature-based drainage solutions such as bioswales and more expansive drainage areas will help water dispersal across the landscape, contributing to water evaporation, replenishing water reservoirs and increasing groundwater recharge. Preservation and conservation of our natural habitats will be essential factors for the long-term economic success of developing surrounding habitat blocks. Development adjacent to the Parks should include open space connectivity and wildlife corridors using existing hydrological features such as washes, bajadas, and alluvial fans.

Thoughtful consideration and collaboration are necessary to buffer the mountain parks and foothills to protect and increase native biodiversity, especially in these transition areas. Incorporating natural open space, pollinator corridors, Low-Impact Development (LID), Green Infrastructure (G.I.) technologies, and nature-based solutions during the development phase could help bridge lands and preserve native habitats, pollinator corridors, and wildlife connectivity. In addition, the collaboration between communities and the parks could help minimize unauthorized park use. Figure 12 and 13 (page 30 and 31) show the county's

forecasted development and population expansion. We must recognize opportunities and work together in planning, especially lands adjacent to the parks, and protect their connectivity to the wildlands. Regional-scale planning that employs Low-Impact Development (LID), Green Infrastructure (G.I.) technologies, prioritizes open-space connectivity, and ecosystem conservation, with economic benefits, will provide the best opportunity for wildlife (and derivatively the desert landscape) to thrive amidst regional development—in turn, growing healthier communities. Figure 14 (page 32) depicts the ideal planned development for community development around the mountain parks and natural areas. Maricopa County Parks currently provide natural open spaces with suitable habitats and healthy ecosystems for wildlife. These habitat blocks and corridors allow park visitors to view native plants and wildlife.

## IDEAL PLANNING FOR NATURAL AREAS PRESERVATION AND WILDLIFE LINKAGES


*Figure 14. Conceptual Plan for the White Tank Mountains in the west valley, includes use of GI and LID technologies with hybrid natural and structural floodways. Developed by Logan and Simpson*

# GOALS, OBJECTIVES, AND STRATEGIES

## GOAL 2.1. PROTECT HABITAT BLOCKS, RIPARIAN CORRIDORS, WILDLIFE CONNECTIVITY, LINKAGES, AND ROADWAY CROSSINGS

1) **Objective 1.** Protect essential wildlife corridors that connect habitat blocks and their surrounding wildlands.
   a) Short-Term Strategy
      i) Identify, inventory, and prioritize habitat blocks and the wildlife linkages that connect them to the surrounding wildlands.

ii) Work with partners such as the BLM to develop a strategic plan to preserve these crucial linkages through land acquisition, conservation easements, and public support to create a new state-sponsored land preservation initiative.
iii) Work with nonprofit conservation groups to purchase land to preserve wildlife connectivity and linkages.

b) Long-Term Strategy
i) Identify future planned areas that may affect wildlife movement and work with the State and County Department of Transportation and local municipalities to protect wildlife connectivity amid development.
ii) Partner to develop initiatives for land acquisition to protect wildlife connectivity and surrounding wildlands.

2) **Objective 2.** Encourage research and monitoring using advanced ecological methods.
a) Short-Term Strategy
i) Collaborate with partners researching nature-based solutions to retain wildlife linkages and crossings to understand better species-specific requirements and crossings that allow for a greater suite of species.
ii) Adapt planning efforts to include wildlife linkage protection according to long-term and short-term wildlife data from other wildlife corridors and linkage successes and failures, incorporating development trends into the equation.
iii) Work with partners to engage neighboring landowners to preserve wildlife habitats and the importance of the wildlife linkages.

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The Arizona Game and Fish Department recognized wildlife species that will be negatively affected by the loss of linkages and corridors that link each habitat block, including within Maricopa County Parks.[45]

Below are examples of species that may be affected if wildlife connectivity is lost:

## MAMMALS:

- Badger (Taxidea taxus)
- Desert bighorn sheep (Ovis ccnadensis )
- Black-tailed Bobcat (Lynx rufus),
- Cactus ferruginous pygmy-owl (Glaucidium brasillianum cactorum)
- Jackrabbit (Lepus californicus)
- Javelina (Tayassu tajacu)
- Kit fox (Vulpes macrotis)
- Mule deer (Odocoileus hemionus)
- Mountain lion (Puma concolor),
- Big free-tailed bat (Nyctinomops marotus)
- California leaf-nosed bat (Macrotus californicus)*
- Cave myotis (Myotis velifer)*
- Greater western mastiff bat (Eumops perotis californicus)
- Lesser long-nosed bat (Leptonyycteris curasoae yerbabuenae)*
- Long-legged myotis (Myotis volans)
- Pale Townsend's big-eared bat (Corynorhinus townsendii)*
- Pocket free-tailed bat (Nyctinomops femorosaccus)

## BIRDS:

- Gambel's quail (Callipepla gambelii)
- Roadrunner (Geococcyx californicus)
- Southwestern willow flycatcher (Empidonax trailii extimus)*
- Yellow-billed cuckoo (Coccyzus americanus occidentalis)*
- Western burrowing owl (Athene cunicularia hypugae)*

## HERPETOFAUNA:

- Arizona chuckwalla (Sauromalus ater)*
- Banded Gila monster (Heloderma suspectum cinctum)
- Common side-blotched lizard (Uta stansburiana)
- Desert iguana (Dipsosaurus dorsalis)
- Desert tortoise (Gopherus morafkai)*
- Giant spotted whiptail lizard (Aspidoscelis stictogrammus)
- Gilbert's skink (Eumeces gilberti rubricaudatus)
- Leopard chuckwalla (Sauromalus obesus)
- Lowland leopard frog (Rana yavapaiensis)*
- Regal ringneck snake (Diadophis punctatus)
- Red-backed lizard (Aspidoscelis xanthonota)
- Rosy boa (Lichanura trivirgata)
- Sonoran Desert toad (Bufo alvarius)
- Tiger whiptail (Aspidoscelis burti)
- Ornate tree lizard (Urosaurus ornatus),
- Tucson shovel-nosed snake (Chionactis palarostris)*
- Zebra-tailed lizard (Callisaurus draconoides).

## FISH/AQUATIC SPECIES:

- Bonytail chub (Gila elegans)*
- Desert pupfish (Cyprinodon macularis)*
- Gila topminnow (Poeciliopsis occidntalis occidentalis)
- Longfin dace (Agosia chrysogaster)*
- Razorback sucker (Xyrauchen texanus)

*ETR Species

[45] Beier, P., E. Garding, and D. Majka. 2008. Arizona Missing Linkages: Gila Bend – Sierra Estrella Linkage Design. Report to Arizona Game and Fish Department. School of Forestry, Northern Arizona University. Retrieved from: http://corridordesign.org/dl/linkages/reports/GilaBendMtns-SonoranDesertNM-SierraEstrella_LinkageDesign.pdf and http://corridordesign.org/linkages/arizona

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*Invasive species invading natural desert landscapes, fueling wildfires throughout Maricopa County.*

# CHAPTER 3

# CLIMATE CHANGE AND WILDFIRES

The climate is the weather conditions prevailing in a specific area, basically daily, weekly, and annual patterns. Climate change refers to changes to these patterns caused by anthropogenic factors, specifically carbon dioxide released into the atmosphere primarily by fossil fuels. Climate change is happening to the global climate annually compared to historically. For example, in the Southwest, wildfires are increasing in frequency and magnitude, annual temperatures are rising and breaking records in Phoenix and around the globe, and sea levels are rising at an unbelievably rapid rate.

The Sonoran Desert is considered the most tropical of the North American deserts,[46] with a frost-free climate and two (2) rainy seasons annually. The summer monsoonal rains originate in the warm Gulf of California, and the Eastern Pacific and North Pacific oceans drive cold winter storms.

About eight million years ago, biotic communities began appearing on the continent (late Miocene). Over time, there have been changes, many of which are post-glacial conversions of shrublands, grasslands, and forests to the habitats we see today; for more detailed information on continental physiography, visit here.

[46] Regional Natural History and Image Galleries, Arizona-Sonoran Desert Museum. Retrieved from: https://www.desertmuseum.org/desert/sonora.php

# CLIMATE CHANGE

## OVERVIEW

The Sonoran Desert has a bimodal precipitation regime; the general climate is arid. With low-intensity winter rains (January/December) and fierce summer monsoon rains (July/August). These distinct rainy seasons are the driving forces that provide the Sonoran Desert's unique plant and wildlife species and diversity. The desert supports a wide-ranging assemblage of warm and cool-season species.[47]

Annual precipitation averages 4-17 inches in the Sonoran Desert; higher elevations typically have more precipitation and snowfall depending on the location.[47]

Summer in the Sonoran Desert is hot, with temperatures regularly exceeding 104° F (40° C) and often reaching 118° F (48° C) with tumultuous thunderstorms and monsoon rains. Winters in the desert are mild, typically frost-free in the valleys; the mountain parks may have frost and sometimes even snow at higher elevations, but that is atypical.

The general climate in Maricopa County is mild, arid, and dry. Winter temperatures can range from 35° F to 75° F, spring and fall temperatures range from 40° F to 95° F, and summer temperatures range from 95° F to well over 110° F for several weeks in July and August (see Figure 15). [47]

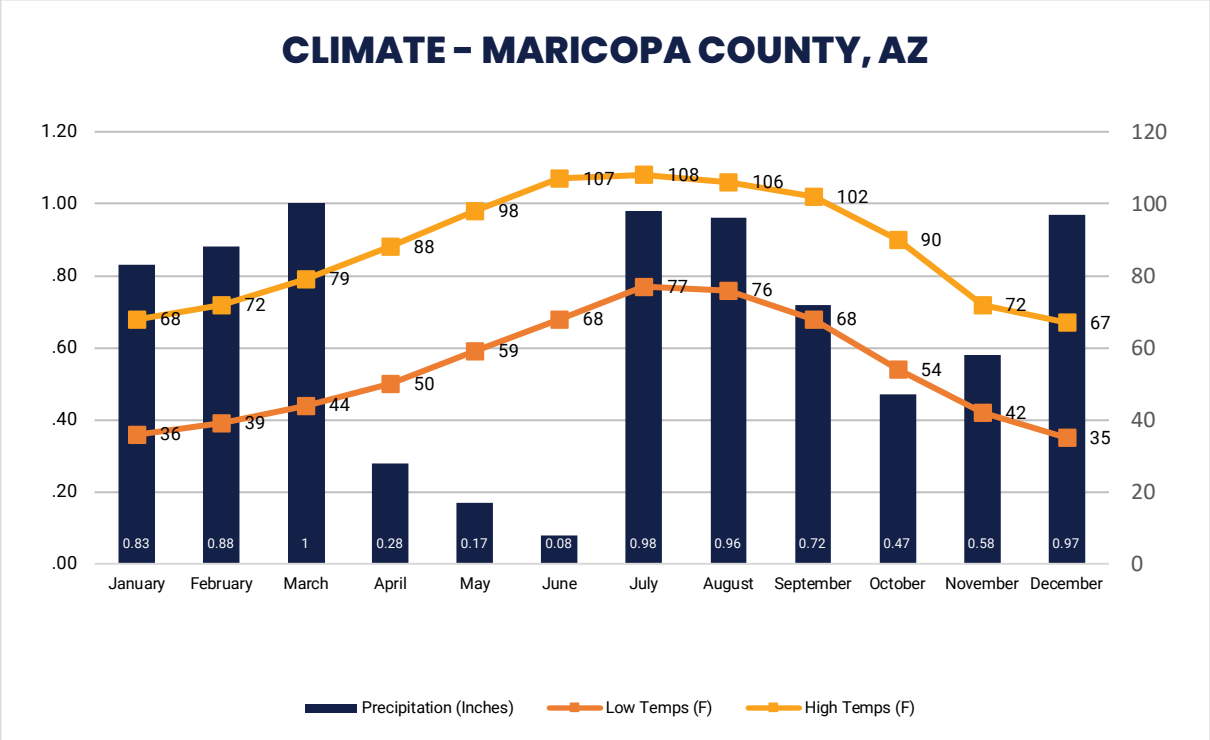


*Figure 15. Climate – Maricopa County, AZ*

[47] Sonoran Desert Network Ecosystems, U.S. National Park Service. https://www.nps.gov/im/sodn/ecosystems.htm

Precipitation in Maricopa County is strongly influenced by climate variations, changing from a warm and semi-arid desert environment at lower elevations to a seasonally cool and moderately humid mountain environment. Mean annual precipitation is 8.03 inches and ranges from 4-8 inches in the Phoenix vicinity and 9-17 inches in the mountain regions of northern Maricopa County.[48]

Precipitation appears in two (2) seasons of comparative rainfall depths: summer (July through September) and winter (December through March). Because of orographic effects, the mountain areas generally receive more precipitation than the lower desert areas (Figure 15).

The monsoon season, essentially a change in the weather pattern, is unique to the desert region. Dry winds that typically blow from the west and southwest shift to the south-southeast, bringing up moisture from the Gulf of California. That moisture, coupled with the heat of summer, fuels the monsoon storms.[49]

Climate change or global warming is a gradual increase in the overall temperature of the earth's atmosphere attributed to greenhouse gases, which means increased levels of atmospheric carbon dioxide from fossil fuels. The effects are happening now and are expected to worsen in the future decades. Currently, scientists are recording the magnitude of sea ice loss, rising sea levels, and longer, more intense heat waves.[50] Predictions suggest that Maricopa County's climate may change significantly over the coming century, with many observable changes over the next few decades. While a small amount of this variation is due to decadal and centennial-scale natural variability in the climate system, most will be driven by anthropogenic factors such as greenhouse gas emissions.

A recent National Aeronautics Space Administration (NASA) study reports that climate change is occurring faster than initially predicted; specifically, the ocean levels will continue to rise more quickly. As sea levels increase at accelerated levels, they could rise to 26 inches or higher than current levels by 2100.[51] Other predictions about regional climate change include increased insect outbreaks, bigger and more intense wildfires, declining water supply, reduced agricultural yields, decreasing human health, and heat.[52] Climate change predictions for the Southwest include longer, hotter summer seasons, a decrease in the rain, reductions in the late-season snowpack, and declines in river flow and soil moisture. In addition, there will be more droughts in the Southwest; the temperatures will increase and become hotter.[53] More information about the science behind climate change can be found here.

[48] Maricopa County Flood Control District: Mean Annual Rainfall as of WY-2017, Stations with ten or more Years of Records. https://alert.fcd.maricopa.gov/alert/Rain/mean_annual_rain.png

[49] University of California Press: *Arizona Sonoran Desert Museum and. A Natural History of the Sonoran Desert*, Phillips et al. 2000.

[50] NASA Global Climate Change: The Effects of Climate Change - https://climate.nasa.gov/effects/.

[51] NASA Global Climate Change: New study finds sea level rise accelerating - https://climate.nasa.gov/news/2680/new-study-finds-sea-level-rise-accelerating/.

[52] 2014 National Climate Assessment U.S. Global Change Research Program: Our Changing Climate - https://nca2014.globalchange.gov/report/regions/southwest

[53] Maricopa County Department of Public Health – Climate and Health Strategic Plan for Maricopa County - https://www.maricopa.gov/DocumentCenter/View/38688/Climate-and-Health-Strategic-Plan-2016-2021-PDFr

The summer of 2020 brought about record-breaking temperatures in the Phoenix. During this period, the region experienced:

- fifty-three (53) days of temperatures greater than 100° F; and
- fourteen (14) days of temperatures greater than 115° F.

According to the Arizona Weather Authority, this doubled the previous record,[54] making July the hottest. The extreme temperatures also contributed to many wildfires that spread across the county (Figure 16). For additional weather extremes in Phoenix, check here, and for national heat records, click here.

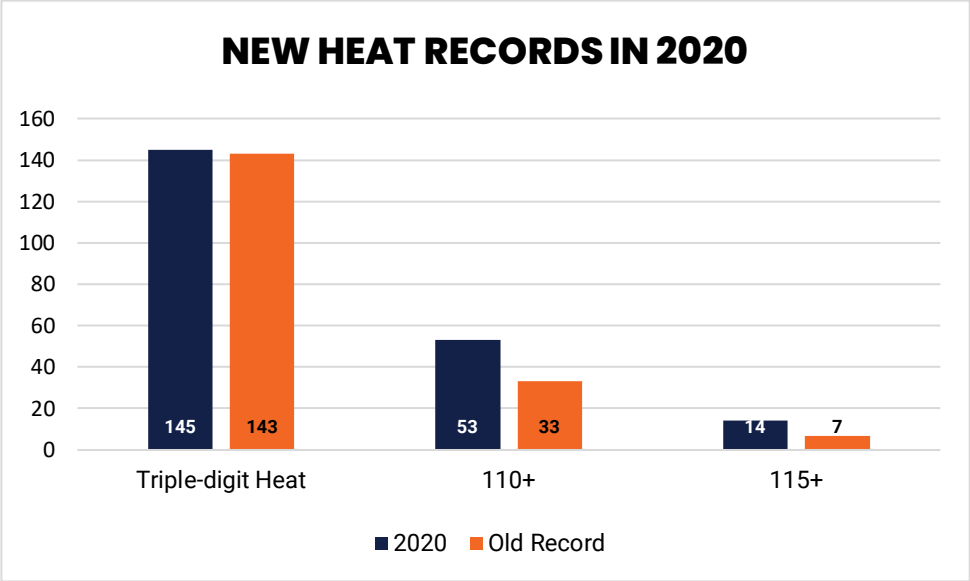


*Figure 16. Phoenix Heat Records 2020*

The predicted climate changes below are based on a high-emissions scenario (anthropogenic). Reductions in emissions, quantitatively rather than qualitatively, affect predictions. Many climate change effects are already 'locked in' by greenhouse gases emitted as of 2021.[55] As a result, confidence is high that temperature averages will increase. Current climate models project an increase in the Southwest regional average temperature of 8.6°F by 2100.

Similarly, temperature extremes will increase, as will the length of heatwaves. The Phoenix region will likely receive approximately 30 additional 90° F (or higher) days annually. There also will be fewer cold snaps. Precipitation is also likely to decrease. Winter precipitation averages are likely to remain approximately the same as historical averages. However, winter precipitation variability and extremes are likely to increase. Spring precipitation, and to a lesser extent, summer precipitation, will decrease by approximately 10 percent by mid-century and 20 percent by end-century – i.e., a decrease in the summer monsoon intensity and duration. Combined with the increases in temperature extremes, these factors are likely to increase the prevalence of extended droughts. In addition, decreased precipitation is expected to reduce regional streamflow and soil moisture.[56]

[54] National Weather Service National Oceanic and Atmospheric Administration. Year in Review 2020 (v2). Retrieved from: https://www.weather.gov/psr/YearInReview2020v2.

[55] Garfin, G., A. Jardine, R. Merideth, M. Black, and S. LeRoy, eds. 2013. Assessment of Climate Change in the Southwest United States: A Report Prepared for the National Climate Assessment. A report by the Southwest Climate Alliance. Washington, DC: Island Press. - https://swccar.org/sites/all/themes/files/SW-NCA-color-FINALweb.pdf.

[56] USGCRP, 2018: Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, 1515 pp. doi 10.7930/NCA4.2018. Available at https://nca2018.globalchange.gov/chapter/25/

Indirectly, these climate changes will likely increase the frequency and magnitude of fires and windstorms. Thus, increasing airborne particulate and pollutants (e.g., smoke and dust)potentially alters the ecosystem (cacti, in particular, are highly susceptible to increased fire frequency).

"Biodiversity and ecosystem services help us to adapt to and mitigate climate change. They are, therefore, a crucial part of our effort to combat climate change. Working with nature, rather than against it, brings multiple benefits for preserving our climate."[57]

# CHALLENGES, THREATS, AND OPPORTUNITIES

Climate change may be one of the planet's most significant challenges and is primarily influenced by greenhouse gas emissions produced by fossil fuels and the planet's warming. One of the effects of climate change is urban heat island effects, causing urban and metropolitan areas to become significantly warmer than surrounding areas due to human activities. Other climate-affecting natural areas include plant community shifts and ecosystem shifts, where entire plant communities move north or to higher elevations where the conditions are similar to their previous habitat.

Climate change is one of the biggest threats to our global ecosystems, including the upland desert habitat. We are seeing changes to weather patterns, causing drought and above-average winter precipitation, which is favorable to invasive species and triggers wildfire frequency and magnitude. "Plant and animal communities shift in elevation and location, coastal waters are warming, and coastal habitats are eroding due to sea-level rise and land subsidence. Thus, a crucial climate change adaptation strategy is to conserve, restore, and establish new ecological connections to shift species into a more suitable habitat" (European Commission 2022).[58]

Also challenging is the global change in weather patterns that affect entire ecosystems and their biological functions. These will impact social and environmental determinants of health, such as clean air, safe drinking water (human and animal), sufficient food, and secure shelters.[59] Climate change also alters the life cycle of plants and animals. As it becomes warmer, plants may bloom earlier, affecting many species, particularly specialist species, such as the Karner Blue butterfly and its reliance on wild lupine. The species was endangered in Indiana, and back in 2010, the lupine plants bloomed several weeks early, so when the Karner blue butterflies emerged, the plants were already going to seed. Later that year, the area suffered a severe drought, and many lupine plants died. As a result, the Karner blue butterfly population disappeared, considered extirpated.

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[57] European Commission: Nature's role in climate change – Retrieved from: https://ec.europa.eu/environment/nature/info/pubs/docs/climate_change/en.pdf

[58] Intergovernmental Panel on Climate Change (IPCC): Global Warming of 1.5 °C. Retrieved from: https://www.ipcc.ch/sr15/
National Park Service: Climate Change in the Sonoran Desert. Retrieved from: https://www.nps.gov/articles/climate-change-in-the-sonoran-desert.htm
National Park Service: Climate Change in the Southwest – Potential Impacts. Retrieved from: https://www.nps.gov/articles/climate-change-in-the-southwest-potential-impacts.htm
National Geographic: Desert Threats. Retrieved from: https://www.nationalgeographic.com/environment/habitats/desert-threats/
National Academies Press: Advancing the Science of Climate Change – Chapter 2: What We Know About Climate Change and Its *Interactions with People and Ecosystem*. Retrieved from: https://www.nap.edu/read/12782/chapter/5#34

[59] World Health Organization: Climate change and health. Retrieved from: https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health

A climate change threat is also affecting the health of Maricopa County residents. Bridging Climate and Public Health report[60] states that dust storms from droughts can cause Valley fever (fungus in the lungs) and breathing problems such as asthma. In addition, flash floods can leave temporary water pooling, providing a breeding habitat for mosquito species that can transmit infectious diseases like the West Nile virus. High temperatures associated with climate change have also increased heat-related deaths.

The County's metro regions experience the urban heat island effect. Phoenix metropolitan areas' expanding concrete, asphalt, and other impervious surfaces create this effect. Heat island effects occur as urban areas absorb more solar energy and become hotter, emitting higher temperatures than in a more natural state or habitat. As Phoenix metro areas continue to grow, more natural areas are paved with asphalt and concrete, and multitudes of buildings have developed, adding to the heat island effect. An opportunity to preserve more natural open space can help mitigate these effects.

Maricopa County Park's natural landscapes help prevent heat island effects and reduce climate change by performing ecological services. High-quality natural areas perform ecosystem services, such as carbon sequestration, reducing stormwater runoff, improving water quality, improving air quality, reducing carbon emissions, heat mitigation, crop pollination, disease regulation, and resilience to environmental shocks such as floods and drought.[61]

There are opportunities to reduce our carbon footprint and heat island effects by mitigating some impacts using LID, GI methods, and nature-based solutions.[62] More information about the issues of urban heat island effect can be found here. In addition, the parks have opportunities to help mitigate the effects of climate change by enhancing, restoring, and maintaining the natural quality of our parks and acquiring new natural areas.

# GOALS, OBJECTIVES, AND STRATEGIES

## GOAL 3.1. MITIGATE THE EFFECTS OF ANTHROPOGENIC CLIMATE CHANGE

1) **Objective 1.** Mitigate climate change and its effects.
    a) Short-Term Strategies:
        i) Retain 90 percent of any new lands/parks for natural areas to prevent urban heat islands in surrounding communities.
        ii) Continue to increase renewable energy and green technology to reduce the park's carbon footprint, i.e., solar for lights and electricity.
        iii) Create park buffers through land acquisition and RP&P to create larger natural areas that perform ecosystem functions to offset the effects of climate change.

[60] Maricopa County Public Health: Bridging Climate Change and Public Health – Retrieved from: https://www.maricopa.gov/4640/Climate-Change-and-Public-Health; / Maricopa County Public Health Department: Climate and Health Strategic Plan for Maricopa County 2016 – 2021. Retrieved from: https://www.maricopa.gov/DocumentCenter/View/38688/Climate-and-Health-Strategic-Plan-2016-2021-PDF

[61] Wall, D. H. & Nielsen, U. N. (2012) Biodiversity and Ecosystem Services: Is It the Same Below Ground? Nature Education Knowledge 3(12):8. Retrieved from: https://www.nature.com/scitable/knowledge/library/biodiversity-and-ecosystem-services-is-it-the-96677163/.

[62] Mohajerani, Abbas; Bakaric, Jason & Jeffrey-Gailey, Tristan (2017) The urban heat island effect, its causes, and mitigation, concerning the thermal properties of asphalt concrete. Retrieved from: https://www.sciencedirect.com/science/article/pii/S0301479717303201.

iv) Work with partners to stay current on the best nature-based GI and LID technologies.
v) Take advantage of natural waterways to harvest water, rain barrels, infiltration pools, etc.
vi) Work with Maricopa County Flood Control District to identify and implement creative ways to capture water and reduce offsite flooding.
vii) Work with partners and Flood Control to improve groundwater recharge, using drain dips, bioswales, and other nature-based solutions to retain water.
viii) Work with universities to monitor climate-species-related trends and consider mitigation efforts if ecological range shifts occur.
ix) Conserve, restore, and establish new ecological connections to shift species.

2) **Objective 2**. Reduce carbon footprint.
   a) Short-Term Strategies:
      i) Work with our partners to promote sustainability and reduce the park's carbon footprint.
      ii) Incorporate innovative renewable energy resources, model, and share our methods for reducing carbon footprint as we become more reliant on renewable energy.
      iii) Consider incorporating limits of acceptable change within the parks' biodiversity and mitigate to prevent decreases caused by climate change.

# WILDFIRES (FIRE ECOLOGY)

## OVERVIEW

Fire ecology is a scientific discipline concerned with natural processes involving fire, its ecological effects, interactions, and abiotic/biotic components within the ecosystem. Many ecosystems, particularly prairie, savanna, chaparral, and coniferous forests, have evolved with fire, and fire is essential to habitat vitality and renewal. In addition, many plant species in fire-adapted environments require fire to germinate, establish, or reproduce.

Fire ecology is closely tied to climate change; due to a warming climate, the results are increased biomass of fine fuels on the landscape, increased invasive species abundance, and increased frequency and magnitude of wildfires in the desert landscape. Several reports suggest that increased human populations, climate change, multiple years of above-average winter precipitation, and increased biomass of fine fuels are the leading sources creating optimal conditions for wildfires in the upland desert habitat.

Historically, the desert upland had more open spaces of exposed rock and soil separating the native plants. Additionally, the wildfire suppression era, grazing, and climate change effects have altered the fire regime, and these wildfires are also negatively impacting the fire-adapted communities.[63] The Upland Sonoran Desert habitats are not fire-adapted communities. Over the past 45 years, the number of wildfires has dramatically increased in frequency and magnitude within the Sonoran Desert; the native species most negatively affected by these wildfires are saguaro (*Carnegiea gigantea*) and foothill palo Verde (*Cercidium microphyllum*).[64] Dry, dead, or dormant invasive and weedy species provide the fuel to create contiguous fuel loads and exacerbate many major wildfires within the region. Cacti are keystone species within the Sonoran Desert, providing food and shelter for many desert animals, including the lesser long-

[63] Fire ecology, Wikipedia. Retrieved from: https://en.wikipedia.org/wiki/Fire_ecology
[64] Alford, E.J. et al. (2005, pg 26), *Effects of Fire on the Sonoran Desert Plant Communities USDA Forest Service Proceedings*.

nosed bat, bobcats, bees, and birds such as cactus wrens, Gila woodpeckers, gilded flickers, elf owls, finches, flycatchers, purple martins, and red-tailed hawks.[65]

In 2020, park staff developed post-fire monitoring methodologies and began monitoring the fire effects. The monitoring occurred at three (3) parks, CCRP, WTRP, and MMRP, with 15-one-hectare plots. The total area burned is estimated at 2,037 acres. The post-fire assessment concluded that an estimated 131,431 trees (predominantly Palo Verde) had more than 50 percent (50%) scorch and were likely to die. It is estimated that 15,342 saguaros had a scorch rate greater than 30 percent (30%), and research shows that these will die within the next few years. Also, results showed that 50,725 shrubs and 134,956 cacti species had more than 50 percent (50%) scorch. We did yield some positive results, as many shrub and forb species showed early signs of re-sprouting from the root stem.

# CHALLENGES, THREATS, AND OPPORTUNITIES

Climate change, the driving force of increased prevalence of invasive species (especially invasive grasses such as red brome and buffelgrass), and an expanding human population (many wildfires are human-caused) have produced a drastic increase in the magnitude and number of wildfires in the Sonoran Desert. As a result, many desert communities could take more than 80 years to recover, but it could likely be much longer. Once a high-magnitude wildfire has scarred the landscape, protecting the park's native biodiversity becomes challenging.

Saguaros have slow development, taking 30 years to reproduce and 50-80 years before an arm develops from the main stem. Young Saguaro pups need protection from unpredictable weather, extreme fluctuations in temperature, and rainfall. Palo Verde's frequently are nurse trees and protect fragile young saguaros. Fires that damage Palo Verde trees also endanger the survival of Saguaros.[66] Protecting these keystone species from the effects of wildfire will be challenging. The parks can aid with continued research and monitoring to understand wildfire effects and mitigation using conservation methods, reducing invasive species, and through education and outreach that includes instruction on the prevention of wildfires.

Native vegetation provides soil stabilization, and after a wildfire scorches the trees, shrubs, and plants, creating a burn scar and, with that, the threat of severe erosion. Thus, trail washouts may occur, and large boulders and debris can be washed down the bajadas and washed into the riparian habitats, causing flooding. These are also public safety concerns; these areas need to be monitored post-wildfire, and mitigation efforts applied to reduce erosion effectively. Using practical, reasonable mitigation efforts to prevent trails from washing away can minimize impacts.[67] However, most mitigation efforts are ineffective in steep areas until native plants become established to hold the soil in place. Therefore, trail monitoring is necessary after wildfires. In steep areas where mitigation efforts would not be practical, alternative options may be to close the trail in those areas during rain events.

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[65] Plant of the Week, *U.S. Forest Service.* Retrieved from: https://www.fs.fed.us/wildflowers/plant-of-the-week/carnegiea_gigantea.shtml

[66] Wilson, R.C., Narog, M.G., Koonce, A.L., Corcoran, B.M., (1994, January) PostfireRegeneration in Arizona's Giant Saguaro Shrub Community. Retrieved from: https://www.fs.usda.gov/psw/publications/4403/PostfireRegen.pdf.

[67] Rainstorms bring new safety concerns after the devastating fire (January 2018), California Department of Water Resources. Retrieved from: https://water.ca.gov/News/News-Releases/2018/Jan-18/Rainstorms-Bring-New-Safety-Concerns-After-Devastating-Fire-Season.

Post-wildfire research revealed that wildfire threatens and negatively impacts cacti, especially saguaro cacti. According to fire ecologists working for the U. S. Forest Service at Tonto National Forest, the rule of thumb is that a saguaro is likely to die if greater than 30 percent (30%) of its skin is scorched, though it can take many years to perish. The absorption of water (rain) following injuries from a fire can result in fire scars and splitting, opening the plant to insects and infections. With the spines burned off, the plant is more susceptible to herbivory.[68]

Opportunities to prevent wildfires are reducing our carbon footprint, continuing with fire bans, educating the public about the risks of their actions, and removing invasive species within the parks.

# GOALS, OBJECTIVES, AND STRATEGIES

## GOAL 3.2. PREVENT AND REDUCE WILDLAND FIRES IN THE SONORAN DESERT HABITAT

1) **Objective 1.** Prevent wildland fires through knowledge and education.
   a) Short-Term Strategies:
      i) Manage developed and natural areas by removing invasive and non-native vegetation along the trail and riparian buffer areas, campgrounds, and other high-use areas.
      ii) Continue researching post-fire effects to understand wildfires' short and long-term impact on the Sonoran Desert habitat.
      iii) Provide educational tools and research about wildfire prevention on social media and website.
      iv) Develop a wildfire awareness protection program or share our partners' Fire Wise program to raise public awareness.
      v) Continue park fire bans as necessary and work with MCSO to address visitor compliance.
      vi) Continue working with partners to stay current on best practices to prevent wildfires and invasive species management.
2) **Objective 2.** Implement wildfire prevention and mitigation actions to reduce fire hazards, reduce hazardous fuels, and create firebreaks.
   a) Short-Term Strategies:
      i) Prioritize potential high-risk areas using ESRI/GIS collector/field app or Google Earth to identify hot spots for invasive species, especially near trail edges and riparian habitats.
      ii) Develop a fire fuel reduction program, identifying, prioritizing, and installing firebreaks by reducing fuel loads along the edge of trails/riparian and roadways by removing swaths of invasive species and non-native grasses.
      iii) Apply for wildfire prevention grants to help offset invasive species removal and fire fuel reduction costs.
      iv) Continue Invasive species management and fire fuel reduction, focusing on urban-wildland interface areas, trail edges, and riparian habitats.

[68] Email communications with US Forest Service Wildlife Biologist (D. Ullberg) and Fire Ecologist (Mary Lata).

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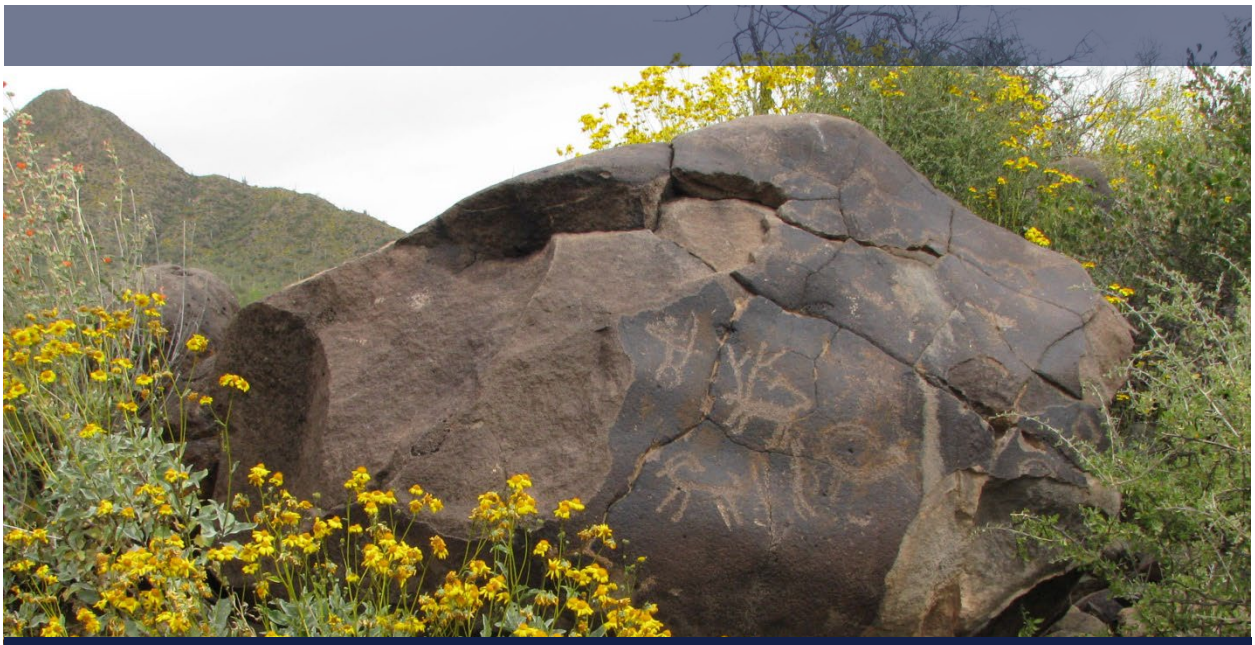

*Natural and cultural resources can be found throughout Maricopa County's regional park system.*

# CHAPTER 4

# PROTECTION OF NATURAL AND CULTURAL RESOURCES

MCPRD has collectively incorporated scientific data and professional expertise to identify critical elements of our natural resources, including ecosystems, biological resources, and cultural resources, as well as rare, listed, and endangered species, hydrology, geology, and sounds, lights, and view sheds; addressing the issues that have been recognized and are currently affecting the parks today.

As we mentioned in the introduction, Maricopa County Parks is home to one of the largest regional park systems in the nation,[69] with approximately 122,000 acres, including more than 680 miles of trails, natural open space, recreation areas, river corridors, and one of the largest lakes in Arizona. Protecting the parks systems natural ecosystems should be our highest priority. Planning for the future of regional parks and park visitors will be vital to strategizing conservation and preservation efforts; advanced planning will enable MCPRD to maintain sustainable, healthy ecosystems that support diverse biological habitats.

[69] About Us Information. Maricopa County. Retrieved from: https://www.maricopacountyparks.net/about-us/administration/about-us/#:~:text=Maricopa%20County%20is%20home%20to,Learning%20Center%20at%20Lake%20Pleasant.

# ECOSYSTEMS

## OVERVIEW

Many upland desert mountain parks have rough and rocky topography typical of rocky mountainous terrain, with large exposed basaltic boulders or prominent ridgelines and steep areas with exposed igneous rock features. Maricopa County's largest Park is the WTMRP at 30,000 acres; it also has the highest elevation of all the parks at 4,070 ft. ASL. The lowest elevation of the mountain parks is BHRP at 860 ft. ASL. Figure 4 provides each park's peak.

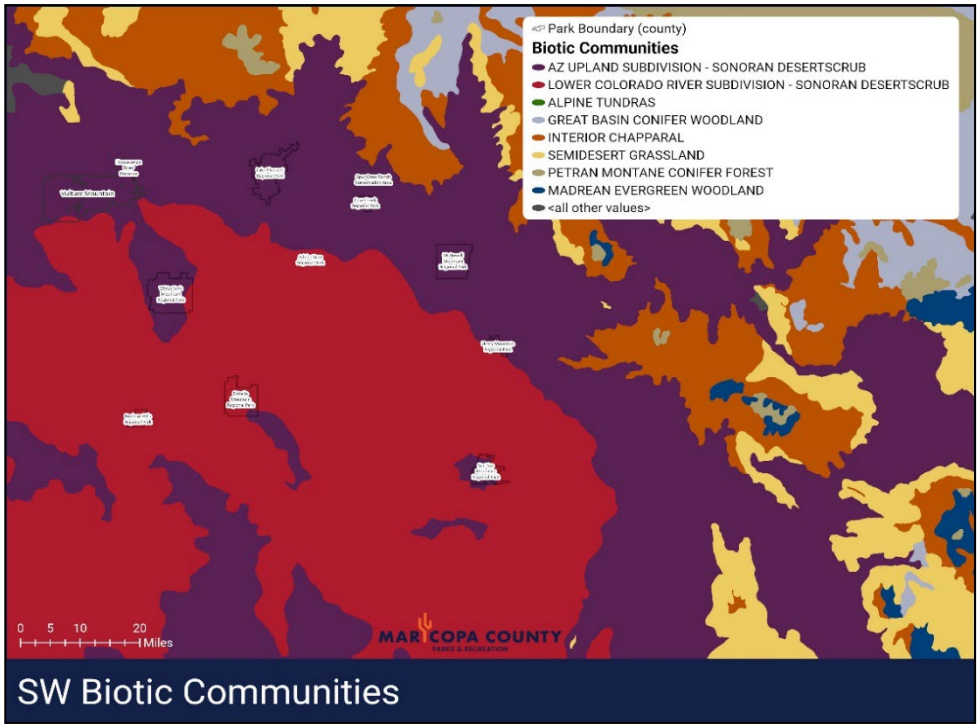


*Figure 17. Biotic Communities. (Appendix pg. 87)*

The Biotic Communities[70] within the Maricopa County Parks (Figure 17) include Arizona Upland Sonoran Desert Scrub and Lower Colorado River Sonoran Desert Scrub. The Upland Sonoran community encompasses all of Cave Creek Regional Park (CCRP); Hassayampa River Preserve (HRP); Spur Cross Ranch Conservation Area (SCRCA); Vulture Mountains Recreation Area (VMRA); most of McDowell Mountain Regional Park (MMRP); San Tan Mountain Regional Park (STMRP); Usery Mountain Regional Park (UMRP); White Tank Mountain Regional Park (WTMRP); parts of Estrella Mountain Regional Park (EMRP); the Desert Outdoor Center at Lake Pleasant (DOC); and Lake Pleasant Regional Park (LPRP).

The Lower Colorado River Sonoran community encompasses all of Buckeye Hills Regional Park (BHRP), most of EMRP, and parts of WTMRP and STMRP, based on Arizona State Land Department (ASLD) data.

[70] A digitized biotic community map for plotting and comparing North American plant and animal distributions, by D. Brown and T. Brennan. Retrieved from: https://canotia.org/volumes/CANOTIA_2007_Vol3_1_Brown_et_al.pdf

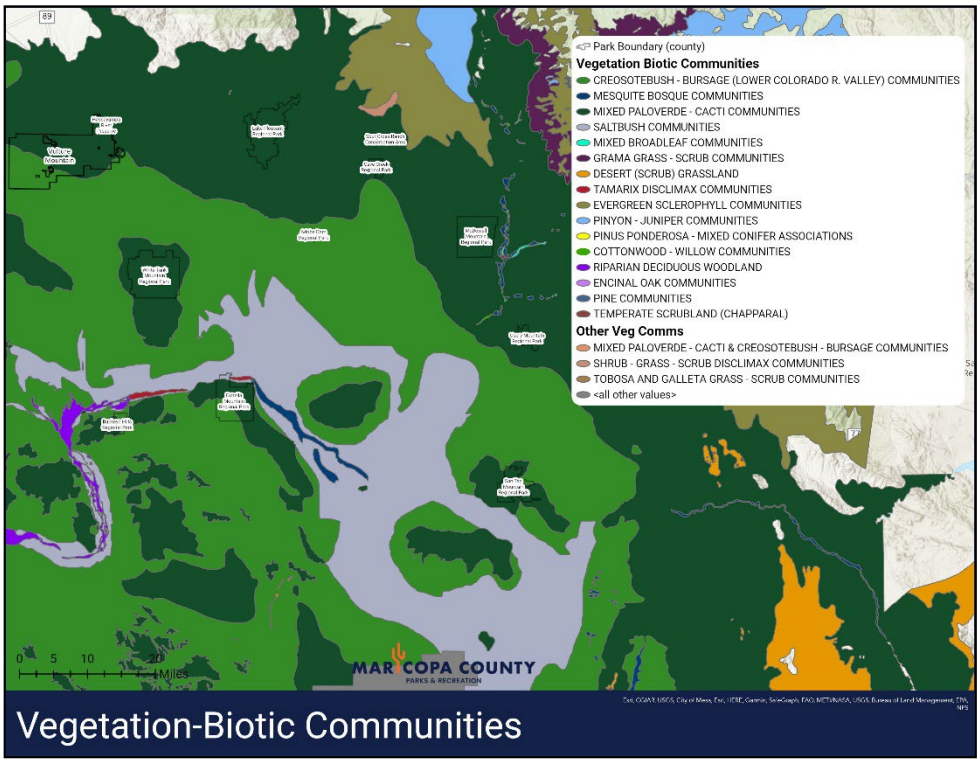


*Figure 18. Biotic Communities with Vegetation Associates. (Appendix pg. 88)*

As one extends their view beyond the biotic communities, they'll begin to explore the Vegetation Associations at each park (Figure 18). All of the County's regional parks contain Mixed Paloverde-Cacti Communities and Creosote-Bursage. The Mixed Paloverde-Cacti Community inhabits CCRP, HRP, MMRP, SCRCA, UMRP, WTMRP, Lake Pleasant Regional Park (LPRP), the DOC, and parts of Buckeye Hills Regional Park (BHRP), EMRP, and STMRP. The Creosote-Bursage Community inhabits all of Adobe Dam Regional Park (ADRP) and parts of EMRP, BHRP, and STMRP, as well as a small portion of WTMRP and VMRA.

EMRP has two (2) additional vegetation association types: Saltbush Communities and Tamarix Disclimax Communities. These biotic communities and vegetation associations will provide insight and help staff better understand these plant communities and their microclimates.

The Ecological Site Descriptions (ESD) focus on the smaller plant communities provided by the National Resource Conservation Services (NRCS) and include information for each soil type, including microclimate, habitat characteristics, and plant species found within these ESDs. The NRCS data will allow staff to properly restore disturbed areas within each biotic community based on their ecological communities or sites. To learn more about NRCS Ecological Site Descriptions, visit www.edit.jornada.nmsu.edu/catalogs/esd.

Understanding plant communities, their relationship, and interactions with wildlife species is the first step in preserving the system's functionality. While managing the parks' native plant biodiversity, the department also helps manage native wildlife species by maintaining the ecosystem function of their habitat, which provides shelter, shade, food source, and all their needs.

# CHALLENGES, THREATS, AND OPPORTUNITIES

Climate change may be one of the planet's most significant challenges and is primarily influenced by greenhouse gas emissions produced by fossil fuels and the planet's warming. One of the effects of climate change is urban heat island effects, causing urban and metropolitan areas to become significantly warmer than surrounding areas due to human activities. Other climate-affecting natural areas include plant community shifts and ecosystem shifts, where entire plant communities move north or to higher elevations where the conditions are similar to their previous habitat.

Large, contiguous natural regions are necessary to maintain species richness. As the landscape is subdivided into smaller pieces, fragmented by development, those segments can support fewer species.[71]

With Maricopa County's population predicted to almost double by 2050, habitat loss and fragmentation will significantly challenge and threaten our natural areas; both could lead to poor gene flow for many species. Habitat loss and fragmentation of ecosystems pose the most significant threat to biological diversity[72] and directly correlate to our rapid population growth and urban sprawl. These are presently the most devastating environmental threats to wildlife species. Protecting wildlife species from endangerment and extinction will be critical to preserving entire ecological systems and preventing them from becoming fragmented landscapes.[73]

In addition, inbreeding depression is associated with conservation risks such as local extinctions. Habitat fragmentation will cause subsequent isolation, contributing to biodiversity loss. Preservation and conservation efforts at an ecosystem level became more widely practiced, beginning in the 1990s, when biologists and ecologists realized that protecting a single species was only practical with preserving the habitat where all associated species reside. Conservation efforts will be critical to preserving biodiversity and retaining functioning ecosystems.[74] Maintaining the landscape's integrity may allow current and future generations to enjoy sustainable natural areas and recreation activities. Collectively, there is a need to protect and conserve the species richness of these natural areas in planning our community development and recreation expansion.

As the intro discusses, natural areas provide many health and economic benefits. This is also true when developers build near and adjacent mountain parks and large mosaics of natural areas. It can be an opportunity for developers to plan healthy communities by using Low-Impact Development (LID), Green Infrastructure (G.I.), and nature-based solutions in their development plans. In addition, building fewer homes, preserving natural green space, preserving natural

[71] Wilson, M.C., X. Chen, R.T. Corbett, R.K. Dedham, P. Ding, R.D. Holt, M. Holyoake, G. Hu, A.C. Hughes, L. Jiang, W.F. Laurence, J. Liu, S.L. Pym, Robinson, S.K., Russo, S.E., X. Si, D.S. Welcome, J. Wu, and M. Yu. 2016. Habitat fragmentation and biodiversity conservation: key findings and future challenges. Landscape Ecology 31(2):219-227.

[72] Kennedy, C., Wilkinson, J., Balch, J., & McElfish, J. (2003). Conservation thresholds for land planners. Environmental Law Institute. Retrieved from: https://www.eli.org/sites/default/files/eli-pubs/d13-04.pdf

[73] Bloch, J.B. (1992). Preserving biological diversity in the United States: The case for moving to an ecosystems approach to protect the nation's biological wealth. Environmental Law Review. Page 175. Retrieved from: https://www.eli.org/sites/default/files/eli-pubs/d13-04.pdf.

[74] Tischendorf, L. & Fahrig, L. (July 1, 2000). On the usage and measurement of landscape connectivity. Semantic Scholar. Retrieved from: https://pdfs.semanticscholar.org/004a/6fa76f28ccb5376863e721b9f5a632aa2a4c.pdf

floodways and hydrologic functions, and adding trails and recreation areas can improve the quality of life for the buyer.

# GOALS, OBJECTIVES, AND STRATEGIES

## GOAL 4.1. RESEARCH AND PROTECT BIOLOGICAL AND ECOSYSTEM FUNCTIONS

1) **Objective 1.** Assess and evaluate current conditions and understand historical conditions.
   a) Short-Term Strategy
      i) Create baseline geological and plant communities' maps, research historical community maps, and compare changes over time.
      ii) Regularly monitor and document plant communities and ecosystem functions.

## GOAL 4.2. PREVENT HABITAT LOSS AND FRAGMENTATION

1) **Objective 1.** Preserve boundaries and prevent fragmentation.
   a) Short-Term Strategy
      i) Research essential preservation areas and consider land acquisitions, including collaborative partnering acquisitions, conservation easements to buffer the parks, or adding acreage.
      **ii)** Work with the Bureau of Land Management (BLM) to identify priority areas for creating new RP&P parks or buffers.

## GOAL 4.3. ENSURE ENVIRONMENTAL SENSITIVITY IS USED FOR INFRASTRUCTURE IMPROVEMENTS, RENOVATIONS, OR NEW DEVELOPMENT WITHIN OR ADJACENT TO THE PARKS

1) **Objective 1.** Encourage open space preservation that provides significant environmental benefits.
   a) Short-Term Strategy
      i) Work with partners, consultants, and contractors to ensure minimal impacts on natural areas within construction zones.
      ii) Incorporate green technologies to reduce the parks' carbon footprint.
      iii) Encourage local developers and park constructions to utilize natural floodways, green technologies, G.I., and LID.
   b) Long-Term Strategy
      i) Become a leading agency promoting renewable energy technologies that strive to reduce the human carbon footprint.

# GEOLOGY

Dynamic geological processes formed the Maricopa County regional parks in different eras and periods. The oldest rocks exposed in our parks formed as far back as about 1.7 billion years ago (Ga), during the Proterozoic Eon (2.5 to 0.54 Ga). Rocks exposed in other parks were formed during the Paleozoic Era, which means "ancient life" roughly started 540 to 250 million years ago (Ma), the Mesozoic Era (250-66 Ma) when reptiles were the dominant animal species, and the Cenozoic Era (<66 Ma) when mammals were the dominant group. The rocks formed during

these eras and the subsequent erosional and weathering forces are associated with varying rock formations, topography, and soil types; these characteristics contribute to the park's biodiversity and uniqueness.

# OVERVIEW

The southwestern United States, including the Sonoran Desert, was created from a violent geological process known as plate tectonics, which has been active since at least 1.7 GA. Plate tectonics involves the movement of plates of the Earth's crust atop the uppermost mantle. In areas where plates converge, one plate is commonly forced beneath the other, resulting in the upthrust of mountain ranges and massive volcanic activity. The Sierra Nevada, Sierra Madre, and Cascade Ranges formed this way, and these processes dominated geologic activity in central Arizona from about 80 to 20 M.A. A visual representation is available here.

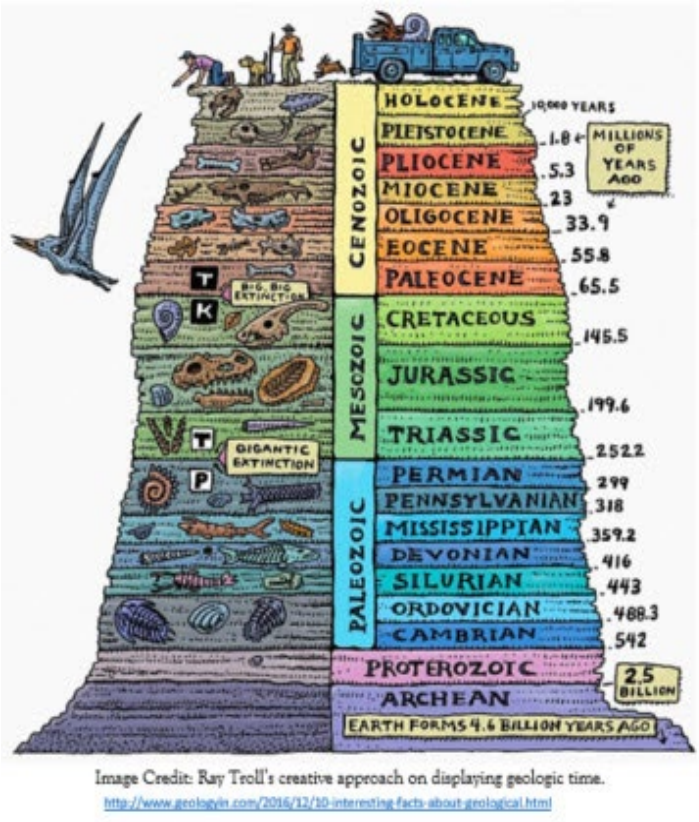


Image Credit: Ray Troll's creative approach on displaying geologic time.
http://www.geologyin.com/2016/12/10-interesting-facts-about-geological.html

*Figure 19A. Geologic Time. (Appendix pg. 89)*

| | Rock and Mineral Types | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Surficial Geology (Unit name) | MAJOR 1, 2 & 3 | | | MINOR 1, 2, 3 & 4 | | | | GENERAL |
| Holocene (RA) | Sand | Gravel | | Silt | Clay | | | Unconsolidated, undifferentiated |
| Holocene (SD) | Silt | Clay | | Gravel | Sand | | | Unconsolidated, undifferentiated |
| Quarterary (SD undivided) | Conglomerate | Sandstone | | Mudstone | Siltstone | Limestone | Gypsum | Sedimentary, clastic |
| Late and Middle Pleistocene (SD) | Gravel | Sand | | Silt | Clay | | | Unconsolidated, undifferentiated |
| *Early Pleistocene -Latest Pliocene (SD)* | Gravel | Sand | | | | | | Unconsolidated, undifferentiated |
| Pliocene to Middle Miocene (D) | Sand | Silt | Clay | | | | | Unconsolidated, undifferentiated |
| Late-Middle Miocene (BR) | Basalt | | | | | | | Igneous, volcanic |
| Middle Miocene-Oligocene (VR) | Basalt | Andesite | Dacite | Rhyolite | | | | Igneous, volcanic |
| Middle Miocene-Oligocene (SR) | Conglomerate | Sandstone | | Mudstone | Sedimentary-breccia | Limestone | | Sedimentary, clastic |
| Middle Miocene-Oligocene (VR&SR) | Volcanic | Clastic | | | | | | Igneous and Sedimentary, undifferentiated |
| Early Tertiary-Late Cretaceous (MB-GR) | Basalt | | | | | | | Igneous, volcanic |
| Early Tertiary-Late Cretaceous (GR) | Granite | | | Pegmatite | | | | Igneous, intrusive |
| Middle Proterozoic (GR) | Granite | | | Aplite | | | | Igneous, intrusive |
| Early Proterozoic (MVR) | Metavolcanic | | | | | | | Metamorphic, volcanic |
| Early Proterozoic (GR) | Granite | Granodiorite | Tonalite | Quartz-diorite | Diorite | Gabbro | | Igneous, intrusive |
| Early Proterozoic (MSR) | Metasedimentary | Metavolcanic | Gneiss | | | | | Metamorphic, undifferentiated |
| Early Proterozoic( MMR) | Metasedimentary | Schist | | Conglomerate | Carbonate | Sedimentary | | Metamorphic, undifferentiated |

*Figure 19B. Geology- Rock and Mineral Types. (Appendix pg. 90)*

Plate tectonic activity and intense heat from the Earth's mantle stressed the Sonoran Desert's underlying crust. This stress caused broad horizontal and vertical movements, creating the characteristic Basin and Range topography. As a result, the area is characterized by roughly parallel mountain ranges that approach elevations just above 10,000 ft. (3,000 m.), separated by

expansive valleys filled with sediments and sedimentary features such as bajadas and coalesced alluvial fans.[75]

The Sonoran Desert comprises igneous, sedimentary, and metamorphic rocks of varying ages. The oldest rock developed 1.7 GA in the Proterozoic Era and was initially formed by igneous

| | Time Began | Surficial Geology | MC Parks: Adobe Dam | Black Mountain | Buckeye Hills RP | Cave Creek RP | Estrella Mountain RP | Hassayampa River Preserve | Lake Pleasant RP | McDowell MRP | PV | San Tan MRP | Spur Cross RCA | Usery MRP | White Tank MRP | Vulture MRA | # of Parks each SG Occurs at |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Years Ago | 10,000 YA | Holocene (River alluvium) | | | | | 932 | | | | | | | | | | 1 |
| | 10,000 YA | Holocene (Surficial Deposits) | | | | | 887 | | | 4274 | | 426 | | 1912 | 387 | | 5 |
| | 1.6 MYA-present | Quarternary (surficial deposits, undivided) | | | | | 7 | | | | | | | | | | 1 |
| Million Years Ago | 1.8 MYA | Late and Middle Pleistocene (Surficial Deposits) | 976 | | 177 | 412 | 3170 | | 3434 | 7409 | | | 245 | 1055 | 3434 | | 10 |
| | 5.3 MYA | *Early Pleistocene–Late Pliocene (Surficial Deposits)* | | | | | | | | | | 213 | | | | | 1 |
| | 23 MYA | Pliocene-Middle Miocene (Deposits) | | | | | | 163 | 3841 | 6801 | | 217 | | | | | 3 |
| | 23 MYA | Late-Middle Miocene (Basaltic rocks) | 220 | | | | | 40 | 360 | | | | | | | | 2 |
| | 33.9 MYA | Middle Miocene-Oligocene (Volcanic rocks) | 30 | | | | | 578 | 7491 | | | 1846 | | | | 8 | 5 |
| | 33.9 MYA | Middle Miocene-Oligocene (Sedimentary rocks) | | | | | | | 10187 | | | | | | | | 3 |
| | 33.9 MYA | Middle Miocene-Oligocene (Volcanic and Sedimentary rocks) | | | | | | | | | | | 1265 | | | | 1 |
| | 146 MYA | Early Tertiary-Late Cretaceous muscovite-bearing granitic rocks | | | | | | | | | | | | | 9313 | | 1 |
| | 146 MYA | Early Tertiary-Late Cretaceous (Granitic rocks) | | | | | | | | | | | | | 3574 | 501 | 2 |
| | 2500 MYA | Middle Proterozoic (Granitic rocks) | | 106 | | | | | | 1866 | | 517 | | | | | 2 |
| | 2500 MYA | Early Proterozoic (Metavolcanic rocks) | | | | 1820 | | | | | | | 18 | | | | 2 |
| | 2500 MYA | Early Proterozoic (Granitic rocks) | | | 4279 | 9 | 5337 | | | | | 4483 | 612 | 1201 | 3103 | | 7 |
| | 2500 MYA | Early Proterozoic (Metasedimentary rocks) | | 141 | | 838 | 1593 | | 325 | 755 | | 1866 | | | | | 4 |
| | 2500 MYA | Early Proterozoic (Metamorphic rocks) | | | | | 7917 | | 23 | | | | | | 9613 | 537 | 4 |

*Figure 19C – Surficial Geology – Timeframe. (Appendix pg. 90)*

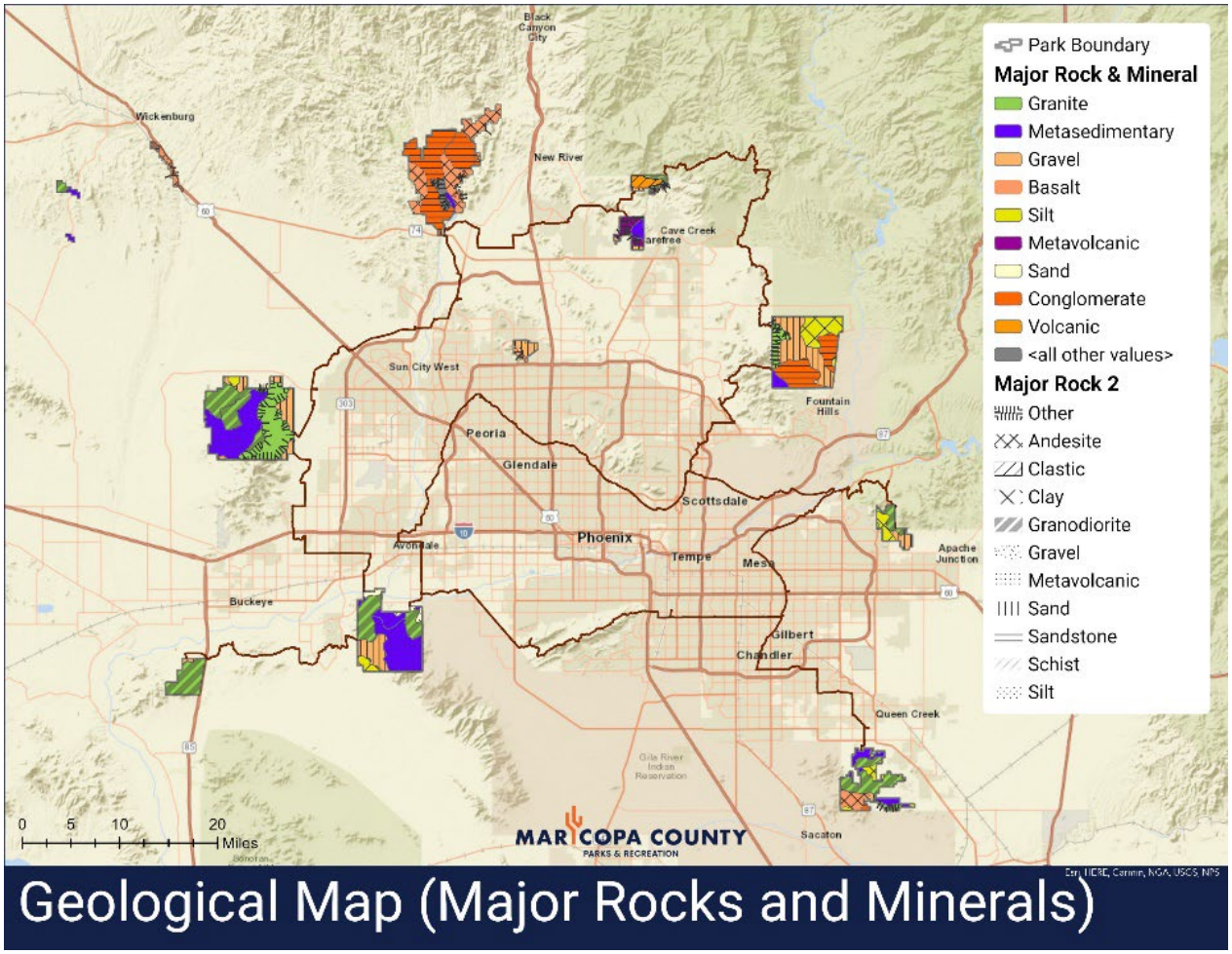


*Figure 19D. Maricopa County Parks-Major Rock and Mineral Deposits. (Appendix pg. 91)*

[75] Sonoran Desert Network Ecosystems (July 5, 2019). The National Parks. Retrieved from: https://www.nps.gov/im/sodn/ecosystems.htm

processes and sedimentary deposition but was subsequently strongly metamorphosed by heat and pressure. The youngest rocks in this region were created through volcanism at the Pinacate Region near the international border with Mexico; they are less than 10,000 years old. Large volcanic fields across southern and western Arizona were active from 15 to 30 M.A., forming large calderas, lava, and pyroclastic flows. The Basin and Range (mountains, valleys, alluvial fans, and sloped terraces) formed within the region over the last 2.6 MA.

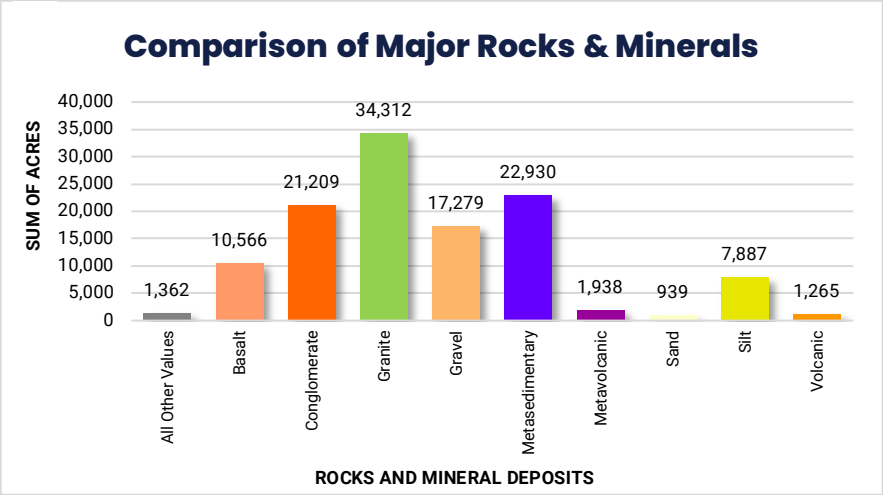


*Figure 19E. Maricopa County Parks-Major Rock and Mineral Deposits (Appendix pg. 92)*

The park's major rock and mineral deposits include about 29 percent (29%) intrusive igneous rocks, 21 percent (21%) metamorphic rocks, 18 percent (18%) sedimentary rocks, 22 percent (22%) unconsolidated gravel, sand, silt, and clay, and 10 percent (10%) extrusive igneous or volcanic rocks. These rock and mineral deposits include andesite, sandstone, granodiorite, schist, gneiss, diorite, quartz-diorite, dacite, tonalite, pegmatite, rhyolite, mudstone, aplite, limestone, gabbro, siltstone, gypsum, conglomerate, and sedimentary breccia. Figures 19B-D and 19E showcase each park's geological features timeline, surficial geology, and major rock and mineral deposits.

# PARKS SURFICIAL GEOLOGY

- Proterozoic Eon (2.5 Ga to 540 MA): Rocks of the Proterozoic Eon and percentages of surficial exposure include the Buckeye Hills Regional Park (90 percent), Cave Creek Regional Park (90 percent), Estrella Mountain Regional Park (70 percent), Vulture Mountains Recreation Area (40 percent) White Tanks Mountain Regional Park (50 percent) San Tan Mountain Regional Park (50 percent). Smaller areas of these rocks can be found in these parks: McDowell Mountain Regional Park (20 percent), Spur Cross Ranch Conservation Area (30 percent), and Usery Mountain Regional Park (30 percent). The first fossilized traces of life were discovered in this timeframe and date back 3.5 billion years ago.[76]
- Cenozoic Era (66 -2.6 MA): Rocks of the Cenozoic Era and percentages of surficial exposure include the White Tanks Regional Park (40 percent), Spur Cross Ranch Conservation Area (10 percent), and Vulture Mountains Recreation Area (60 percent). The Cenozoic Era is known for the rise of mammals.

[76] The Proterozoic Record. *Wikipedia*. https://en.wikipedia.org/wiki/Proterozoic#cite_note-StratChart_2022-5.

- Oligocene to Middle Miocene Epochs (28 - 16 M.A.): Rocks of the Oligocene to Middle Miocene Epochs and percentages of surficial exposure include the Adobe Dam Regional Park (20 percent), Hassayampa River Preserve (90 percent), Lake Pleasant Regional Park (85 percent), Spur Cross Ranch Conservation Area (60 percent), and the San Tan Mountain Regional Park (30 percent). Fossils in this period indicate extensive terrestrial life, including early dogs, horses, bears, and the first saber-toothed cats.[77]
- Middle Miocene-Pliocene Epochs (16 - 2.6 Ma): Rocks of the Middle Miocene-Pliocene Epochs and percentages of surficial exposure include Hassayampa River Park (20 percent), Lake Pleasant Regional Park (15 percent), McDowell Mountain Regional Park (40 percent), and San Tan Regional Park (10 percent). The Middle Miocene-Pliocene Epochs marked the first appearance of ape-like mammals.
- Quaternary Period (2.6 MA - modern): Sediments of the Quaternary Period and percentages of surficial coverage include Adobe Dam Regional Park (80 percent), Estrella Mountain Regional Park (20 percent), Buckeye Hills Regional Park (10 percent), Spur Cross Recreation Area (10 percent), McDowell Mountain Regional Park (30 percent), Usery Mountain Regional Park (30 percent), San Tan Mountain Regional Park (10 percent), and the White Tanks Mountain Regional Park (10 percent). The Pleistocene Epoch (2.6 – 0.12 MA) was dominated by repeated advances and retreats of extensive ice sheets and glaciers, changing vegetation patterns in response to climate changes, and the continued evolution of Archaic humans.[78]
- The Holocene Epoch (less than 12,000 years) was marked by the development of human civilizations with similar (to present) climate conditions and subtle changes in vegetation.

There are 121 unique soil types comprised within Maricopa

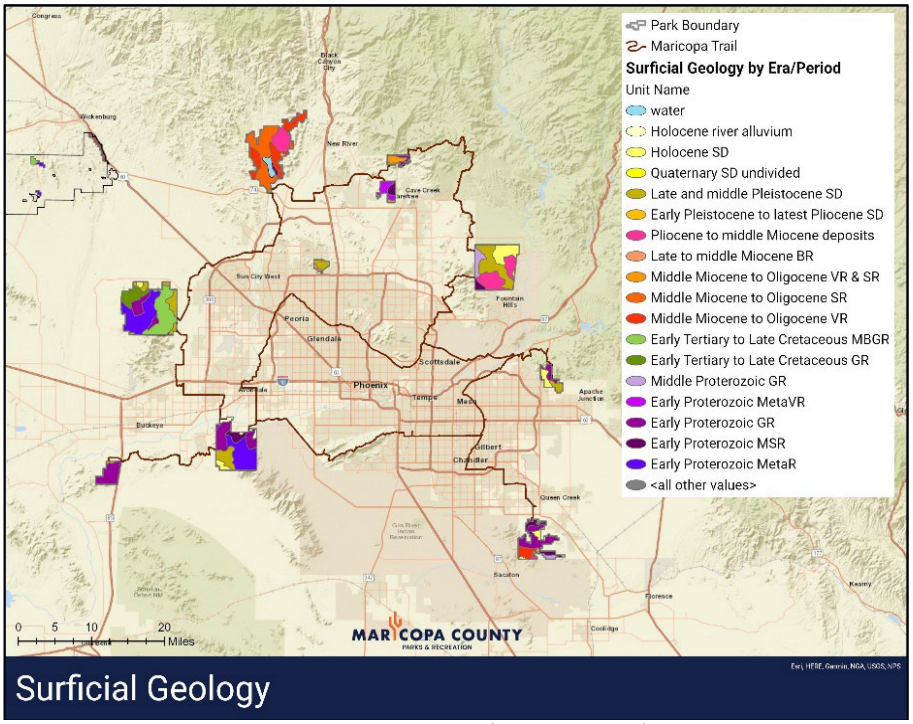


*Figure 19F – Maricopa County Park Geological Map. (Appendix pg. 93)*

[77] The Oligocene Record. Wikipedia. https://en.wikipedia.org/wiki/Oligocene.

[78] Pester, P., & Zimmermann, K.A. ( February 28, 2022). Pleistocene epoch: The last ice age. Live Science. https://www.livescience.com/40311-pleistocene-epoch.html.

County's regional parks.[79]

Twenty-four of those soil types cover the majority of parklands (77 percent), totaling approximately 106,995 acres. Figure 19F shows the parks' soil types after extrapolating the National Resource Conservation Service's (NRCS's) soil data for the Maricopa County parks.

# THE PARK'S TOP 25 SOIL TYPES:

- Mountain Soils: Nine (9) soil types comprise approximately 50,067 acres of mountain slopes, granite mountains, hill slopes, mountainsides, or low granite hills dissected by floodplain and washes, usually shallow to a hardpan bedrock, excessively or somewhat excessively drained soils.
- Alluvial Fan Soils: Three (3) deep soil types (including old alluvial fans and valley plains) comprising approximately 16,323 acres of parkland. These are characterized by well-drained soils in floodplains derived from igneous rock.
- Terrace Soils: Representing ten (10) soil descriptions covering approximately 16,899 acres of park lands. These soils generally consist of fan terraces from the groups of haplocalcids (loamy-skeletal) and calciargids (clayey-skeletal) that form deep, often well-drained soils.
- The last approximately 6,412 acres of the parks' soils are Floodplains, representing two (2) soil types. These are well-drained soils formed in alluvium or loamy colluvium or from landslides on slopes and stream valleys.
- For additional soil details for Maricopa County, see the survey at Soil Survey of Maricopa County, Arizona, Central Part (usda.gov).

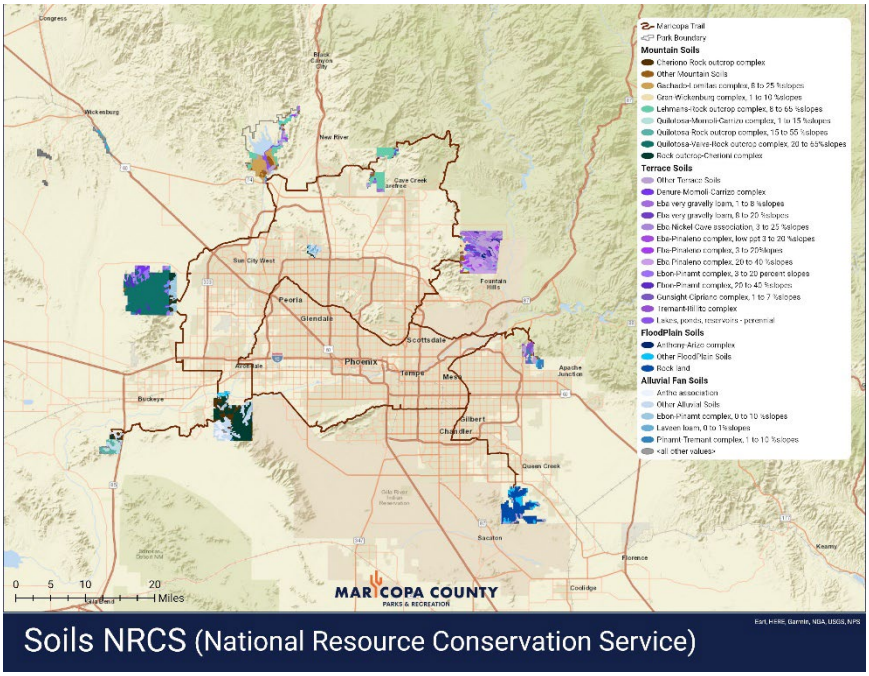


*Figure 19G – Park Soils from the NRCS. (Appendix pg. 94)*

# CHALLENGES, THREATS, AND OPPORTUNITIES

Erosion potential is high in areas with steep and rugged slopes (15 percent or greater), resulting in talus and alluvium deposits at the base of mountains and within washes and alluvial fans. Water and debris are quickly transported to lower-lying areas during extreme flash floods. These

[79] The soil was derived from NRCS GIS data. However, the portion of Lake Pleasant outside Maricopa County was not provided and, therefore, was not calculated within the soil percentages.

areas are particularly vulnerable to severe flooding and debris flows after wildfires, which the presence of non-native grasses and forbs can exacerbate.[80]

Many of the parks' soils have established biocrust, which are threatened by anthropogenic disturbance. Biocrusts are soil layers mixed with algae, lichen, and fungus that take a long time to form, several to hundreds of years. It is an integral part of the desert ecosystem and essential to storing water and retaining soil with sparse plant cover. Cattle grazing and excessive off-trail activities can destroy these incredibly fragile biocrusts. Visit the USGS Science for a Changing World Biocrusts: The Living Skin of the Earth article at Biocrusts: The Living Skin of the Earth (usgs.gov).

Opportunities for outreach and education through the Interpretive Ranger programs interface will assist in educating visitors about preserving the parks' geological features. Telling history should deter most visitors from damaging or destroying these timeless features. Arizona has a rich mineral endowment, and the geologic conditions that created the parks have led to historic mineral exploration activities. These exploration activities have created abandoned crevices, cave openings, and disturbances that pose hazards for park visitors. Closing these abandoned caves and crevices, restricting access using fencing and berms, as well as outreach and education through programs and Ranger interface, will assist in teaching visitors to avoid abandoned mines.

# GOALS, OBJECTIVES, AND STRATEGIES

## GOAL 4.4. PROTECT AND IDENTIFY GEOLOGICAL FEATURES

1) **Objective 1.** Identify geological features and provide educational opportunities.
   a) Short-Term Strategies
      i) Encourage local universities and the Arizona Geological Survey to research the parks' geology.
      ii) Develop mapping, signage, and kiosks to display the parks' geological features and history.
      iii) Provide educational programs about the parks' geological timeframe and features.
      iv) Monitoring will help to minimize impacts on geological features.
      v) Collaboration with the Arizona State Mine Inspector, BLM, and F.S. to fund and execute mine closure efforts.
2) **Objective 2.** Protect the parks' geomorphic features.
   a) Short-Term Strategies
      i) Manage the trail system and prevent erosion in the wash and water crossing areas.
      ii) Encourage local universities to research the parks' geomorphology.
      iii) Provide educational programs that teach the importance of the biocrust, geological features, and geological history.

[80] For example, Post-Wildfire Debris-Flow & Flooding Assessment: Coconino County, Arizona | *AZGS Document Repository*, OFR-17-06

# HYDROLOGY

Hydrology plays a vital role in desert habitats which often receives less than 11 inches of precipitation per year. In addition, the natural areas within the region play a significant role in rainwater distribution and groundwater recharge, so when developing these areas, it is vital to retain the natural habitats and character that perform these necessary ecological functions.

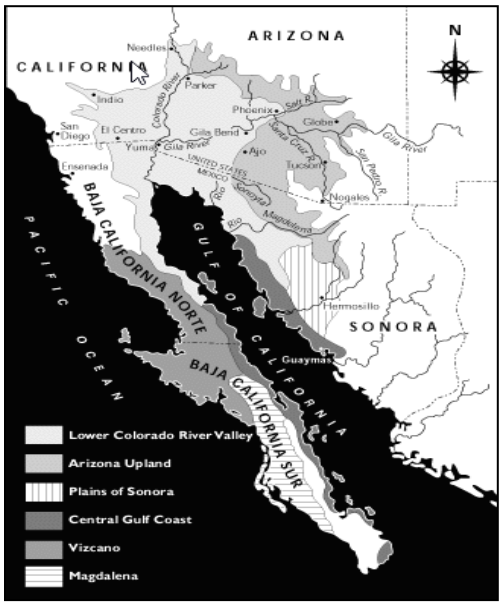


*Figure 20. Sonoran Subdivisions*
*Source The Institute of World Politics.*

# OVERVIEW

The Arizona Upland subdivision borders the Lower Colorado River Valley subdivision (Figure 20). It occurs primarily on elevational slopes 980 to 4,000 feet above sea level (ASL). It merges with interior chaparral or semi-desert grassland. The AZ Upland subdivision receives more precipitation than the other Lower Colorado Valley subdivision, with average annual precipitation between eight (8) and 16 inches. The dominant vegetative species in Lower Colorado desert scrubland areas and low woodland habitats are blue and foothill Palo Verde, ironwood, mesquite, and catclaw acacia trees. Cacti are extremely important in this subdivision, including saguaro, organ pipe, cholla, and barrel cacti (Brown, 1982).[81]

Hydrology in Arizona is divided into two (2) categories: surface water and groundwater. Surface water includes streams, rivers, lakes, and reservoirs. Groundwater is all water stored underground in subsurface aquifers.[82]

[81] Brown, D.E. (1982) Biotic Communities of the American Southwest - United States and Mexico | Resolution Copper Project and Land Exchange Environmental Impact Statement. Retrieved from: https://www.resolutionmineeis.us/documents/brown-biotic-communities-southwest-1982

[82] Arizona Water Factsheet Maricopa County (December 17, 2021). University of Arizona Water Resources Research Center. Retrieved from: https://wrrc.arizona.edu/sites/wrrc.arizona.edu/files/attachment/Maricopa-County-Water-Factsheet.pdf.

The laws that protect groundwater are different from surface water protection, although they are physically connected. The Arizona Department of Environmental Quality (ADEQ) enforces federal environmental standards for water quality. Arizona Department of Water Resources (ADWR) oversees groundwater and surface water use, which are legally distinct. The state has

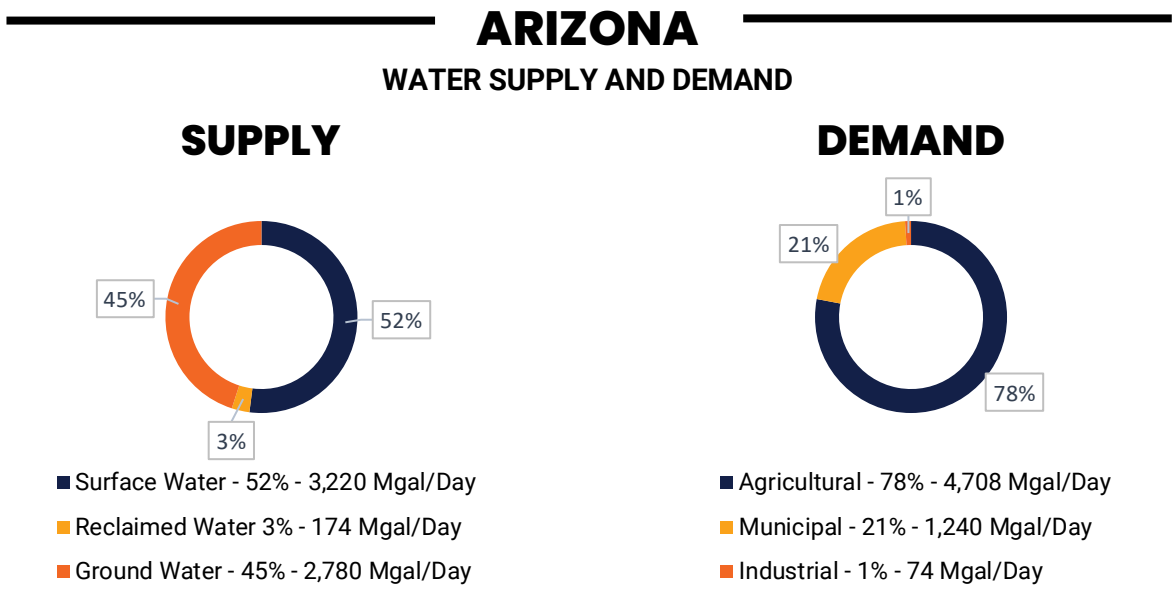


*Figure 21 . Arizona Water Supply and Demand. Source: University of Arizona Water Resources Research Center*

divided high water use areas into Arizona Management Areas (AMAs), and the ADWR regulates groundwater more strictly in these AMA areas.[83] Figure 21 shows the supply and demand for surface and groundwater, in which high demand from agriculture is 78 percent, with 21 percent (21%) from municipal and one percent (1%) from industrial.

[83] University of Arizona College of Agriculture and Life Sciences Cooperative Extension Arizona Fact Sheet Maricopa County. Retrieved from: https://wrrc.arizona.edu/sites/wrrc.arizona.edu/files/attachment/Maricopa-County-Water-Factsheet.pdf

Phoenix Metro area is located within the Phoenix AMA; however, parts of northeast Maricopa County are within the Harquahala AMA. In addition, some southern and southeastern regions are located within the Pinal AMA (Figure 22). The Sonoran Desert's annual precipitation averages three (3) to twenty (20) inches (76 to 500 mm) with substantial variability in timing and quantity.[84]

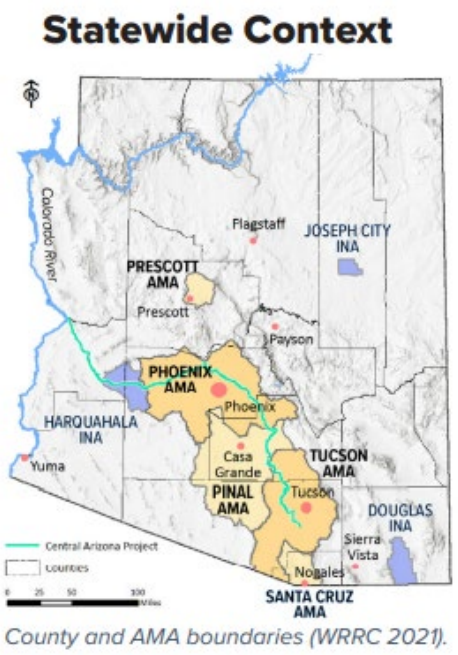


*Figure 22. Arizona Managmenent Areas (AMA's)*

Maricopa County Parks' mountain elevation and topography aids in the distribution of stormwater. Rainfall flows from the higher elevations at the top of the mountains, taking the path of least resistance with forces of gravity, flowing or rushing through the drainages and down the bajadas to the alluvial fans and eventually reaching the rivers, streams, and surrounding lowlands. Native vegetation helps slow the water flow and holds soil in place, aiding in groundwater recharge, especially in these lower flat areas; many native plant species can purify or clean water by removing toxins. This is especially true of wetland plants. Natural springs and tanks throughout the park systems can retain water into the summer months, helping groundwater recharge and providing water to wildlife when it is scarce. Principle rivers and streams within Maricopa County include the Hassayampa, Verde, Gila, and Salt rivers. However, the Verde River is the only perennial river throughout the region.[85]

Six (6) of Maricopa County's parks (ADRP, EMRP, LPRP, WTRP, STRP, HRP) currently rely on groundwater for park operations and public consumption; these deep-production wells depend on water table depths. Continued groundwater pumping may decrease water availability or lower the groundwater depth so significantly that existing infrastructure would become obsolete. Between 2016 and 2021, new facilities and remodeling of park amenities have improved water-use efficiency. MCPRD will continue to utilize the latest technology to ensure good stewardship of these finite resources.

# CHALLENGES, THREATS, AND OPPORTUNITIES

It will be challenging for the Parks to protect riparian habitats, such as those found at SCRCA and HRP, which have a hyporheic zone that runs beneath and alongside their stream beds. These hyporheic areas strongly influence stream ecology, biochemical cycling, and water temperatures. The zone flow dynamics and behavior are essential for surface water/groundwater interactions and fish spawning, among other processes.[86] These areas are

[84] US National Park Service Sonoran Desert Inventory & Monitoring Network – *Sonoran Desert Ecosystems*. Retrieved from: https://www.nps.gov/im/sodn/ecosystems.htm#:~:text=Annual%20precipitation%20in%20the%20Sonoran%20Desert%20averages%20from,islands%2C%20with%20a%20sizable%20proportion%20occurring%20as%20snowfall.

[85] Are there many perennial rivers in Arizona? | *Friends of the Verde River.* Retrieved from: https://verderiver.org/.

[86] H. Maurice Vallett, Stuart G. Fisher, Nancy B. Grimm, and Phillip Camill (March 1, 1994). Vertical Hydraulic Exchange and Ecological Stability of a Desert Stream Ecosystem. Ecological Society of America (ESA). Retrieved from: https://esajournals.onlinelibrary.wiley.com/doi/abs/10.2307/1939557

crucial for the endangered and threatened species' survival, and adequately managing these areas is essential since there are known endangered aquatic species at both parks within these zones.

Protecting the county's water resources, tanks, and riparian habitat will be challenging as the developing communities alter or manipulate the natural water flow surrounding the parks. For example, rainfall flows naturally through the washes, bajadas, and alluvial fans, and water flows from these areas to the rivers, including Salt, Verde, Hassayampa, and Gila Rivers. In the flow process, these pathways fill the ponds, pools, reservoirs, and tanks where water naturally accumulates, providing water to wildlife during the dry seasons.

Another challenge will be managing invasive plants growing in the washes and rivers, altering the hydrology, causing flooding, and overtaking native riparian vegetation.

Development can threaten natural pathways when manipulated and replaced by concrete channels that push the water flow away from developments faster. This action removes the natural ability of water to fill wildlife tanks and to be absorbed through the vegetation and soil to replenish the groundwater table.

Maricopa County Parks has the opportunity to create wildlife watering ponds or catchments and bring wildlife closer, which provides wildlife viewing experiences to park visitors. The parks have recently developed new water catchments that are "naturalized" and will provide habitat and a water source to a suite of species, including frogs, insects, and mammals at WTRP and CCRP. The parks also partner with the Arizona Game and Fish Department (AZGFD) to provide artificial water catchments to benefit the wildlife and enhance visitors' park experience with wildlife viewing. However, older artificial catchments are deteriorating and require renovation. AZGFD recently developed a more sustainable artificial water catchment design made with polyethylene and PVC pipes: a two-part storage unit with an underground tank that collects and stores rainwater and has separate surface water storage for wildlife. The surface storage tank also has a shade structure to minimize water evaporation. The caveat is that these structures are for larger mammals and do not provide naturalized ponds for the larger suite of species. So, they are best for larger mammals, especially during severe droughts.
Wildfires threaten natural habitats as they incinerate vegetation that would naturally have slowed the flow of water, and after wildfires occur, they leave large burn scars. In addition, there is often a high potential for erosion and blowouts in areas where the trails intersect with drainages. These areas can become a safety hazard for trail users. For post-wildfires, trails need monitoring for possible threats and practical solutions to mitigate impacts, including trail closures during post-fire rain events.[87]

Rainwater is absorbed through the topsoil and into the bedrock to replenish the water table (especially in riparian areas). However, in the mountains, where the water table is hundreds of feet down, the relatively impermeable bedrock at or near the surface allows only a minimal amount of percolation to replenish the water table. As a result, flash flooding can occur in mountain range areas.

[87] Youberg, A., Neary, D.G., Koestner, K.A., & Koestner, P.E. (2013). Post-wildfire erosion in the Chiricahua Mountains. *U.S. Department of Agriculture Forest Service*. https://www.fs.usda.gov/treesearch/pubs/44460.

Opportunities to offset hydrological challenges and threats include working with partners to develop more natural or hybrid flood control measures to ensure a more natural flow of rainwater, increasing land preservation of riparian areas, washes, and bajadas, and buffering our natural area parks that will provide wetlands, basins, and tank preservation supporting groundwater recharge and natural reservoirs for wildlife. In addition, we have opportunities to continue to work with our partners at AZGFD to develop artificial wildlife catchments that are auto-refilled during drought months. However, these types of reservoirs are artificial and will only serve the larger wildlife species. We are also working with our partners to develop ways to provide water to wildlife during droughts when the reservoirs are empty, acquire more natural lands along the riparian corridor, and buffer our current natural areas.

# GOALS, OBJECTIVES, AND STRATEGIES

## GOAL 4.5. PROTECT HYDROLOGICAL FUNCTIONS, INCLUDING SURROUNDING COMMUNITIES

1) **Objective 1.** Protect water quality and availability, especially in high-quality areas with high biodiversity.
    a) Short-Term Strategies
        i) Work with the Maricopa County Flood Control District to identify important hydrological and hyporheic areas, prioritize protection, and improve water quality and quantity.
        ii) Work with partners to protect the riparian and wash pathways amid the development. Use innovative engineering solutions with natural and or hybrid flow control features.
        iii) Manage invasive species affecting water flows in the riparian and wash habitats.
        iv) Work with partners to preserve the necessary priority washes, bajadas, and alluvial fans and provide linkages and water tanks for the native wildlife.
        v) Create and or update deteriorating artificial ponds. Create "naturalized" wildlife waters with educational kiosks bringing wildlife into view for park visitors.
        vi) Work with partner agencies to improve water availability, such as artificial water catchments for severe droughts in the more rugged habitat.

2) **Objective 2.** Mitigate wildfire impacts to prevent erosion.
    a) Short-Term Strategy
        i) Ground truths burn scars, especially where trails intersect the washes. Identify and map areas that may become erosion hazards (steep slopes where trails and washes intersect).
        ii) Close trails for public safety during significant rain events if deemed hazardous and continue to monitor trails. Park staff will mitigate erosion areas by building the trail, adding features to prevent trail erosion, and planting native species for long-term prevention.

# LIGHTS, SOUNDS, AND VIEWSHEDS

Maricopa County's once-remote parks provided a buffer for humans and wildlife to escape the lights and sounds emitted from urbanization, providing a viewshed that blocked civilization. However, as the population grows, these viewsheds are not providing the shield they once did, and the light and sound pollution are getting closer. Lights, sounds, and views can affect animals and people alike, and in this chapter, we will discuss their impacts and ways to mitigate them.


*The starlit sky and milkyway as seen with no light pollution, taken at Bryce Canyon National Park 2022.*

## OVERVIEW

Ecologists have found that artificial light levels affect night sky views, reducing the visibility of astronomical constellations. Death can result from artificial light for certain taxonomic groups, such as migratory birds and terrestrial and aquatic ecosystem inhabitants that become disoriented by the light.[88] Also, some prey becomes more accessible to locate since artificial light illuminates them. This light also disrupts the predator's ability to view away from the light, which can cause them to miss their prey or become prey to another predator. Artificial lighting from urban areas alters animals' diurnal and nocturnal patterns, affecting their foraging, hunting, and movement success. The increased use of artificial night light now impairs our view of the universe for humans. Light pollution adversely affects our environment, safety, energy consumption, and health. View the map here: https://maps.dot.gov/BTS/NationalTransportationNoiseMap/.

[88] Longcore, T. & Rich, C. (May 2004 Vol2. Issue 4). Frontiers in ecology and the environment: Ecological light pollution. Ecological Society of America (ESA). Retrieved from: https://esajournals.onlinelibrary.wiley.com/doi/full/10.1890/1540-9295%282004%29002%5B0191%3AELP%5D2.0.CO%3B2

Sounds known as noise pollution can affect humans and animals, altering sleep patterns, performance, and mood. According to the World Health Organization, noise pollution is considered the second-largest environmental cause of health problems just after the impacts of air pollution.[89] Figure 23 shows the transportation noise pollution. The decibels emitted under the range of 69.9 are represented by the colors of pink (60-69.9 db), red (55-59.9 db), orange (50-54.9), and yellow. The least emitted are under 49.9 decibels. The purple and deep blue areas emit over 70.0 decibels or greater. Many of these deep purple/blue areas include airplane traffic sounds.

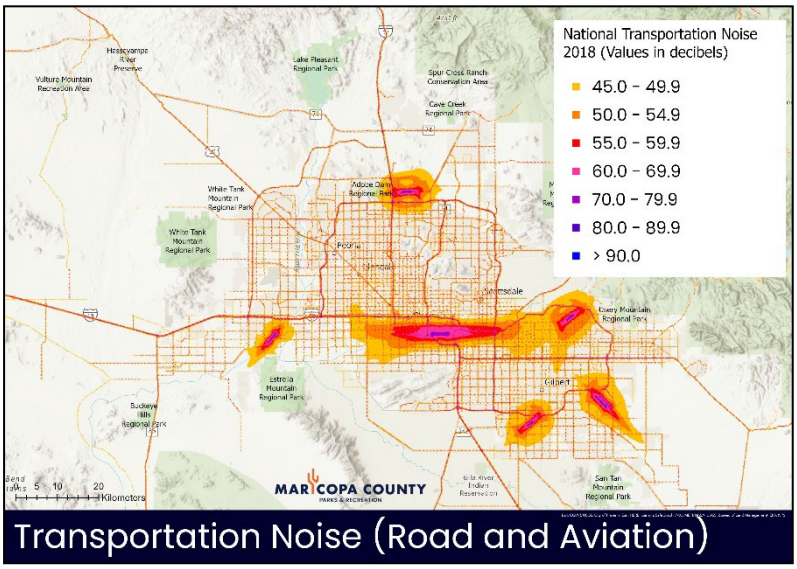


*Figure 23. National Transportation Noise. (Appendix pg. 85)*

It is also essential to consider that each park and its habitat's soundscape is unique and forms a critical part of the experience of being in those environments. The soundscape connects us to the qualities that define these places as unique.

Viewsheds can also affect wildlife and humans alike. Although the parks are now considered part of the wildland-urban interface (WUI), viewsheds are essential for allowing humans and wildlife to believe they are far from civilization in mountain parks and natural wildlands. Natural formations can shield the viewshed and hide the surrounding development views, sounds, and lights.

# CHALLENGES, THREATS, AND OPPORTUNITIES

It can be challenging to provide a viewshed free from urbanization using the landscape features as they become subdivisions. For example, many parks have natural viewsheds, hills, and mountains that block their view from development and protect them from noise and light pollution. But as each Park becomes engulfed in urban expansion, this can all change. Working with partners to foresee the future and using technology and knowledge to plan better mountainsides, open space development, and acquiring buffers for each park can mitigate some of these effects.

Noise and light pollution threats exist in the form of flyovers by commercial and private aircraft and the presence of motor vehicles. Loud, consistent noises can disrupt wildlife communications and cause stress to wildlife. As the population grows, so do sound decibels

[89] Kukreja, R. Effects of noise pollution on human health and animals. Conserve Energy Future. https://www.conserve-energy-future.com/effects-noise-pollution-humans-health-animals.php

emitted and light amount/duration, and they both will alter visitor experiences and negatively impact wildlife species. Therefore, it will be essential to establish guidelines to maintain positive visitor experiences and protect wildlife species from these increased sounds and light. Opportunities to work with other agencies that promote the Dark Sky initiative's ideals and reduce noise pollution can help. The National Park Service's Natural Sounds program has a management and community engagement model on this issue.[90]

## GOALS, OBJECTIVES, AND STRATEGIES

### GOAL 4.6. PROTECT THE PARKS FROM NOISE AND LIGHT POLLUTION AND PROTECT THE VISITOR'S NATURAL VIEWSHED

1) **Objective 1.** Reduce noise and light pollution.
   a) Short-Term Strategies
      i) Implement and promote education programs regarding the impact of light and sound emissions on natural landscapes.
      ii) Adopt and implement the Dark Skies Initiative and promote the National Park Service (NPS) Sounds Program.
   b) Long-Term Strategies
      i) Continue utilizing natural landscape features, rock structures, hills, and mountains (basin and range) to buffer and block light and sound from reaching remote natural areas and create a natural viewshed.

# CULTURAL & HISTORICAL RESOURCES

## OVERVIEW

Many archaeological and cultural sites and isolated artifacts reside within the Maricopa County Park system. These sites range from Western Archaic, Hohokam, and Yavapai to Euro-American. These cultural resources feature prominently in the stories of the American West – and the physical remains of these historical events are preserved and interpreted by Maricopa County Parks.

Numerous archaeological and historical sites and isolated artifacts are in the Maricopa County Park system. These sites preserve a diverse cultural continuum, from several Native American (Western Archaic, Hohokam, Patayan, and Yavapai) cultures to Euro-American history, encompassing thousands of years of human history in the region. These cultural resources feature prominently in the stories and embody the spirit of the American West.
Native American archaeological sites within the Maricopa County parks represent a long span of use and habitation. They are expressed through isolated artifacts and artifact scatters, groundstone, lithics and lithic procurement areas, pithouse village sites, agricultural features, and extensive petroglyph concentrations. Historic Euro-American sites preserve the region's mining, homesteading, ranching, and tourism history. Historic sites within the parks include several historic trails, isolated artifact scatters, homestead sites, numerous corrals, other

[90] U.S. National Park Service. Why Sounds Matter - Natural Sounds. Retrieved from: https://www.nps.gov/subjects/sound/soundsmatter.htm.

ranching features, and remnants of the dude ranch and resort operations. Two historic and modern gravesites are found within the boundaries of the county's regional parks.
Many of these archaeological and historic sites are regionally and potentially nationally significant. At least two landmark areas are listed on the Arizona Register of Historic Places, and many are potentially eligible for the National Register of Historic Places (NRHP). Several historic trails/routes have been officially recognized by the Arizona State Historic Preservation Office (SHPO) as landmark trails. The Parks Department has offered interpretation for several sites through publications, wayside exhibits, and ranger programs. The extensive cultural resources within the park system will be addressed in more detail in individual park Natural Resource Plans or a separate Cultural Resource Plan to be developed later.

# CHALLENGES, THREATS, AND OPPORTUNITIES

One challenge is that the parks need more baseline data. While past surveys have been completed in various sections, the data could be more organized, and the opportunity to find additional archeological sites is high. Other challenges and threats include more staff knowledge of the archeological locations. In addition, there is no consistent process for identifying potential resources that could lead to impacts and damage to resources. The proximity of sites to public areas and lack of enforcement are challenges and opportunities that should be addressed, leaving the spaces open to an increased risk for vandalism, pothunting, etc. And a need for dedicated law enforcement to focus on resource violations.

The parks have complex and often rugged terrain with opportunities for discovering artifacts dating back to the Paleo-Indian and Archaic cultures; most found are those of the Hohokam. Petroglyphs, dwellings, and other artifacts can be found throughout the parks. A significant threat to these artifacts includes the public going off-trail and causing damage to them; this includes traffic and graffiti.

Beyond petroglyphs, our parks have other historical artifacts of generations past, including historic dwellings. Protecting these historic and cultural resources is essential. In addition, identifying their location on maps can help with future monitoring.

While numerous archaeological surveys have been completed over the years, comprehensive surveys have yet to be compiled into ARC-GIS-based files. Cultural resource surveys within the parks need to be updated, and many were project-driven and limited to areas directly impacted by park development. Therefore, there are opportunities to organize the data and map the added cultural and historic sites, especially isolated occurrences; this could add further understanding to the cultural history preserved in the parks. Staff expertise and resources limit the protection of these cultural and historical sites.

# GOALS, OBJECTIVES, AND STRATEGIES

## GOAL 4.7. IDENTIFY AND PROTECT CULTURAL AND HISTORICAL RESOURCES

1) **Objective 1.** Identify, map, and protect the park's cultural and historical features.
   a) Short-Term Strategies:
      i) Identify parks that need further mapping of archeological areas using GIS.
      ii) Using GIS-based mapping, establish baseline data on historical and cultural locations.
      iii) Protect archeological and cultural resources by educating the public about each park's cultural resources and incorporating survey data from previous surveys.
      iv) Consult a qualified archaeologist to perform comprehensive archeological surveys before development and construction.
      v) Locate all mining areas and follow Arizona State Mining regulations.
      vi) Identify existing and potential designations at the National Register of Historic Places (NRHP, AZ Register of Historic Places, Historic Trail, etc.).
      vii) Identify the significance of resources and Traditional Cultural Properties (TCPs) to culturally affiliated tribes through consultation.
      viii) Provide programs that encourage responsible use and educate about the park's cultural resources and history.
      ix) Continue partnership with the Arizona State Park's Site Steward Program to monitor sites.
      x) Continue to work with partners that develop policies, guidelines, and data to help conserve and protect significant cultural resources.
      xi) Implement mitigations based on monitoring data.

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*Agencies working together to revitalize an area within McDowell Mountain Regional Park that was burned and scarred by the Diamond wildfire in 2023.*

# CHAPTER 5

# RECREATION, VISITOR USE, AND AGENCY COLLABORATION

Maricopa County Parks has become a leader in providing open space and high-quality natural remnant habitats. The parks have hundreds of miles of trails, campgrounds, and nature centers, providing diverse nature-based recreational opportunities. Our quality park system and facilities have many recreational options that motivate increased visitation. Maintaining optimum use without negatively impacting our natural resources is necessary to continue using our natural areas for current and future generations. Understanding the balance between the park's capacity for visitor use and the ecosystem impacts of heavy traffic on the natural areas will be crucial since the parks are essential to local communities' mental and physical health.

It is essential to understand each park's origins and management agreements, as each comes with different requirements for recreation and oversight. The lands were acquired through various processes, including land acquisitions, collaborative partner acquisition, BLM patent/leases, and conservation easements. Figure 24 shows the park's current status: origin/ownership, lease, patent, or acquisition.

Most Maricopa County Parks originated as Recreation and Public Purposes (RP&P) patents or became patents after leasing for 25 years based on mutual agreement. RP&P patents and

leases were created under the Title RP&P Act Title 43 of the code of federal regulations (43 CFR). Learn more about RP&P patents and leases.[91]

The parks' agreements include conservation and management as a requirement, and the park staff use best management practices to preserve and maintain the parks' health, biodiversity, and sustainability.

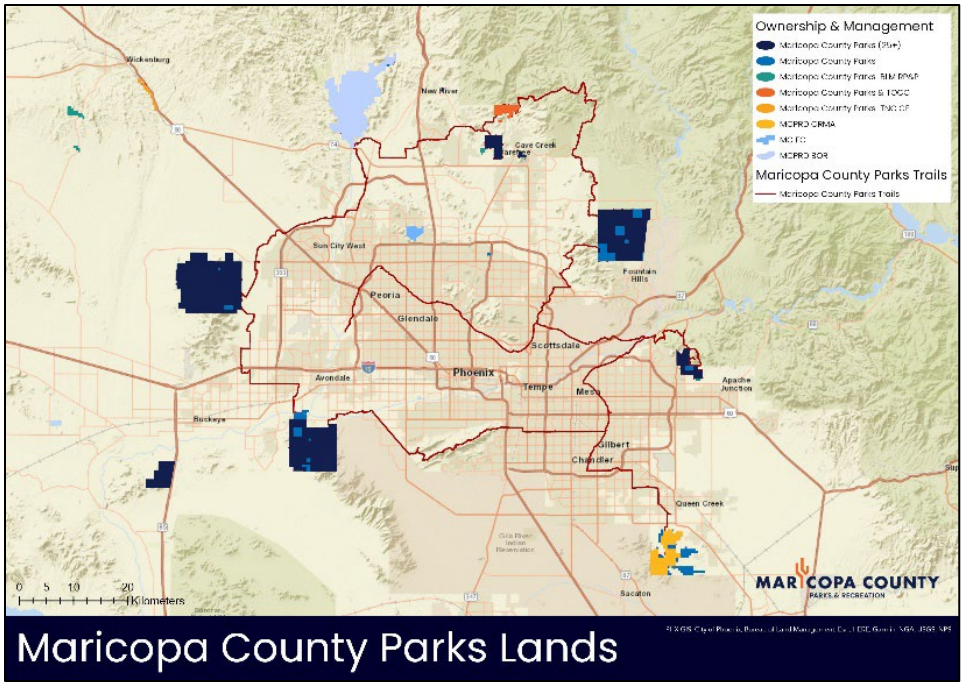


*Figure 24 . Maricopa County Parks Land Ownership and Agreements (Appendix pg. 98))*

Conservation Easements, including the one at HRP, are part of a cooperative agreement between MCPRD and The Nature Conservancy (TNC). MCPRD is responsible for overall maintenance, management, and interpretation. The TNC is an advisor on protecting the conservation values of the property. Part of HRP is burdened with a conservation easement held by TNC to limit the property's development in perpetuity. The remainder of the property is leased and encumbered upon transfer to Maricopa County.

Partner Collaborative Acquisition - three (3) government agencies purchased SCRCA: The Town of Cave Creek, Arizona State Parks, and Maricopa County Parks. In this unique partnership, Arizona State Parks assisted in buying land. In addition, the Town of Cave Creek taxed itself and provided an operating budget annually so the County could manage the property.

Land Acquisition - land that is purchased to help increase the park size for various reasons, including buffering the park's conservation area, improving recreation opportunities, or connecting park systems.

Cooperative Management Agreement - STMRP is an example of increasing the park size; the parks purchased some "fingers" or adjacent parcels.

[91] Recreation and Public Purposes Act Information Sheet, Bureau of Land Management. Retrieved from: https://www.blm.gov/sites/blm.gov/files/LandTenure_RecandPublicPurposesAct_InfoSheet.pdf

# RECREATION AND VISITOR USE

## OVERVIEW

Great weather, scenic beauty, and numerous recreational opportunities are why people visit or move to Maricopa County; our natural open space areas are essential to our economy. Providing better visitor experiences is fundamental to maximizing benefits for park users while protecting natural and cultural resources. Maricopa County Parks had almost 2 million (1,704,200) visitors in 2019. The parks offer something for everyone: hiking along a barrier-free trail, enjoying the scenic Sonoran Desert views on horseback, ranger-led natural and cultural resource programs, or peddling rigorously up a trail on a mountain bike.[92] All of Maricopa County's parks are within a 45-minute drive from downtown Phoenix. To view park locations, visit the website here. Maricopa County Parks is a fee-based economic system where the revenue generated supports most staff salaries and daily operations.

*Moon rising over Spur Cross Ranch and Conservation Area*

As part of the System Master Plan, the parks utilize 10% (or less) of each park area for recreational development. That allows for the preservation of 90% of natural habitat for conservation purposes. Maricopa County Parks is one of the few parks that preserve such a large amount of land in its natural state.

To correctly manage our resources, understanding visitor use and needs are fundamental. Since 2000, the MCPRD has partnered with ASU to complete a visitor use study and updates the data every four (4) years. The most recent survey conducted, "Maricopa County Parks Visitors Study Final Report," in 2018-2019, included eight (8) most popular parks within the greater metro Phoenix area and discovered that regional parks are becoming more popular for nearby residents. The most participated activities among Maricopa County Park visitors, in order of magnitude, are trail hiking (76.3 percent), walking for pleasure (48.8 percent), photography (29.4 percent), nature experience (23.5 percent), watching wildlife (20.1 percent) and utilizing the nature center (16.6 percent).[93]

The 2019 Visitor Use Report disclosed these park highlights.

- CCRP had the highest percentage of returning visitors at 52.4 percent (52.4%).
- Most visitors were day-trippers.

[92] 2019 Attendance County Spreadsheet (internal document), Maricopa County Parks and Recreation Department.

[93] M. Budruck, Ph.D., and M. Sampson, Maricopa County Parks and Recreation Department 2018-2019 Visitor Study, Arizona State University School of Community Resources and Development College of Public Programs. https://www.maricopacountyparks.net/assets/1/6/MCPRD_Visitor_Use_Study_2018-19_Final_ON_LINE_.pdf

- LPRP was the most visited park due to its 10,000 surface acres of water, receiving 40 percent (40%) of the total visitors. LPRP visitors can also utilize concessionaire Scorpion Bay Marina for restaurants and aquatic-activity rentals.
- WTRP was the second-most visited park, with 18 percent visitation. It is the largest park at just under 30,000 acres and has exceptional biodiversity and topography.[94]

Another recreational activity at the parks is hunting, allowed seasonally with specific methods/equipment and managed/enforced by AZGFD. Hunting is permitted at these parks: WTRP, EMRP, LPRP, and MMRP; individuals hunting must declare their intent to a park entry station attendant or other employees. The permitted hunting method is archery only and some small game (shotgun with birdshot only) during specified hunting seasons.

In addition to visitor use, it is essential to understand the parks' economic impact on the region. The 2019 Economic Impact Study performed by ASU was the second study completed and found that recreation spending by park visitors at the eight (8) parks and the operating budget for the nine (9) regional parks are significant drivers of economic activity in the region and are a robust instrument of economic activity. The study shows that 2019 there were 1.67 million visitors, of whom 69.4 percent (69.4%) were residents and 30.6 percent (30.6%) were non-locals (outside the general areas or state).[95] In the last four years (2016-2019), the parks had an average visitor increase of one point three percent (1.3%) per year, with a 40 percent (40%) increase in visitation since the COVID-19 pandemic began in spring 2020. The number of park visitors will likely increase concurrently as the Phoenix metro population grows.

Other 2019 Economic Impact Study highlights:

- The Park visitors spent approximately $82.74 million on the local economy.
- The Maricopa County Parks and Recreation System generated $93.36 million (from $82.74 million in visitor expenditures and $10.63 million in MCPRD's overall operating expenses) in 2019.
- The shared impact of visitor spending and operating costs on the local economy has resulted in $117.77 million in output, $69.87 million in the gross regional product (value-added), $45.61 million in labor income, and 948 jobs (full/part-time).
- Furthermore, the shared impact has generated $9.5 million in federal and state/local tax contributions.
- For each dollar invested in net operating costs by MCPRD in the eight parks, $4.85 is generated in resident income. In other words, for every dollar invested in the eight regional parks, a resident receives the economic benefits of $4.85 in employee compensation and proprietor income.[96]

[94] M. Budruck, Ph.D., and M. Sampson, Maricopa County Parks and Recreation Department 2018-2019 Visitor Study, Arizona State University School of Community Resources and Development College of Public Programs. Retried from: https://www.maricopacountyparks.net/assets/1/6/MCPRD_Visitor_Use_Study_2018-19_Final_ON_LINE_.pdf

[95] D. Chhabra, Ph.D., and L, He, Ph.D., 2019 Maricopa County Parks and Recreation System Report: Economic Impact of the Maricopa County Parks and Recreation System, Arizona State University School of Community Resources and Development Watts College of Public Service and Community Solutions. Retrieved from: https://www.maricopacountyparks.net/assets/1/6/2019_Economic_Impact_Maricopa_County_Parks_and_Recreation_System_ASU_Report_-_Final.pdf

[96] D. Chhabra, Ph.D., and L, He, Ph.D., 2019 Maricopa County Parks and Recreation System Report: Economic Impact of the Maricopa County Parks and Recreation System, Arizona State University School of Community Resources and Development Watts College of Public Service and Community Solutions. Retrieved from: https://www.maricopacountyparks.net/assets/1/6/2019_Economic_Impact_Study_Summary.pdf

In addition to recreational opportunities, the parks provide a variety of outdoor educational programs for all. The interpretive rangers and volunteers host these programs; they use "Core Identified" aligned programs (foundation subjects, i.e., plants, animals, health, fitness), which allows the park programs relevancy and consistency. All programs provided help visitors gain important information about the Sonoran Desert's value and the importance of its wildlife and natural and cultural resources. Also, programs are designed to incorporate the goals and objectives of natural resources.

# CHALLENGES, THREATS, AND OPPORTUNITIES

The Phoenix metro area's population is expected to become the 4th most populous city in the U.S. by 2020 (Phoenix has reached this population status during the creation of this document completed in 2023), and by 2030, the US Census Bureau estimates its population will reach six point three (6.3) million, overuse looms as one of Maricopa County Parks' most significant challenges.[97] The high demand may surpass the current staff's ability to monitor and protect natural and cultural resources within the park system. While the parks recognize the importance of providing residents and visitors with positive experiences and recreation opportunities, managing optimal park use while protecting natural and cultural resources will be challenging.

Maintaining sustainable visitor use in preparation for overcrowded parks may take time and effort. However, early planning may help mitigate negative impacts, such as understanding the visitor capacity and the limits of acceptable change.[98] Planning should involve allocating funds to hire and maintain adequate staffing to protect and manage the resources. It may include understanding the limits of acceptable change, fee increases, and limiting the number of visitors per day. It may also need to consider additional funding mechanisms.

As the population grows, the subdivisions and developments move closer to the parks. It will be difficult for the parks to manage and prevent these new communities from creating spider trails and other illegal activities. It will also be easier to accurately count the number of visitors with measures to validate usage, such as an iron ranger. Since the staff is predominantly funded by visitor use, this will be a loss to the park's budget but may be mitigated by working with the HOA to establish trails with an iron ranger. These activities will also affect the park's wildlife, light pollution, noise pollution, and viewshed changes.

Protecting wildlife from illegal hunting may become a more common threat as the boundaries become more accessible to the public through development, and poaching may become more common, affecting the park's sustainability and native biodiversity. In addition, more studies are required to understand the parks' game populations and herd sustainability needs - data is needed to determine game take allowances in the future.

We have the opportunity to educate the public and partners about the importance of our parks and the surrounding wildlands to promote wildlife habitat, ecosystem resilience, and other issues the parks currently face. Since not all visitors attend park programs, the opportunity to

[97] Phoenix, Arizona Population 2022, *World Population Review*. Retrieved from: https://worldpopulationreview.com/us-cities/phoenix-az-population

[98] Stankey, G.H., McCool, S.F., Stokes, G.L. (1984) Limits of Acceptable Change: A New Framework for Managing the Bob Marshall Wilderness Complex. Retrieved from: https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5346576.pdf http://winapps.umt.edu/winapps/media2/leopold/pubs/166.pdf

utilize different media outlets to provide outreach and education, including a website, social media, kiosks, and brochures, will be critical. By hosting natural resource programs and citizen science projects, the parks have an opportunity to create natural resource stewards, promoting volunteerism for managing our natural resources and citizen science programs.

# GOALS, OBJECTIVES, AND STRATEGIES

## GOAL 5.1. MANAGE SUSTAINABLE LEVELS OF VISITOR USE WHILE PROMOTING ENVIRONMENTAL AWARENESS AND COMMUNITY ENGAGEMENT

1) **Objective 1.** Understanding sustainable visitor use and the limits of acceptable change to provide positive recreation while preserving ecosystem health.
    a) Short-Term Strategies:
        i) Research and identify limits of acceptable change. Work with local universities to better understand visitor capacity for long-term natural and cultural resource sustainability.
        ii) Use social media and public outlets to educate the public on Leave No Trace principles and host informational programs discussing the benefits of the resources and their protection.
2) **Objective 2.** Prevention of illegal or unauthorized park use.
    a) Short-term Strategies
        I) Work with MCSO on park regulations and rules to address any issues
        II) New developed communities can prevent unauthorized trail use by addressing any expected impacts, such as unauthorized trails and park use. Work with adjacent developers to create solutions like a community trail with iron rangers.

## GOAL 5.2. ENHANCE THE PARKS STEWARDSHIP SYSTEM TO PROTECT NATURAL RESOURCES

1) **Objective 1.** Develop community stewards who love the desert and can help protect and maintain habitats by providing them with knowledge and understanding of the importance of nature.
    a) Short-Term Strategies:
        i) Create lifelong stewards and engage the public in natural resources, providing opportunities to participate in conservation efforts to manage the lands.
        ii) Strengthen the park's current programs by incorporating natural resource-aligned programs with stewardship and citizen science programs that encourage stewardship.
        iii) Develop and participate in national citizen science programs that provide biodiversity information for parks and other high-level research projects, including monitoring programs (Butterfly, bats, frogs, and invasive species).
        iv) Develop a robust natural resource stewardship program using citizen science programs providing educational information to engage the public and their support to help protect our natural areas and wildlife linkages.
        v) Work with partners to develop a public campaign to support wildlife habitat and linkage preservation.

# AGENCY COLLABORATION

A collaboration that includes communicating and coordinating with our many partners, state, federal, local government, conservation agencies, land trusts, and non-governmental organizations, will help move the goals, objectives, and strategies within this plan forward—for example, working together to create more robust and healthier communities throughout Maricopa County while preserving our natural areas, wildlands, and wilderness.

## OVERVIEW

Collaboration, coordination, and communication with our partners are vital to bridging the gap on many resource matters, promoting biodiversity, stewardship, and visitor use. Working with partners, we can collectively:

- Identify, prioritize, and preserve buffers, wildlife corridors/linkages
- Develop a land evaluation system to prioritize land parcels
- Preserve floodways, and conserve water quality and quantity
- Promote and create natural resource stewardship
- Develop land acquisition program and funding sources

## CHALLENGES, THREATS, AND OPPORTUNITIES

Amid the planned development and urbanization, preserving habitat blocks surrounding our wildlands, natural open space parks, and land that provide linkage corridors with the wildlands will be challenging. In addition, large-scale land acquisition throughout the county will be challenging for the parks to tackle alone, working with our partners to drive the initiatives for wildland preservation and land acquisition to protect and preserve our wildlands' wildlife corridors and natural/hybrid floodways.

Equally challenging is allocating preservation funds and initiatives to protect and preserve our state's biodiversity, wildlife linkages, and waterways. It may require state and federal leaders to create and pass legislation to maintain wildlife and hydrological function landholdings. It could be highly beneficial for MCPRD to retain corridors that connect the habitat blocks, utilizing the current washes protected under Section 404 of the Clean Water Act.

It may be challenging to align the park's objectives with all of our partners' objectives and facilitate data-sharing. Such as learned outcomes; what worked? What was learned and their adaptive strategies?

Threats from a variety of processes, such as illegal park use,  misuse, encroachments, unauthorized trails, invasive species, wildfires, and climate change, can all be brought to the public eye by working with our partners on education and outreach programs such as the Leave No traces, Desert Defenders, etc.

Land acquisitions and conservation easements are additional opportunities to consider preserving wildlife habitat, linkage, and connectivity, as they could help sustain biodiversity

within the parks. However, the most critical consideration is wildlife connectivity between existing habitat blocks, often via floodways.

# GOALS, OBJECTIVES, AND STRATEGIES

## GOAL 5.3. AGENCY COLLABORATION TO BUFFER NATURAL OPEN SPACE, ACQUIRE IMPORTANT NATURAL AREAS

1) **Objective 1.** Identify and protect critical remnant habitats necessary for biodiversity and linkages.
   a) Short-Term Strategies:
      i) Develop a prioritization list that will help decipher the important/priority lands for preservation and conservation to help protect and enhance parks' biodiversity, including critical aquatic habitats along the riparian corridors.
      ii) Coordinate with partners to develop a short-term list of the most wanted land parcels based on landscapes containing high-priority ecosystems with high biodiversity.
      iii) Identify and protect priority parcels and essential wildlife linkage(s).
      iv) Enter into agreements with partners when they are appropriate to manage resource efforts.
   b) Long-term Strategy
      i) Coordinate and support partners with projects that can aid in land acquisitions and conservation easements to protect wildlife habitats and linkages near the parks and other habitat blocks.
      ii) Collaborate with partners to develop a complete list of high-priority parcels, especially adjacent to the parks or in county areas that currently do not have parks.
      iii) Work with partners to identify funding to support wildlife linkages.
      iv) Work with BLM to acquire additional RP&P sites; refer to Chapter 2 of this document and Strategic System Master Plan.
2) **Objective 2.** Foster partnerships and intergovernmental collaboration, cooperation, and communication to protect and conserve natural open space.
   a) Short-term Strategy
      i) Encourage open space preservation that provides significant environmental benefits.
      ii) Develop natural resource-related partnerships that provide multi-jurisdictional benefits, including preservation, protection, restoration, and habitat enhancement.
      iii) Maintain regular communication among key partners to discuss, strategize, and support efforts to maintain regional biodiversity.
      iv) Assist leading partners and consultants in ensuring essential wildlife corridors, linkages, and habitats are identified, prioritized, and protected.
   b) Long-term Strategy
      i) Encourage and endorse development planning that promotes healthier communities using natural and hybrid flood control methods, GI, LID, and low unit-land ratio for housing.
      ii) Coordinate with planning and development of the county and local agencies to ensure environmental impacts are considered when developing new construction, primarily when affecting the natural open space areas.
      iii) Work with partners to support legislation to help with the land acquisition (similar to the Arizona Parks Initiative), support partners on creative funding to help with land acquisitions, and protect the wilderness areas and wildlands by buffering these areas.

## GOAL 5.4. COLLABORATION ON CONSERVATION AND HABITAT ENHANCEMENT.

1) **Objective 1.** Engage with our partners to protect and restore natural areas and wildlife habitats.
   a) Short-Term Strategy
      i) Continue to collaborate and communicate with CAZCA partners to promote the Regional Open Space Strategy (ROSS) goals being fulfilled at a regional level.
      ii) Continue to work with conservation agencies to promote conservation management efforts for lands within the region's natural areas.
      iii) Work with partners to protect biodiversity, wildlife corridors, and linkages.
      iv) Collaborate with partners to prioritize areas for ecological habitat enhancement to maintain the natural quality of the remnant natural areas and riparian habitats, especially wetlands, washes, springs, and tanks or aquatic habitats.
      v) Develop a Land Evaluation System that incorporates the FQA and other crucial natural landscape features by scoring them to help prioritize land parcels for preservation and recreation potential.

## GOAL 5.5. PROMOTE ECONOMIC BENEFITS AND IMPACTS OF NATURAL AREAS AND OPEN SPACE

1) **Objective 1.** Develop relationships to promote the benefits of natural open space.
   a) Short-Term Strategy
      i) Work with partners that have developed research protocols that explore the economic benefits of natural open spaces and visitor needs.
      ii) Preserve natural open space and existing hydrological functions (GI & LID).
      iii) Continue working with partners on economic impact surveys.

## GOAL 5.6. ENGAGE COMMUNITY INVOLVEMENT TO PROMOTE THE PROTECTION OF OPEN SPACE

1) **Objective 1.** Provide opportunities for community engagement.
   a) Short-Term Strategies:
      i) Work with partners in educational opportunities aligned with natural resource programs.
      ii) Develop a land stewardship program within select parks to promote volunteer liaisons that assist and help improve resource management and species monitoring.
      iii) Develop an I-Naturalist program to improve and provide current data for the park's ECO database.
      iv) Engage the public to use, learn about, and better understand the park's plant and animal communities.
   b) Long Term Strategy
      i) Maintain land stewardship programs for long-term natural resource management.

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# NATURAL RESOURCE APPENDIX

MARICOPA COUNTY
PARKS & RECREATION

41835 N. Castle Hot Springs Rd.
Morristown, AZ 85342
(602) 506-2930 • www.maricopa.gov/parks

# APPENDIX

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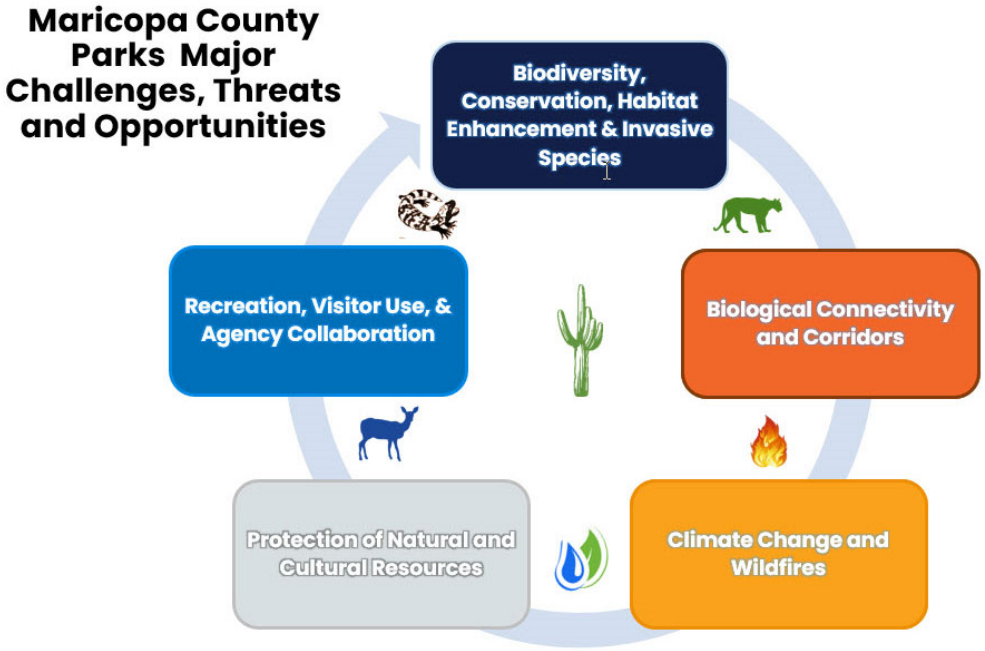
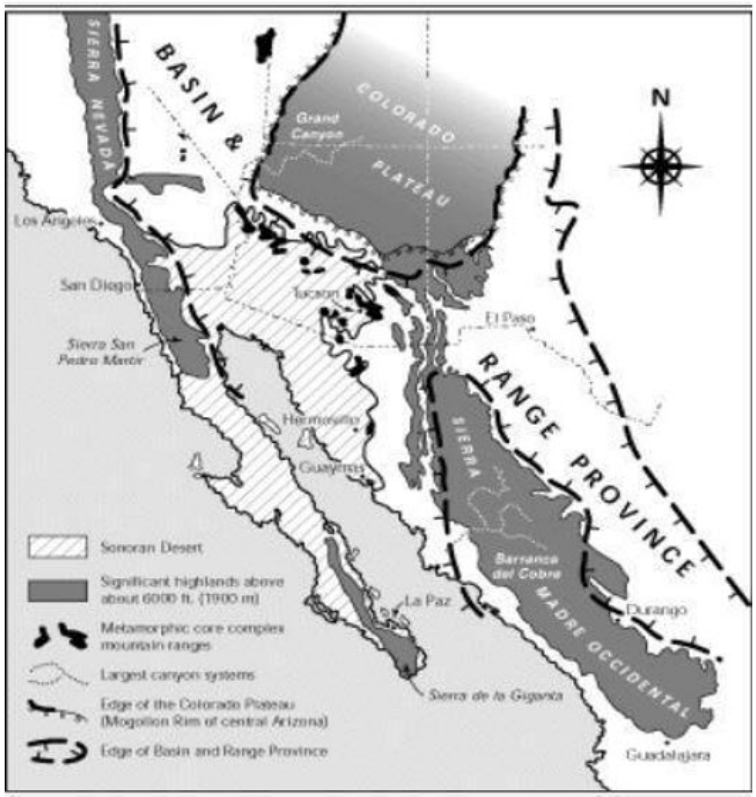
## FIGURE 1: Maricopa County Parks Major Challenges, Threats, and Opportunities



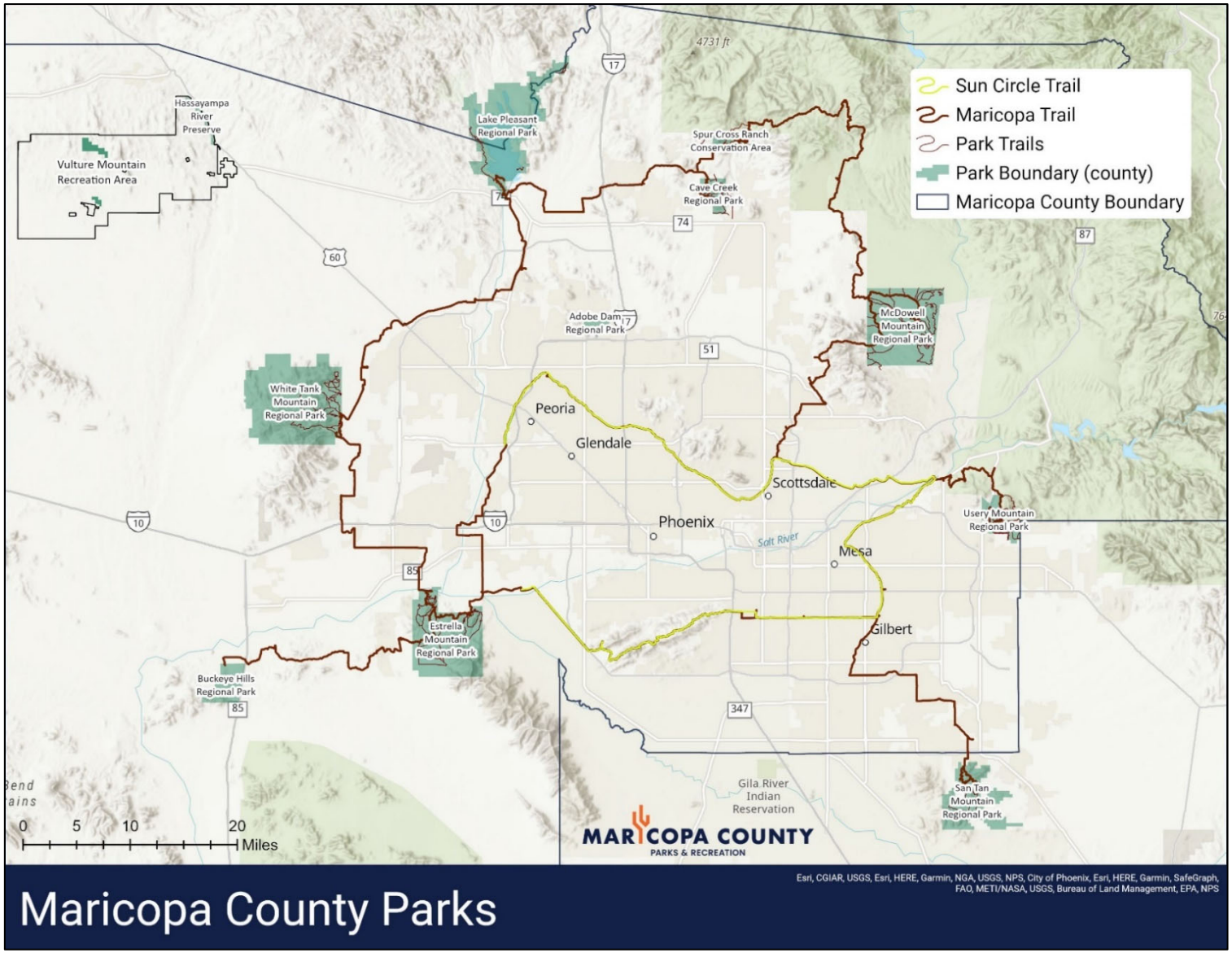




## FIGURE 2: Basin and Range Province

## FIGURE 3: Maricopa County Parks

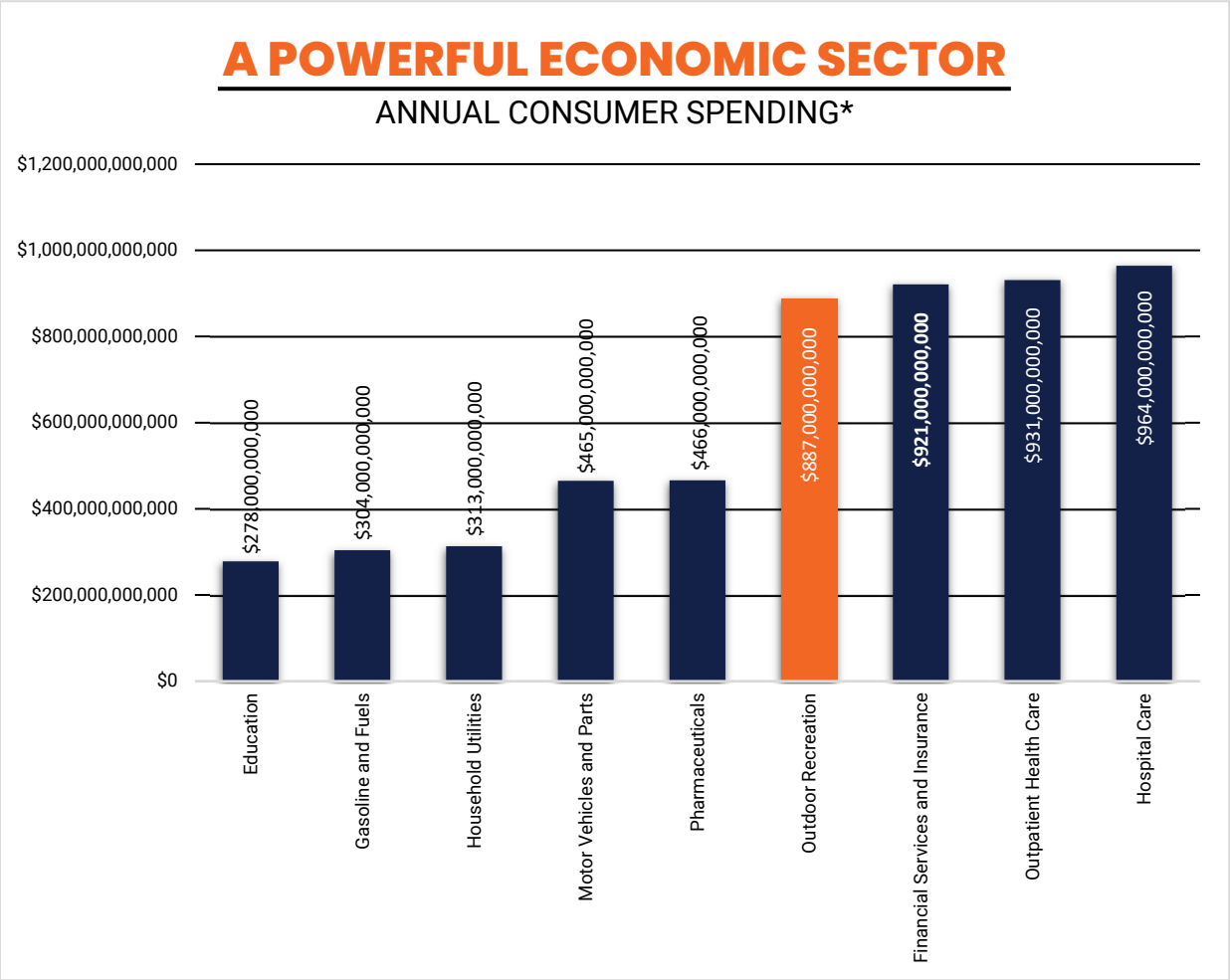
| MARICOPA COUNTY PARKS | ACRES | MAX ELEVATION ASL | MIN ELEVATION ASL |
|---|---|---|---|
| Adobe Dam Regional Park | 1,353 | 1,580 | 1,350 |
| Buckeye Hills Regional Park | 4,471 | 1,860 | 860 |
| Cave Creek Regional Park | 2,992 | 3,060 | 1,880 |
| Estrella Mountain Regional Park | 19,840 | 3,640 | 900 |
| Hassayampa River Preserve | 711 | 2,220 | 1,840 |
| Lake Pleasant Regional Park | 23,662 | 2,800 | 1,390 |
| McDowell Mountain Regional Park | 21,099 | 3,060 | 1,540 |
| San Tan Mountain Regional Park | 10,198 | 2,540 | 1,410 |
| Spur Cross Ranch Conservation Area | 2,154 | 3,920 | 2,200 |
| Usery Mountain Regional Park | 3,648 | 2,370 | 1,690 |
| White Tank Mountain Regional Park | 29,571 | 4,070 | 1,370 |
| Vulture Mountains Recreation Area (FY2025) | 1,046 | 3,650* | 2,100 |
| | | | |
| OTHER PARKS | | | |
| Black Mountain Summit Preserve | 247 | NA | NA |
| Paradise Valley and Golf Course | 106 | NA | NA |
| New River Kiwanis Park | 80 | NA | NA |
| **Total Acres** | **121,178** | | |

## FIGURE 4: Maricopa County Parks Map

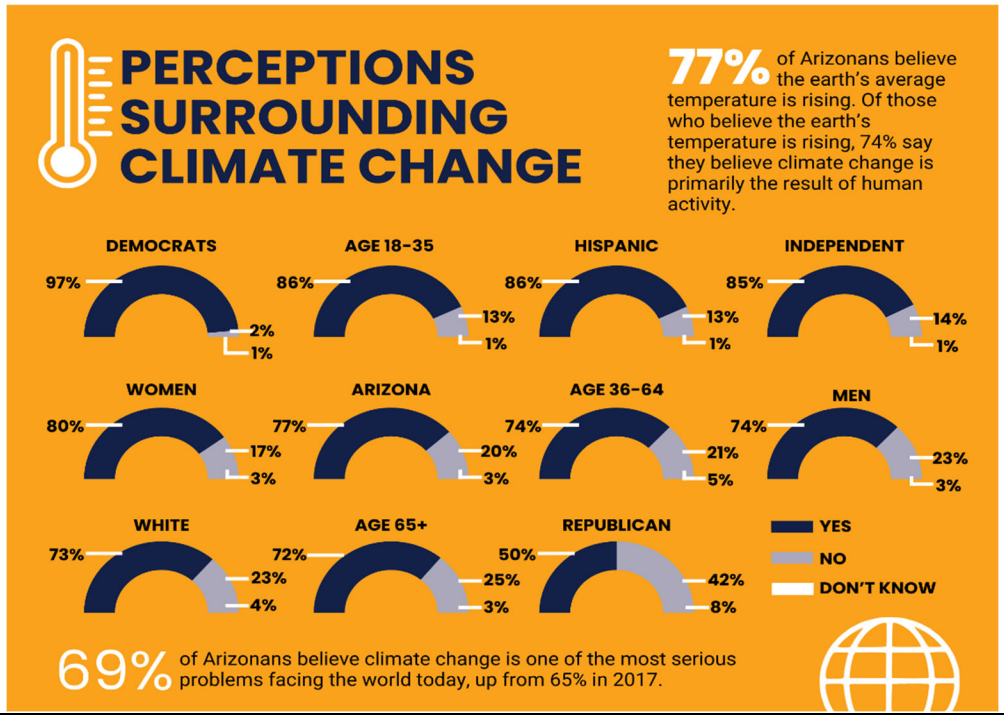


## FIGURE 5: Annual Consumer Spending – Outdoor Recreation Drives Commerce

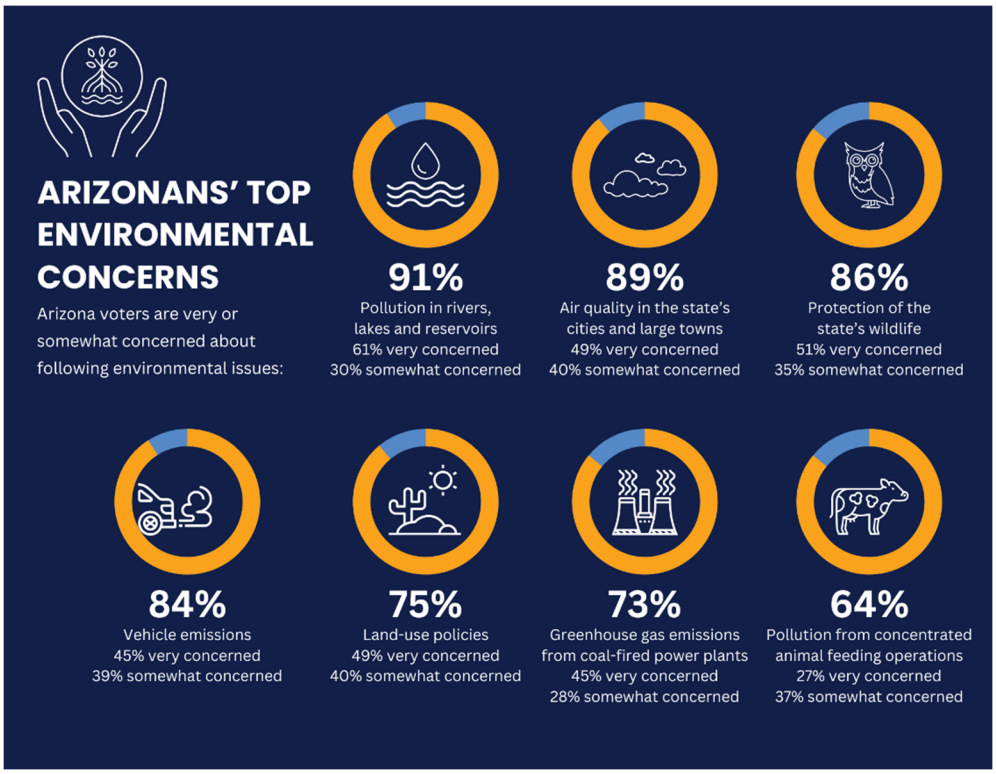
*CURRENCY IN THE CHART REFLECTS BILLIONS OF DOLLARS



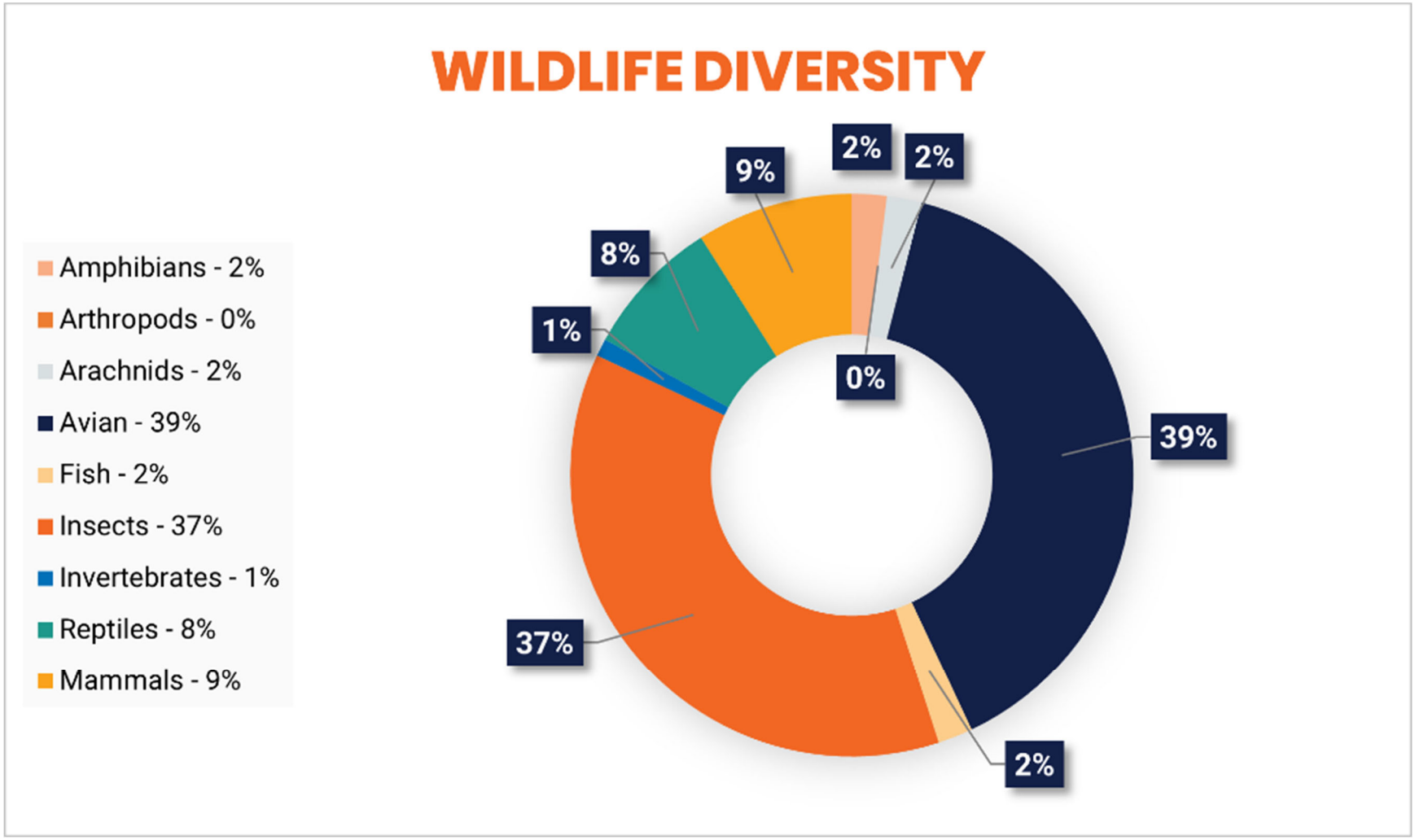
## FIGURE 6A: 2017 and 2020 Nina Pulliam Charitable Trust ASU survey



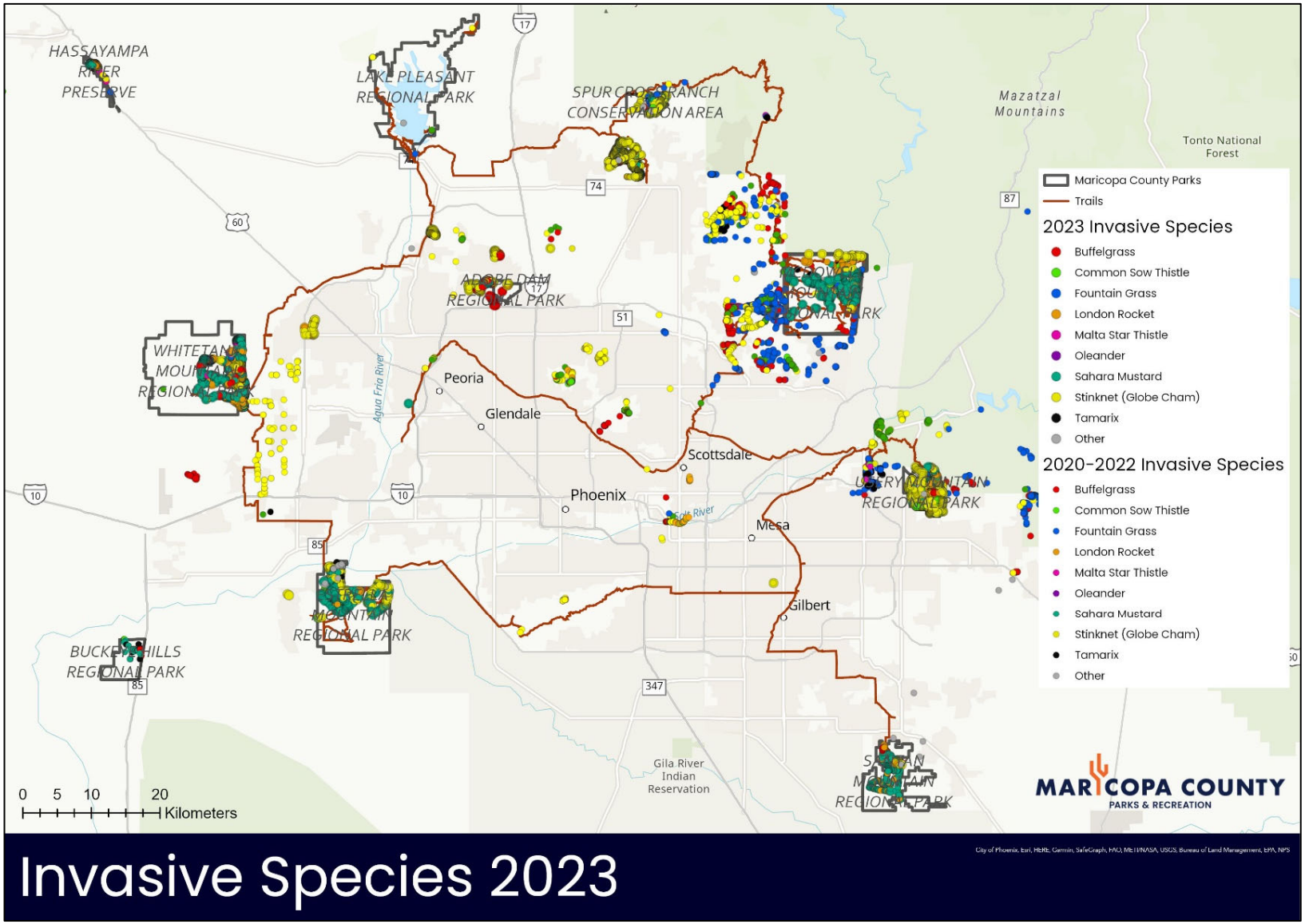

## FIGURE 6B: 2017 and 2020 Nina Pulliam Charitable Trust ASU survey



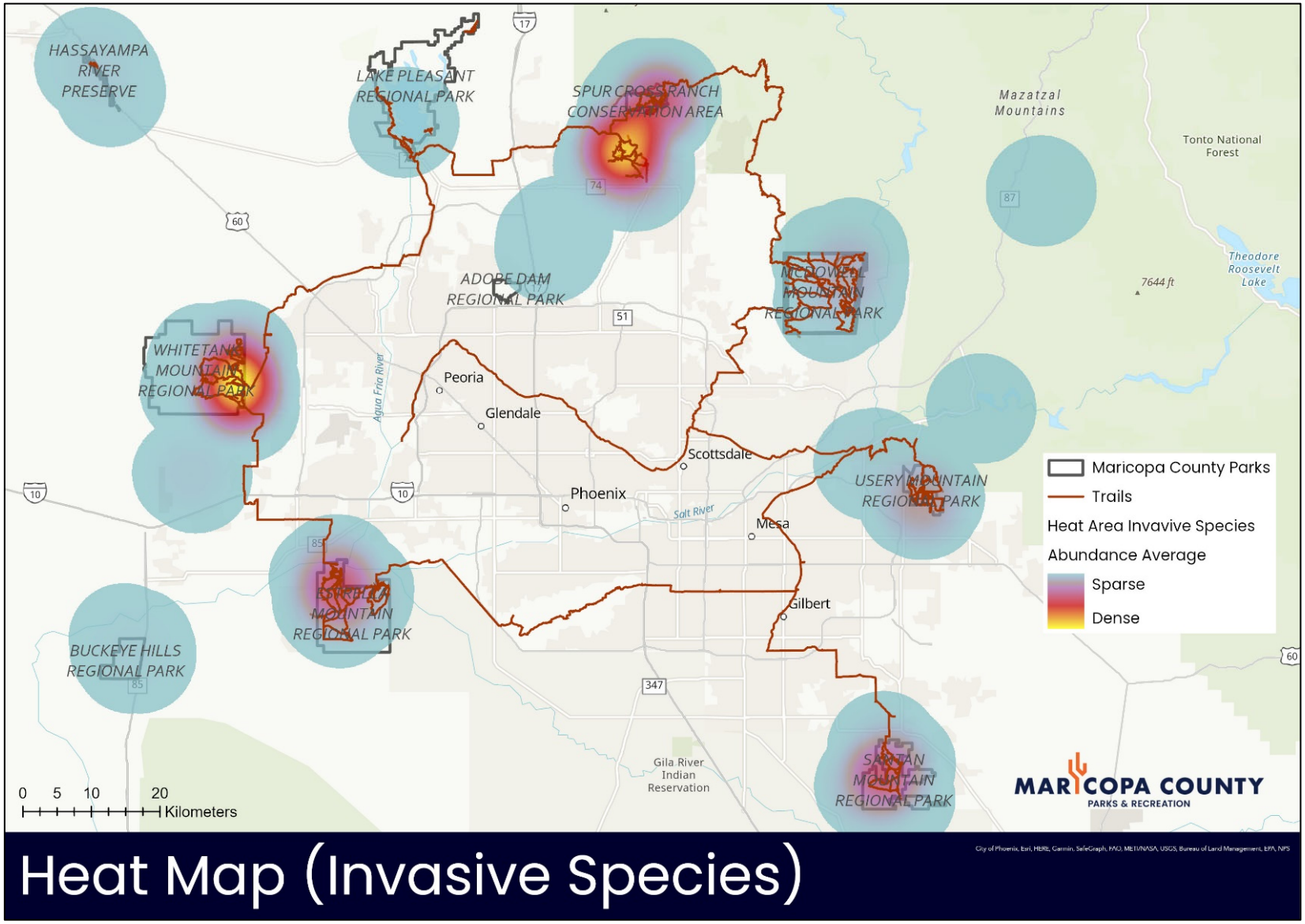
## FIGURE 7: Maricopa County Parks – Invasive Species Mapping 2020 - 2023



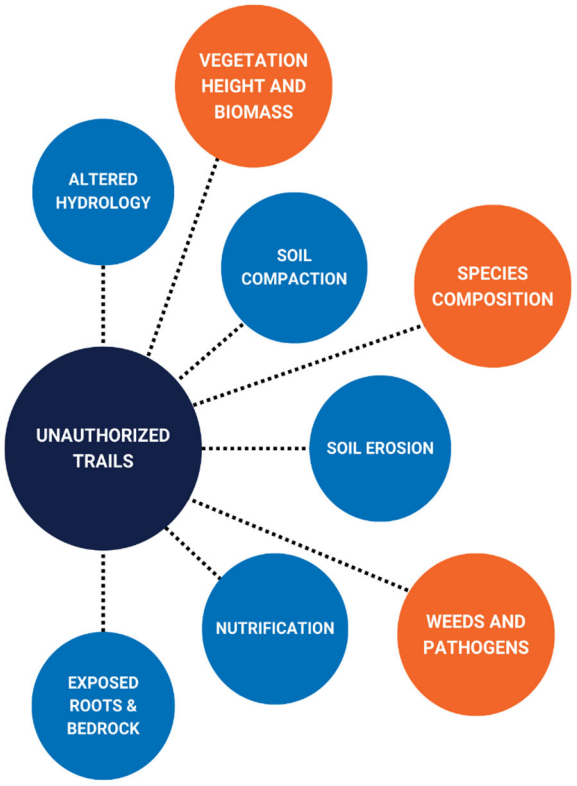
## FIGURE 8: Maricopa County Parks – Invasive Species Mapping 2020 - 2023



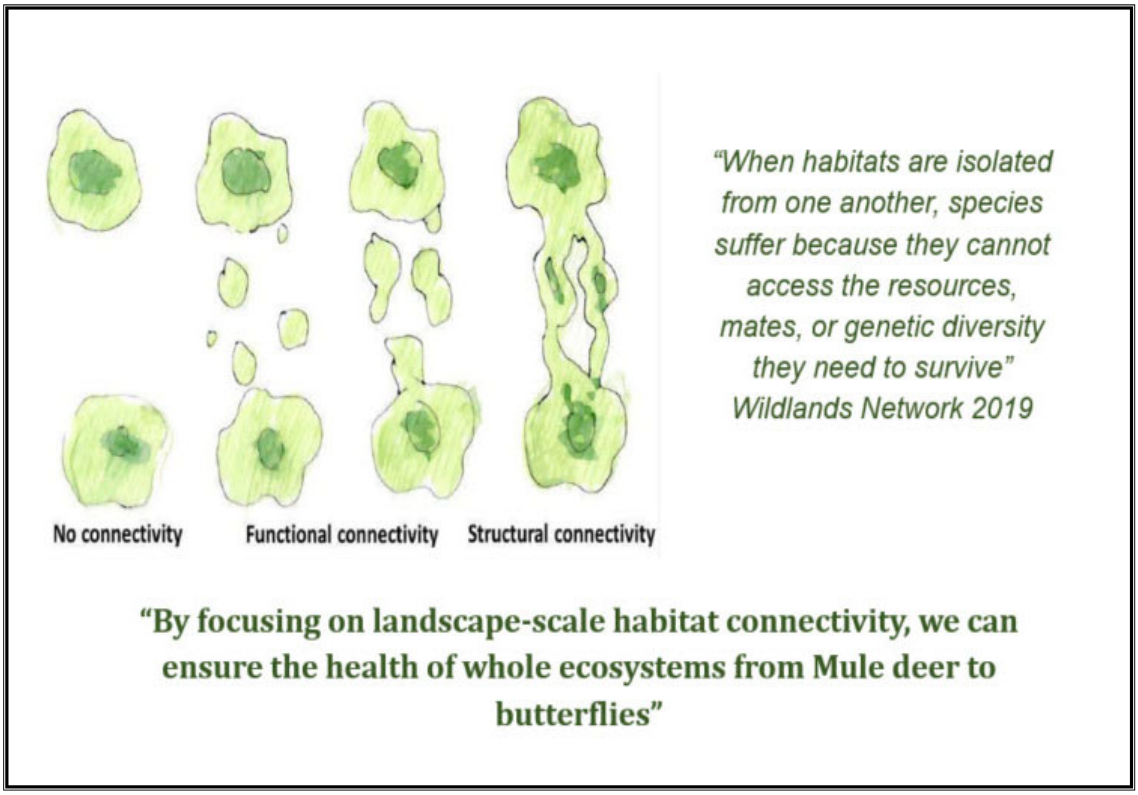
## FIGURE 9: Maricopa County Parks – Invasive Species Hot Spots 2019 – 2020



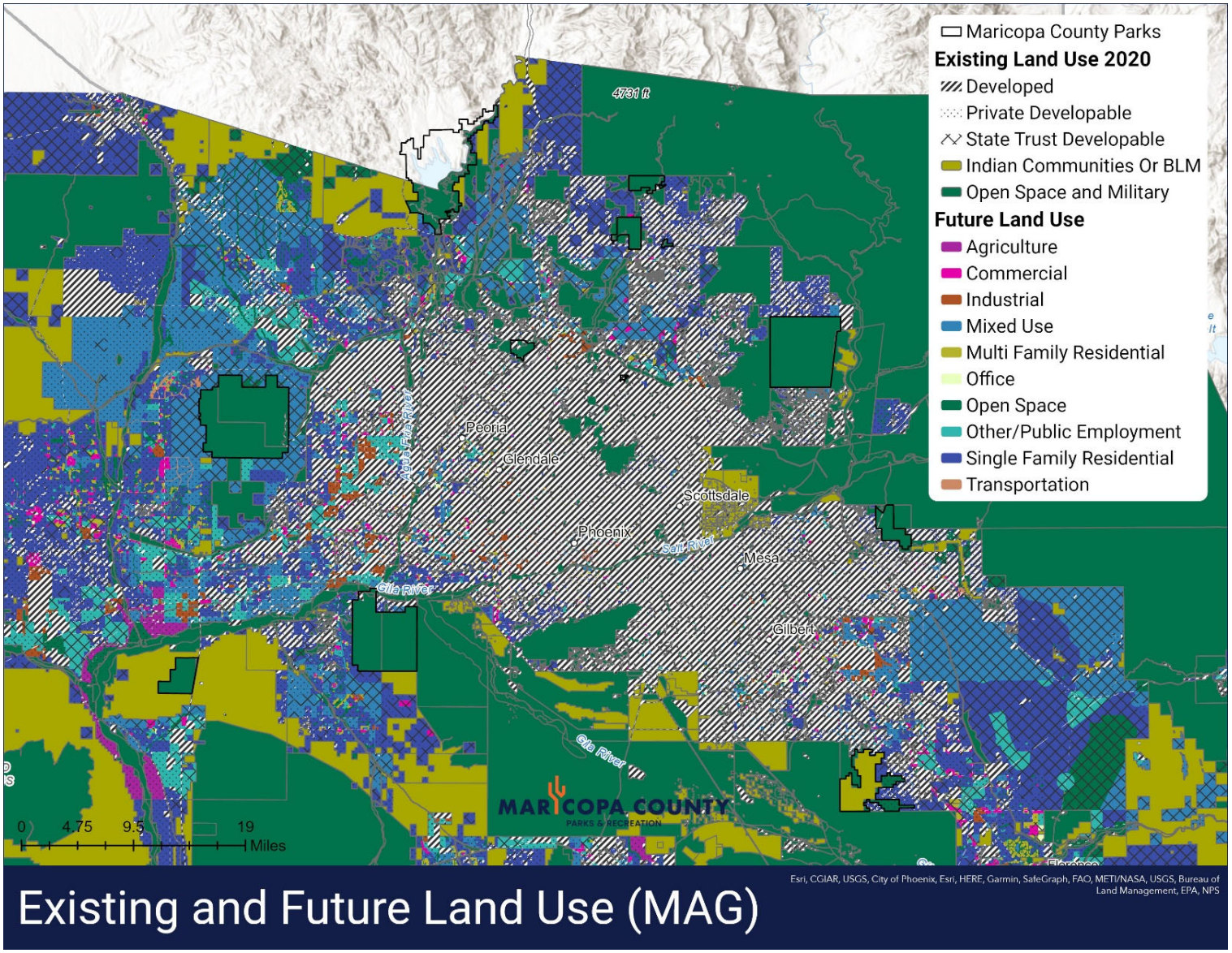
## FIGURE 10: Unauthorized Trail Effects



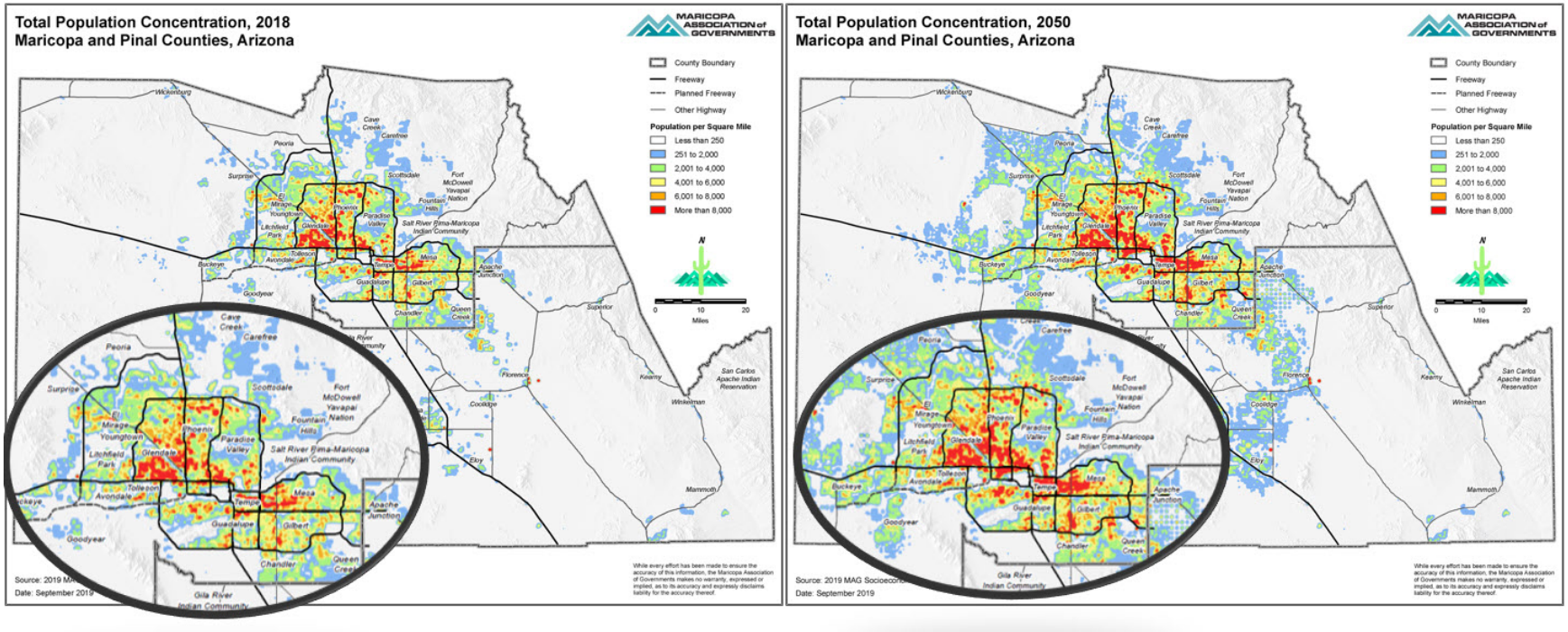

## FIGURE 11: Differing Levels Of Connectivity



## FIGURE 12: Maricopa Association of Governments – Planned Development



## FIGURE 13: Maricopa Association of Governments – Population Data

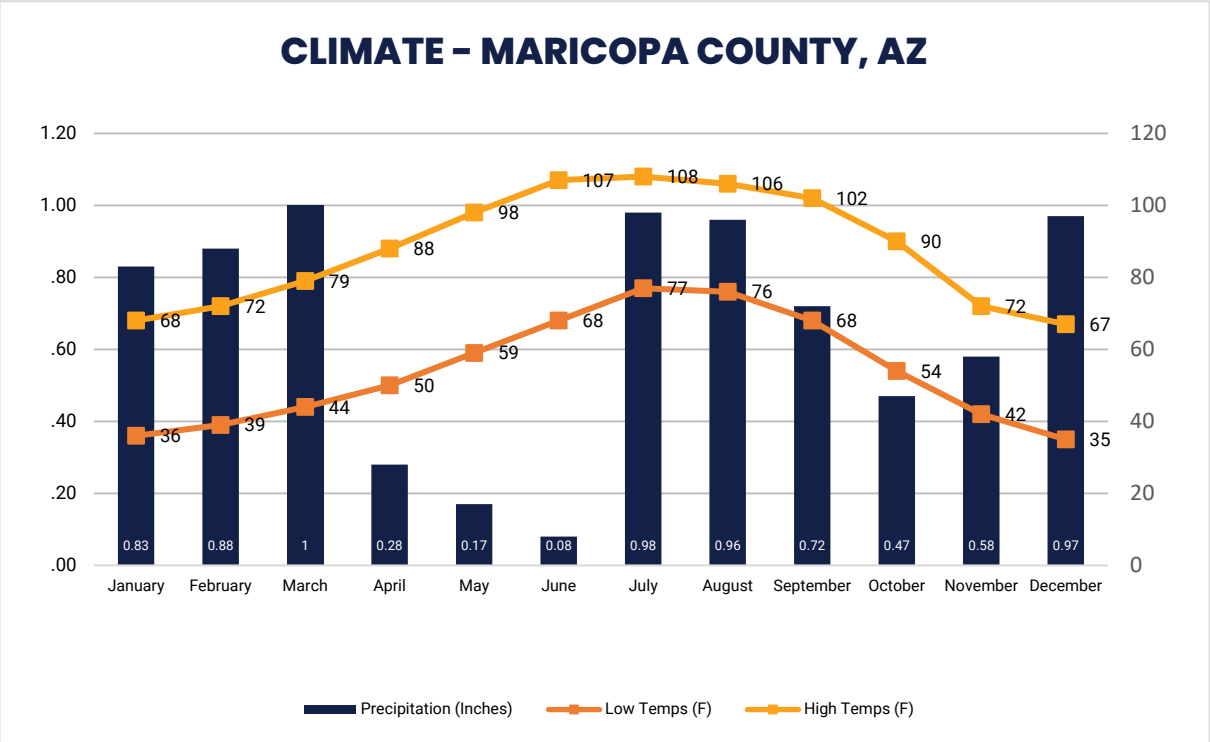


## FIGURE 14: Conceptual Plan For The White Tank Mountains In The West Valley, Includes Use Of GI and LID Technologies With Hybrid Natural and Structural Floodways.

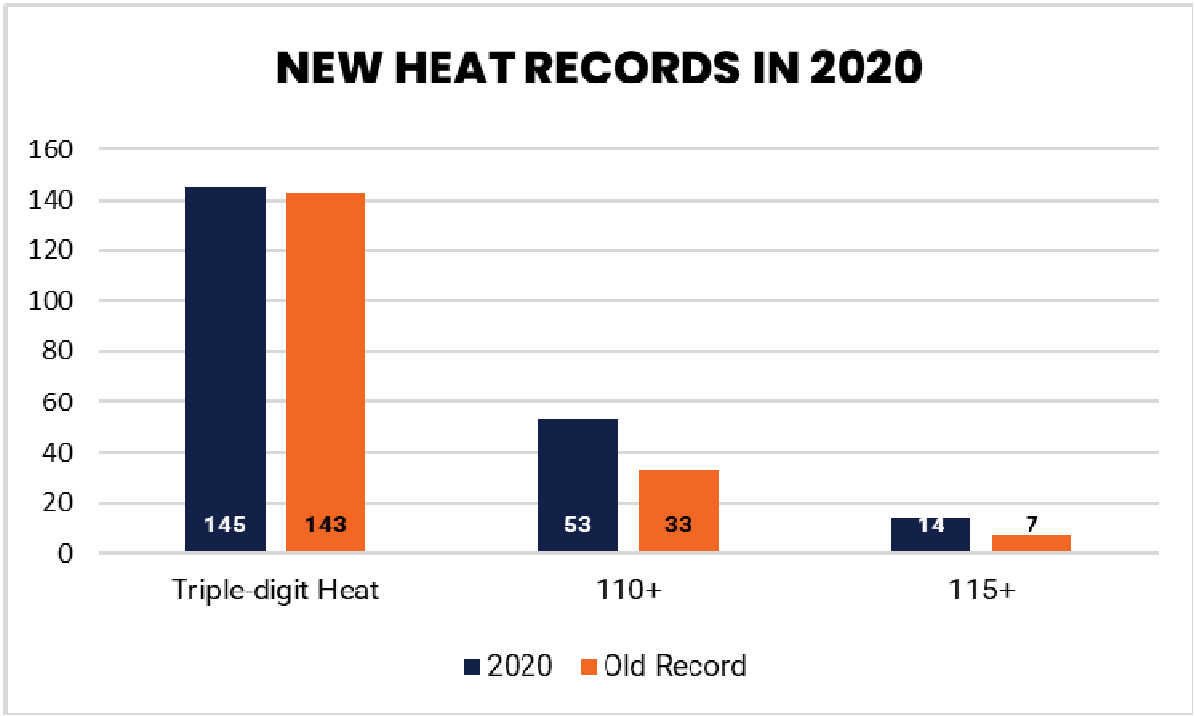



MARICOPA COUNTY PARKS & RECREATION

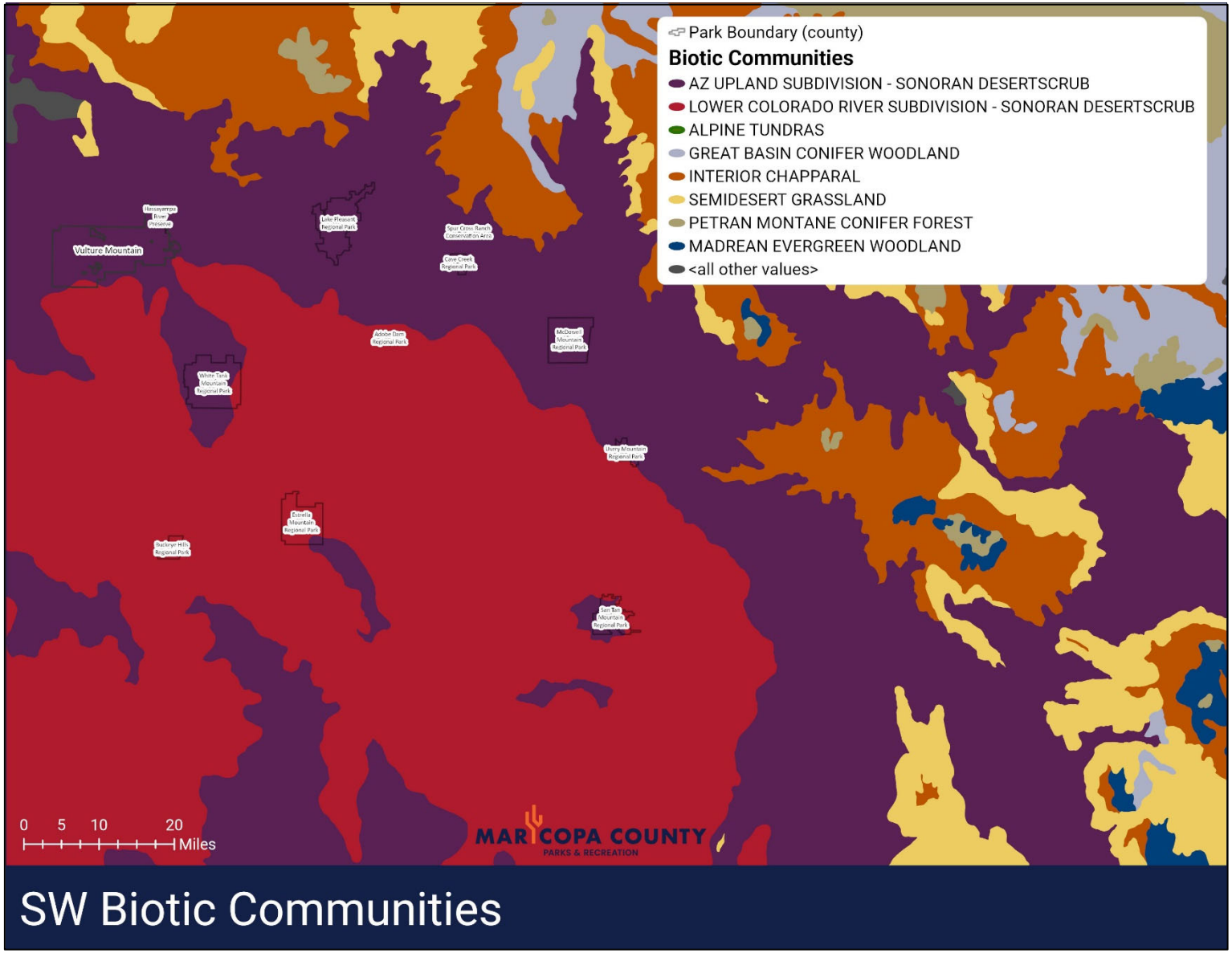
## FIGURE 15: Climate – Maricopa County, Arizona



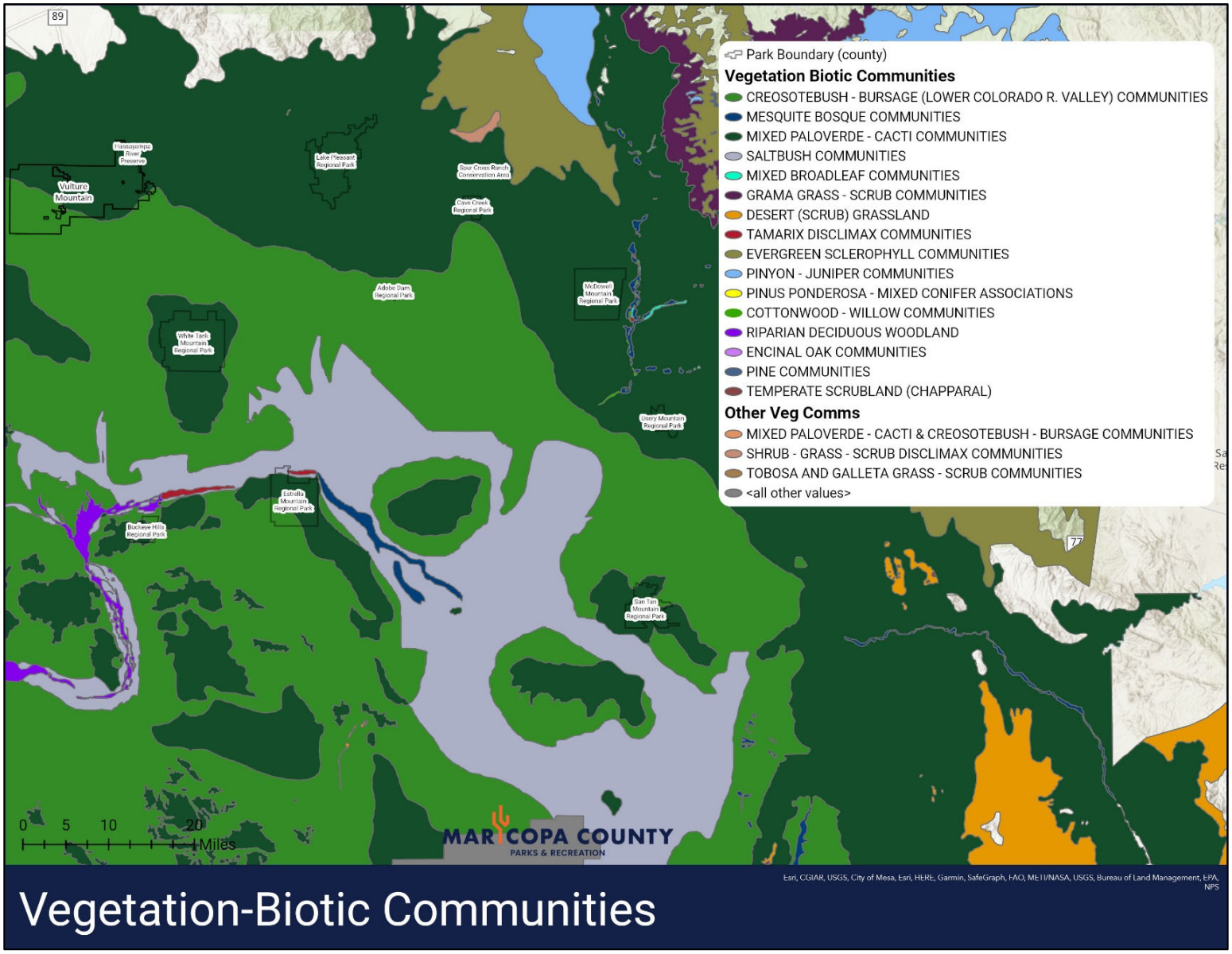

## FIGURE 16: Phoenix Heat Records 2020



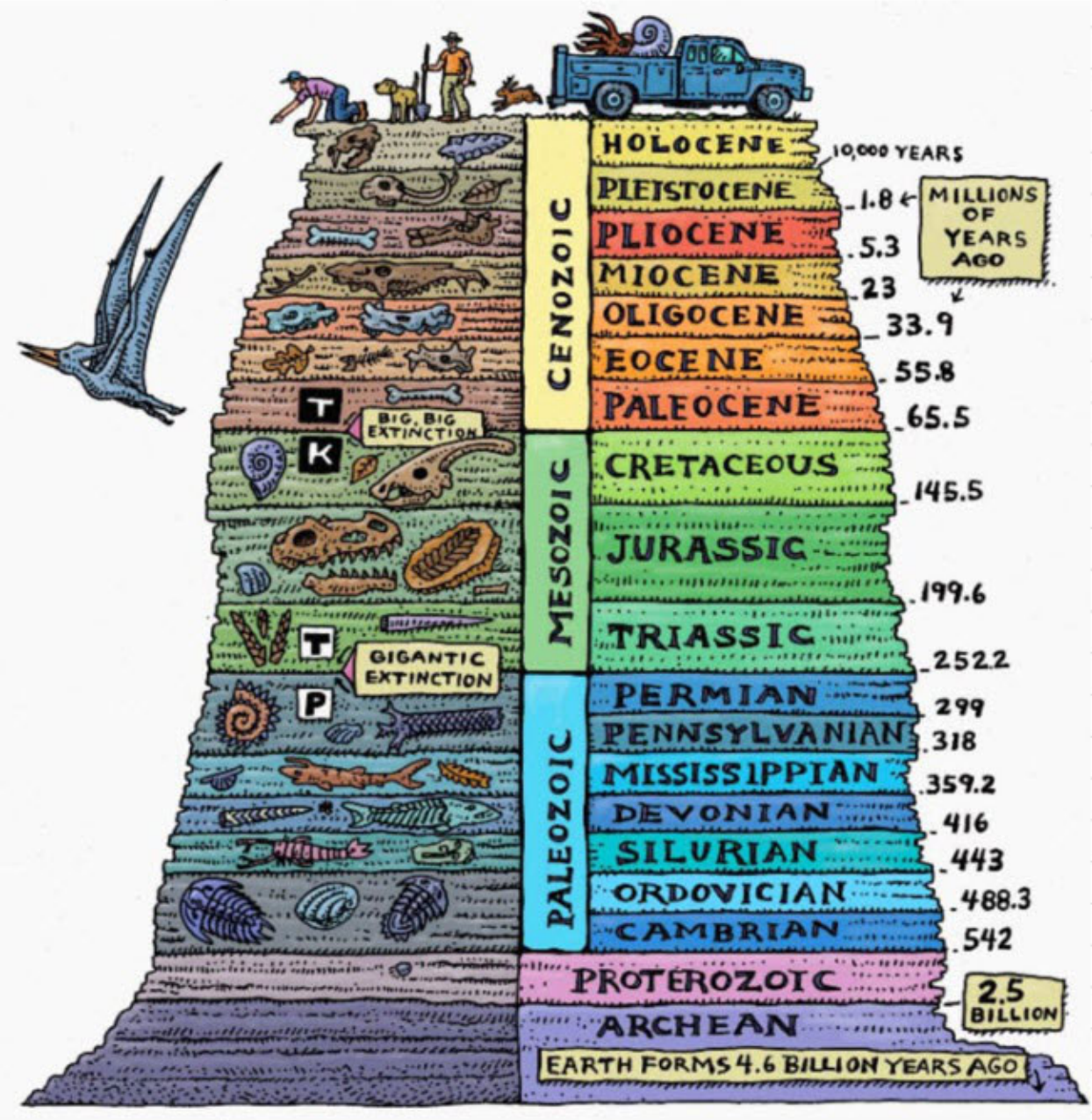
## FIGURE 17: Biotic Communities of Maricopa County Parks



## FIGURE 18: Biotic Communities Vegetation Associations of Maricopa County



## FIGURE 19A: Geological Time

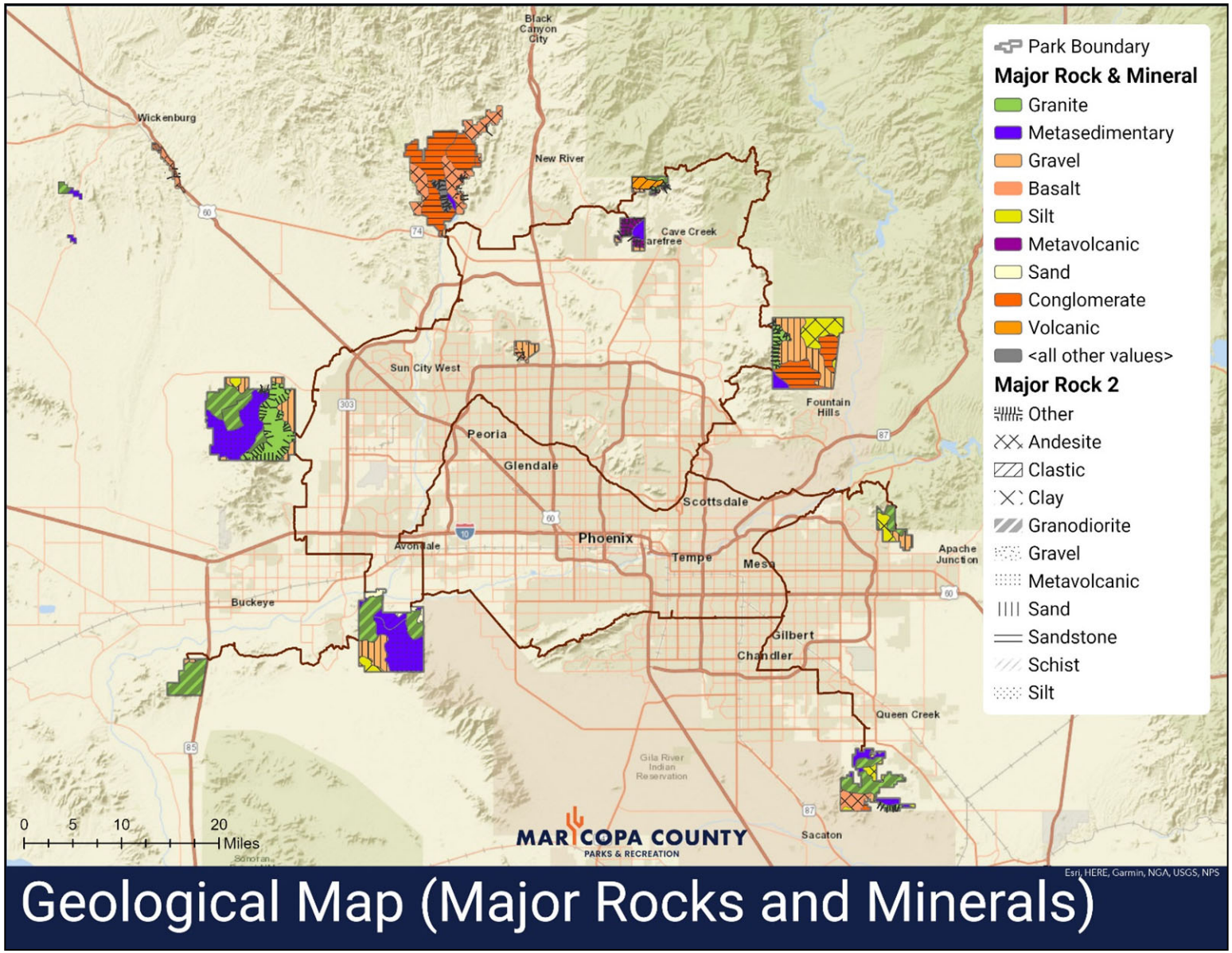


# FIGURE 19B-C: Maricopa County Parks Surficial Geology/Rock-Minerals and Surficial Geology Timeframe

| | Rock and Mineral Types | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Surficial Geology (Unit name) | MAJOR 1, 2 & 3 | | | MINOR 1, 2, 3 & 4 | | | | GENERAL |
| Holocene (RA) | Sand | Gravel | | Silt | Clay | | | Unconsolidated, undifferentiated |
| Holocene (SD) | Silt | Clay | | Gravel | Sand | | | Unconsolidated, undifferentiated |
| Quarterary (SD undivided) | Conglomerate | Sandstone | | Mudstone | Siltstone | Limestone | Gypsum | Sedimentary, clastic |
| Late and Middle Pleistocene (SD) | Gravel | Sand | | Silt | Clay | | | Unconsolidated, undifferentiated |
| *Early Pleistocene -Latest Pliocene (SD)* | Gravel | Sand | | | | | | Unconsolidated, undifferentiated |
| Pliocene to Middle Miocene (D) | Sand | Silt | Clay | | | | | Unconsolidated, undifferentiated |
| Late-Middle Miocene (BR) | Basalt | | | | | | | Igneous, volcanic |
| Middle Miocene-Oligocene (VR) | Basalt | Andesite | Dacite | Rhyolite | | | | Igneous, volcanic |
| Middle Miocene-Oligocene (SR) | Conglomerate | Sandstone | | Mudstone | Sedimentary-breccia | Limestone | | Sedimentary, clastic |
| Middle Miocene-Oligocene (VR&SR) | Volcanic | Clastic | | | | | | Igneous and Sedimentary, undifferentiated |
| Early Tertiary-Late Cretaceous (MB-GR) | Basalt | | | | | | | Igneous, volcanic |
| Early Tertiary-Late Cretaceous (GR) | Granite | | | Pegmatite | | | | Igneous, intrusive |
| Middle Proterozoic (GR) | Granite | | | Aplite | | | | Igneous, intrusive |
| Early Proterozoic (MVR) | Metavolcanic | | | | | | | Metamorphic, volcanic |
| Early Proterozoic (GR) | Granite | Granodiorite | Tonalite | Quartz-diorite | Diorite | Gabbro | | Igneous, intrusive |
| Early Proterozoic (MSR) | Metasedimentary | Metavolcanic | Gneiss | | | | | Metamorphic, undifferentiated |
| Early Proterozoic( MMR) | Metasedimentary | Schist | | Conglomerate | Carbonate | Sedimentary | | Metamorphic, undifferentiated |

| | | | MC Parks | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Time Began | Surficial Geology | Adobe Dam | Black Mountain | Buckeye Hills RP | Cave Creek RP | Estrella Mountain RP | Hassayampa River Preserve | Lake Plesant RP | McDowell MRP | PV | San Tan MRP | Spur Cross RCA | Usery MRP | White Tank MRP | Vulture MRA | # of Parks each SG Occurs at |
| Years Ago | 10,000 YA | Holocene (River alluvium) | | | | | 932 | | | | | | | | | | 1 |
| | 10,000 YA | Holocene (Surficial Deposits) | | | | | 887 | | | 4274 | | 426 | | 1912 | 387 | | 5 |
| | 1.6 MYA-present | Quarterary (surficial depostis, undivided) | | | | | 7 | | | | | | | | | | 1 |
| Million Years Ago | 1.8 MYA | Late and Middle Pleistocene (Surficial Deposits) | 976 | | 177 | 412 | 3170 | | 3434 | 7409 | | | 245 | 1055 | 3434 | | 10 |
| | 5.3 MYA | *Early Pleistocene -Late Pliocene (Surficial Deposits)* | | | | | | | | | | 213 | | | | | 1 |
| | 23 MYA | Pliocene- Middle Miocene (Deposits) | | | | | | 163 | 3841 | 6801 | | 217 | | | | | 3 |
| | 23 MYA | Late-Middle Miocene (Basaltic rocks) | 220 | | | | | 40 | 360 | | | | | | | | 2 |
| | 33.9 MYA | Middle Miocene-Oligocene (Volcanic rocks) | 30 | | | | | 578 | 7491 | | | 1846 | | | | 8 | 5 |
| | 33.9 MYA | Middle Miocene-Oligocene (Sedimentary rocks) | | | | | | | 10187 | | | | | | | | 3 |
| | 33.9 MYA | Middle Miocene-Oligocene (Volcanic and Sedimentary rocks) | | | | | | | | | | | 1265 | | | | 1 |
| | 146 MYA | Early Tertiary-Late Cretaceous muscovite-bearing granitic rocks | | | | | | | | | | | | | 9313 | | 1 |
| | 146 MYA | Early Tertiary-Late Cretaceous (Granitic rocks) | | | | | | | | | | | | | 3574 | 501 | 2 |
| | 2500 MYA | Middle Proterozoic (Granitic rocks) | | 106 | | | | | | 1866 | | 517 | | | | | 2 |
| | 2500 MYA | Early Proterozoic (Metavolcanic rocks) | | | | 1820 | | | | | | | 18 | | | | 2 |
| | 2500 MYA | Early Proterozoic (Granitic rocks) | | | 4279 | 9 | 5337 | | | | | 4483 | 612 | 1201 | 3103 | | 7 |
| | 2500 MYA | Early Proterozoic (Metasedimentary rocks) | | 141 | | 838 | 1593 | | 325 | 755 | | 1866 | | | | | 4 |
| | 2500 MYA | Early Proterozoic (Metamorphic rocks) | | | | | 7917 | | 23 | | | | | | 9613 | 537 | 4 |

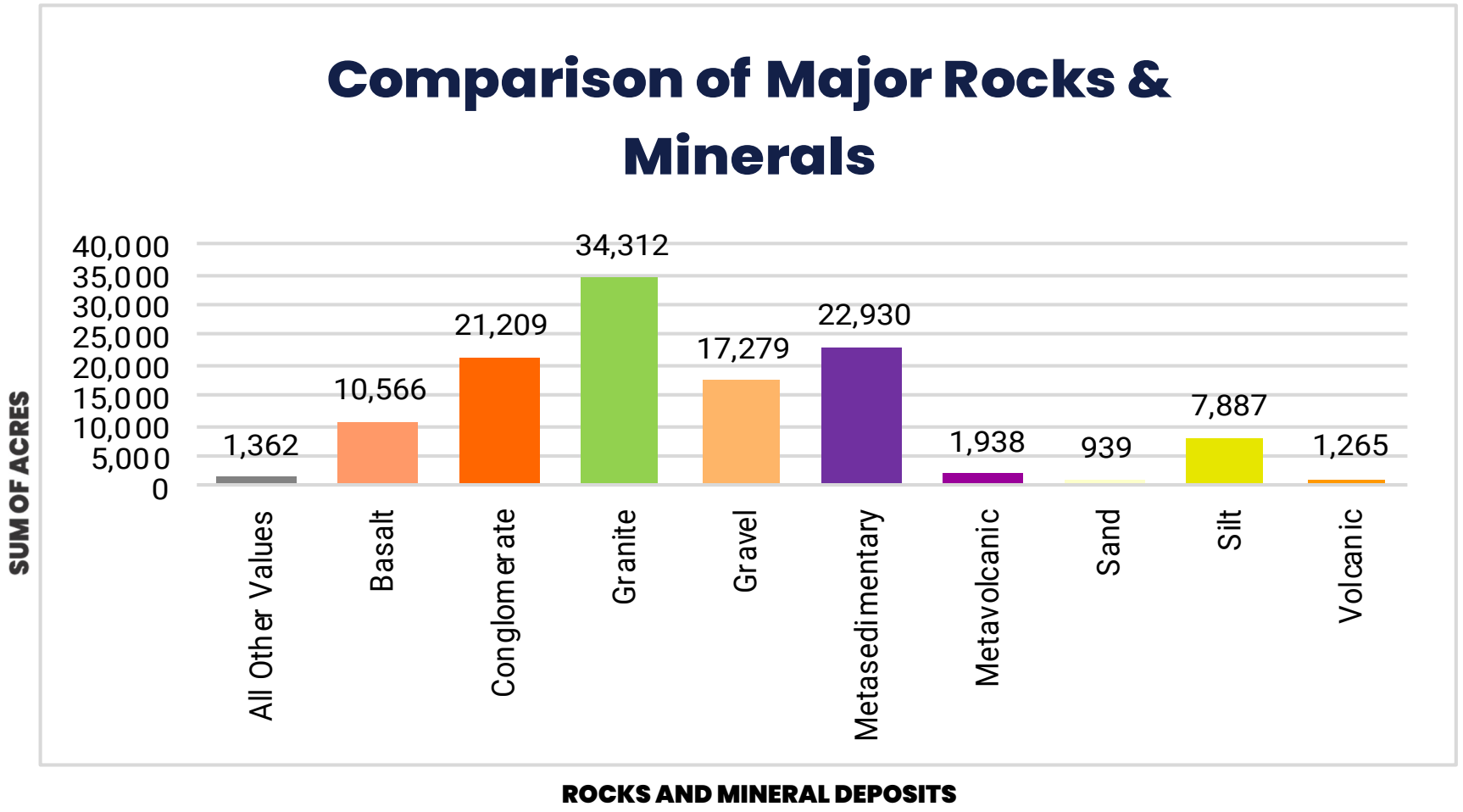
## FIGURE 19D: Geological Rocks and Minerals (Majors) Map of Maricopa County Parks



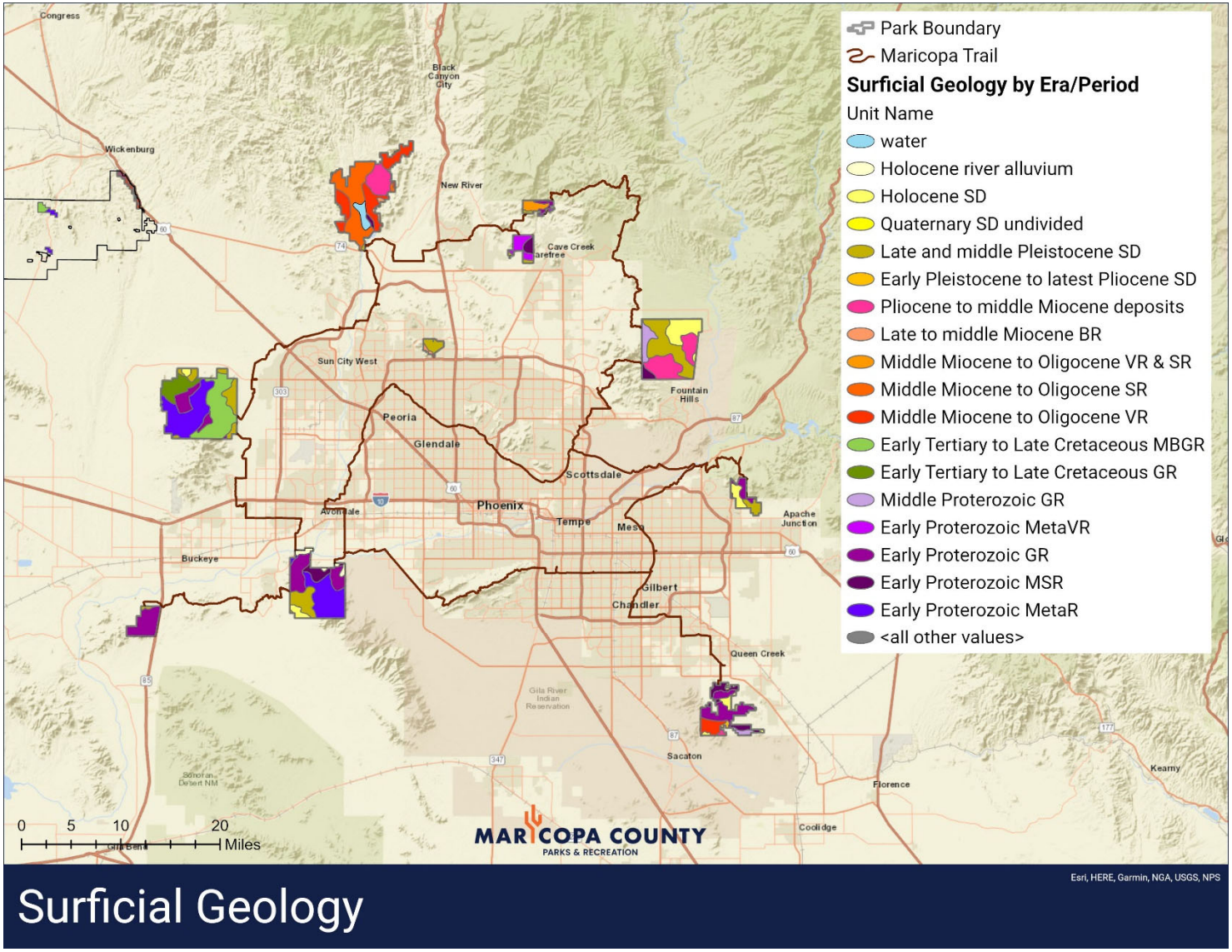



MARICOPA COUNTY
PARKS & RECREATION

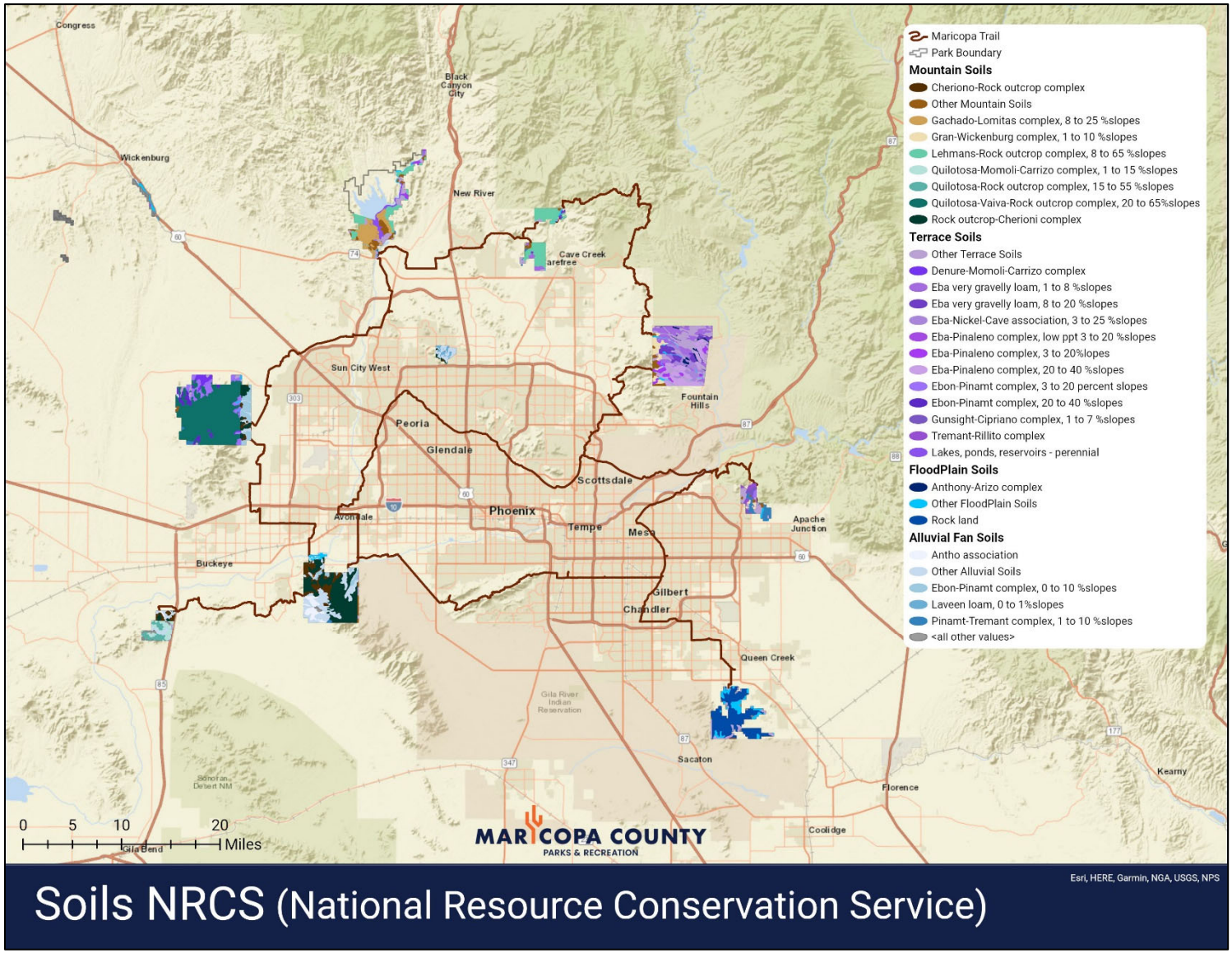
## FIGURE 19E: Maricopa County Parks - Major Rock and Mineral Deposits



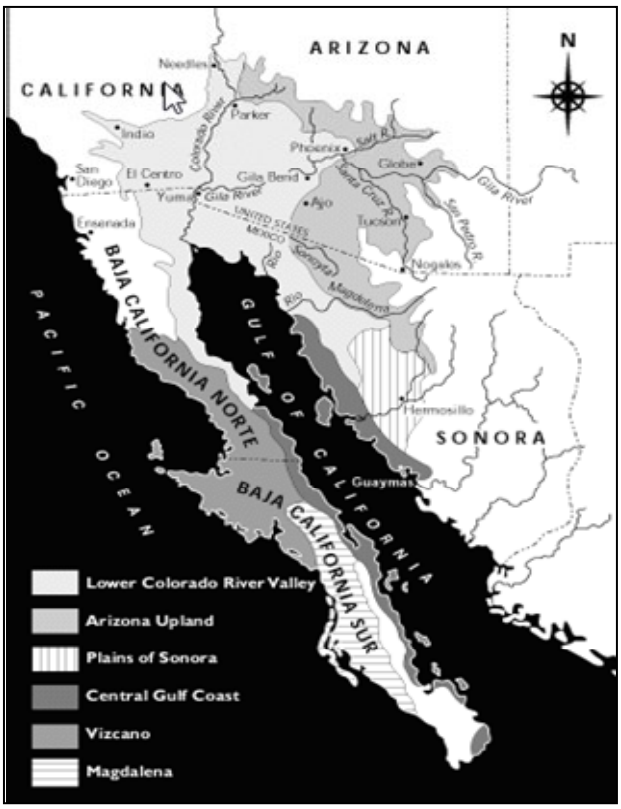
## FIGURE 19F: Surficial Geology Map of County Parks



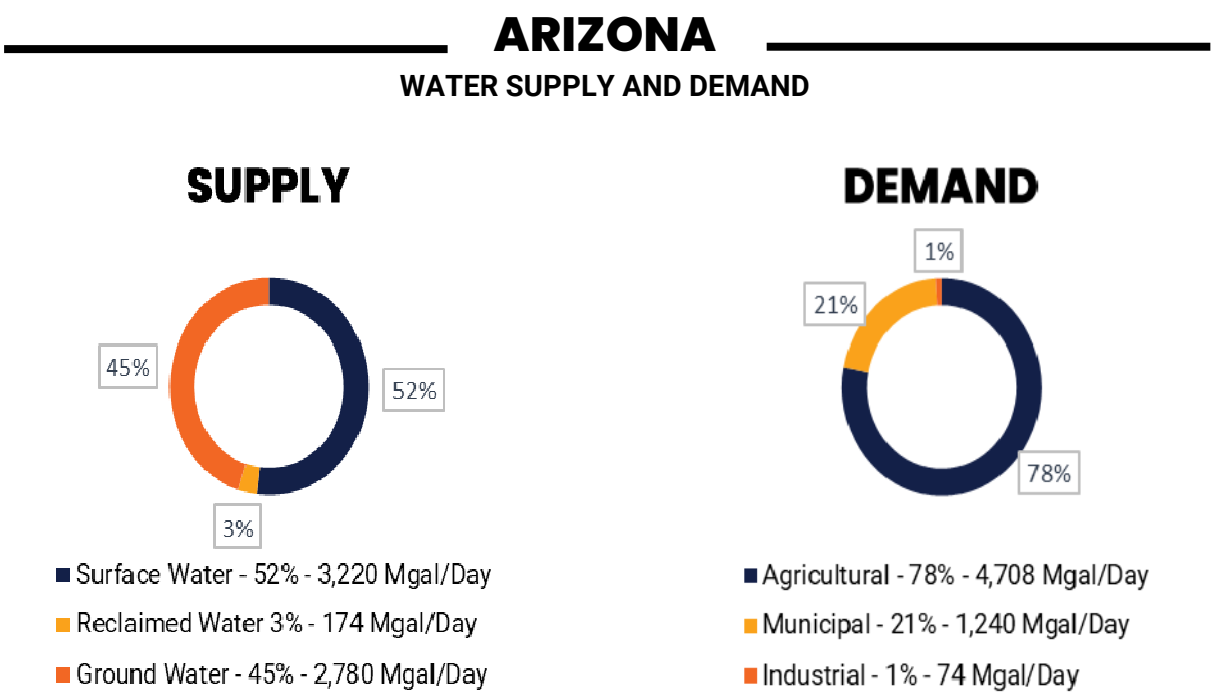
## FIGURE 19G: Park Soils Based on NRCS data



## FIGURE 20: Sonoran Desert Boundary



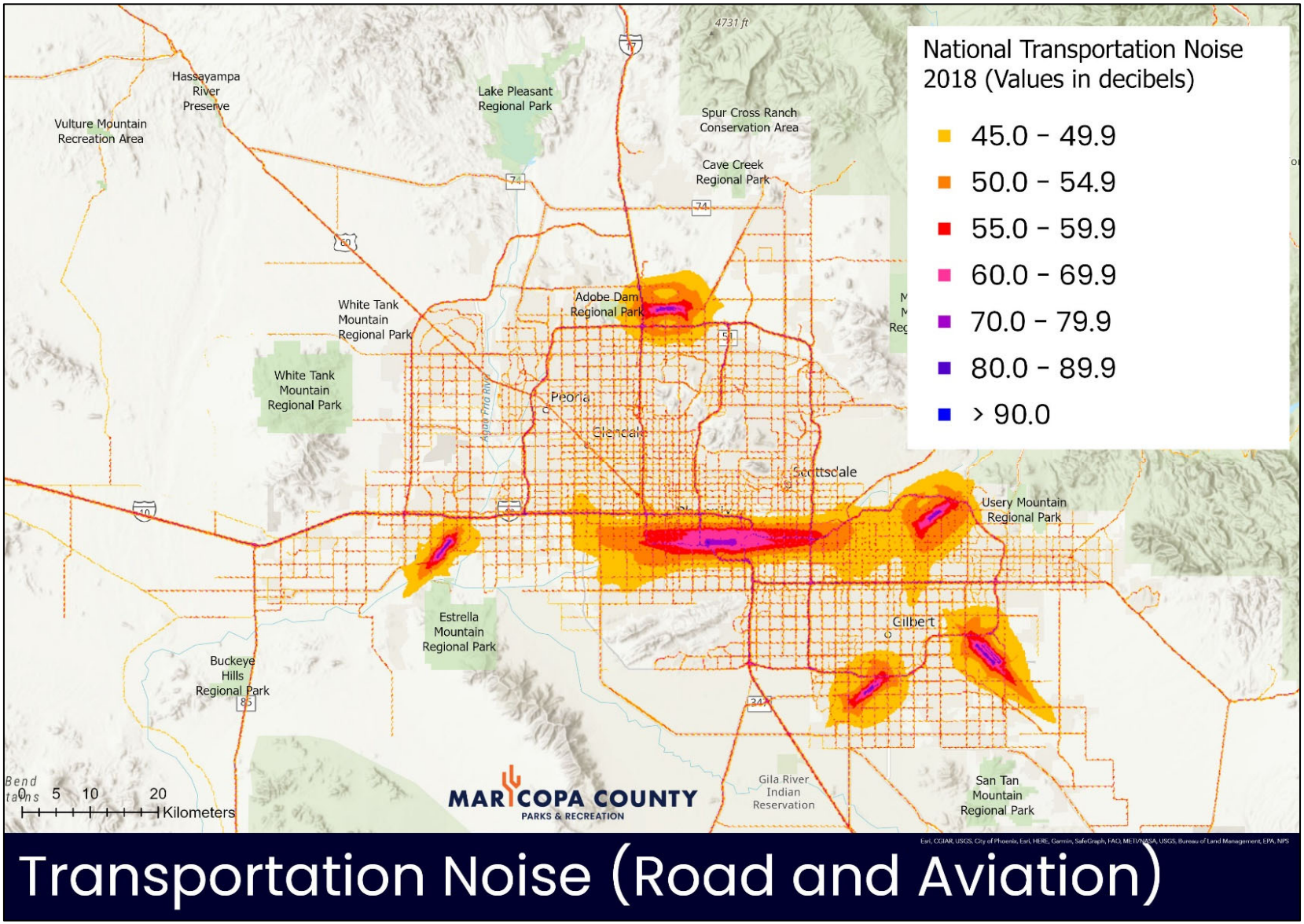

## FIGURE 21: Arizona Water Supply and Demand



## FIGURE 22: Arizona Management Areas

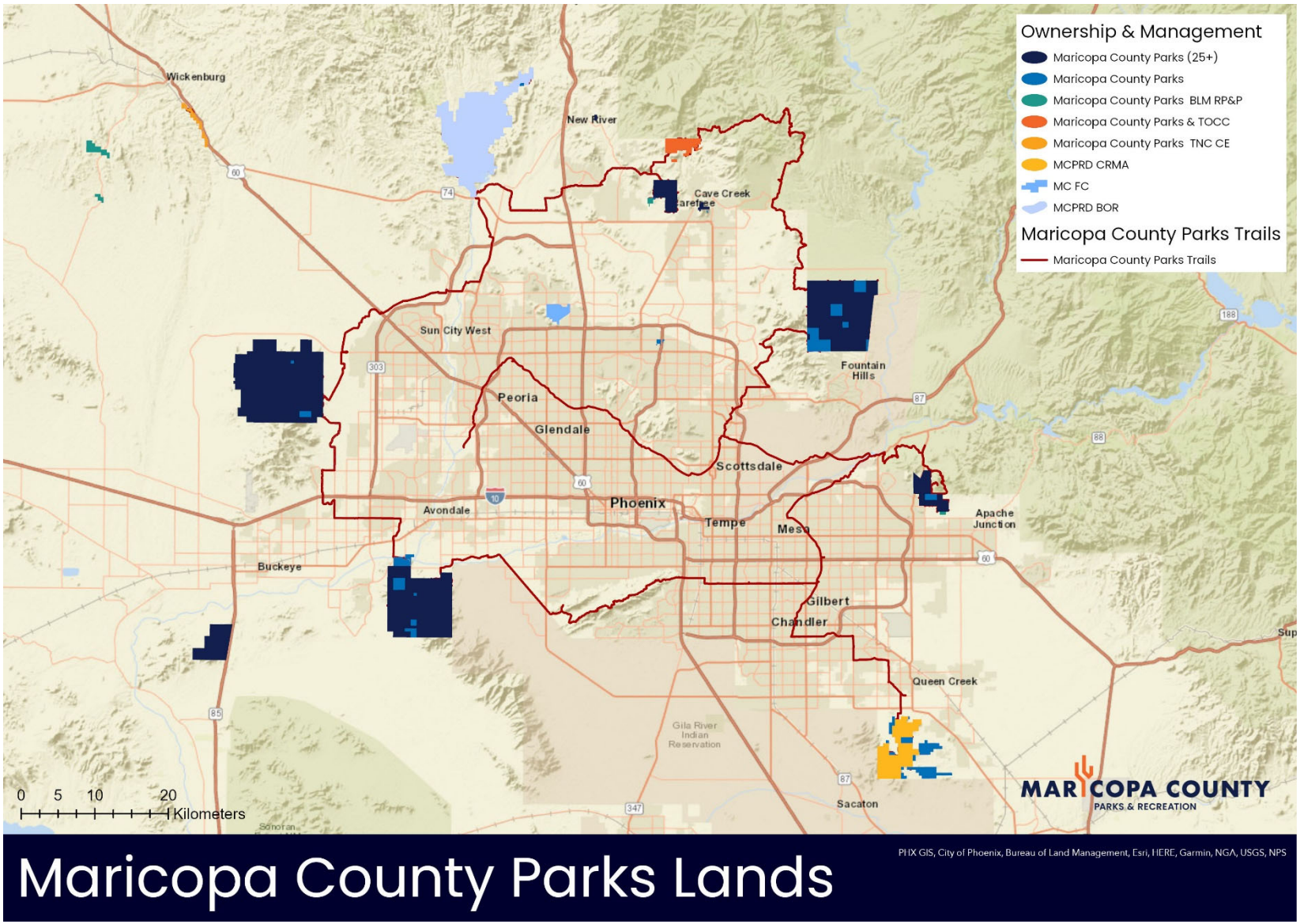

*County and AMA boundaries (WRRC 2021).*

## FIGURE 23: Transportation Noise




# Transportation Noise (Road and Aviation)

## FIGURE 24: Maricopa County Parks Land Ownership and Agreements



# TABLE 1: MARICOPA COUNTY PARKS FEDERALLY LISTED SPECIES

| Common Name | Wildlife Species | ESA_ FWS | USFS | BLM | SGCN | BHRP | CCRP | EMRP | HRP | LPRP | MMRP | SCRCA | STRP | UMRP | VMRP | WTRP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **American Peregrine Falcon** | *Falco peregrinus anatum* | SC | S | S | 1A | | | | | 2005 | | 2013 | | | | |
| **Arizona Toad** | *Anaxyrus microscaphus* | SC | | S | 1B | | | | 2021 | 2010 | | | | | | |
| **Bald Eagle** | *Haliaeetus leucocephalus* | BGA, SC | S | S | 1A | | | | | 2022 | | | | 2020 | | |
| **Bald Eagle WP** | *Haliaeetus leucocephalus WPOP* | BGA, SC | S | S | 1A | | | 2016 | | 2016 | | | | | | |
| **Big Free-tailed Bat** | *Nyctinomops macrotis* | SC | | | | | | | 2022 | | | | | | | |
| **Bonytail chub** | *Gila elegans* | LE | | | 1A | | | | 1991 | | | | | | | |
| **Burrowing Owl** | *Athene cunicularia* | SC | S | S | 1B | | | 2021 | | 2022 | | | | | | |
| **California Leaf-nosed bat** | *Macrotus californicus* | SC | | S | 1B | | | | 2022 | | 1994 | 1965 | | | | |
| **Cave Myotis** | *Myotis velifer* | SC | | S | 1B | | | | 2022 | | 2016 | | | | | |
| **Channel Catfish** | *Ictalurus punctatus* | LT | | | 1A | | | | | 2021 | | | | | | |
| **Common Chuckwalla** | *Sauromalus ater* | SC | | | | | | 2020 | | | | | | 2022 | | 2022 |
| **Desert Pupfish** | *Cyprinodon macularius* | LE | | | 1A | | | | 1990 | 2010 | 2010 | 2009 | | | | |
| **Desert Tortoise (Sonoran)** | *Gopherus morafkai* | CCA | S | S | 1A | 2004 | 2021 | 2020 | 2022 | 2019 | 2021 | 2004 | 2010 | 2017 | 2019 | 2019 |
| **Gila Longfin Dace** | *Agosia chrysogaster chrysogaster* | SC | | S | 1B | | | | 1994 | 2018 | | 2008 | | | | |
| **Gila Topminnow** | *Poeciliopsis occidentalis occidentalis* | LE | | | 1A | | | | 1993 | 2018 | 2009 | 2009 | | 2011 | | 2009 |
| **Gray Hawk** | *Buteo plagiatus* | SC | | S | | | | | 2021 | | | | | | | |
| **Gray Vireo** | *Vireo vicinior* | | S | | 1C | | | | | | | | | | | 2018 |
| **Hohokam Agave** | *Agave murpheyi* | SC | S | S | | | | | 1991 | 1991 | | | | | | |
| **Le Conte's Thrasher** | *Toxostoma lecontei* | | | S | 1B | | | 2020 | | | | | | | | |
| **Lesser Long-nosed Bat** | *Leptonycteris yerbabuenae* | SC | | | 1A | | | | | | 1992 | | | | | |
| **Long-eared Myotis** | *Myotis evotis* | SC | | | 1C | | | | 2020 | | | | | | | |
| **Longfin Dace** | *Agosia chrysogaster* | SC | | S | 1B | | | | 2022 | | | | | | | |
| **Long-legged Myotis** | *Myotis volans* | SC | | | | | | | 2022 | | | | | | | |
| **Lowland Leopard Frog** | *Lithobates yavapaiensis* | SC | S | S | 1A | | | | 2022 | 2017 | | 2011 | | UMRP | VMRP | WTRP |



MARICOPA COUNTY PARKS & RECREATION

| Common Name | Wildlife Species | ESA_ FWS | USFS | BLM | SGCN | BHRP | CCRP | EMRP | HRP | LPRP | MMRP | SCRCA | STRP | UMRP | VMRP | WTRP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maricopa Tiger Beetle** | *Cicindela oregona maricopa* | SC | | | | | | | 2021 | | | | | | | |
| **Northern Mexican Gartersnake** | *Thamnophis eques megalops* | LT | S | | 1A | | | | | 1985 | | | | | | |
| **Olive-sided Flycatcher** | *Contopus cooperi* | SC | | | 1C | | | | 2019 | | | 2021 | | | | 2019 |
| **Pale Townsend's Big-eared Bat** | *Corynorhinus townsendii pallescens* | SC | S | S | 1B | | | | | | 2019 | | | | | |
| **Peregrine Falcon** | *Falco peregrinus* | SC | | | | | | | | 2020 | | | | | 2017 | |
| **Razorback sucker** | *Xyrauchen texanus* | LE | | | 1A | | | | 1990 | | | | | | | |
| **Southwestern Willow Flycatcher** | *Empidonax traillii extimus* | LE | | | 1A | | | | 2018 | 2015 | | | | | | |
| **Squaw Peak Talussnail** | *Maricopella allynsmithi* | SC | | | 1B | | 2011 | | | | | | | | | |
| **Townsend's Big-eared Bat** | *Corynorhinus townsendii* | | | S | | | | | 2022 | | | | | | | |
| **Tucson Shovel-nosed Snake** | *Chionactis occipitalis klauberi* | SC | | | 1A | | | | | | | | | | 2016 | |
| **Western Burrowing Owl** | *Athene cunicularia hypugaea* | SC | S | | 1B | | | 2016 | | | | | | | | |
| **Western Red Bat** | *Lasiurus blossevillii* | | S | | 1B | | | | 2022 | | | | | | | 2020 |
| **Western Small-footed Myotis** | *Myotis ciliobrum* | SC | | | | | | | 2022 | | | | | | | |
| **Western Yellow Bat** | *Lasiurus xanthinus* | | S | | 1B | | | | 2022 | | | | | | | |
| **Yellow-billed Cuckoo (Western DPS)** | *Coccyzus americanus* | LT | S | | 1A | | | | 2019 | 2015 | | | | | | |
| **Yuma Myotis** | *Myotis yumanensis* | SC | | | 1B | | | | 2022 | | | | | | | |

# TABLE 2: MARICOPA COUNTY REGIONAL PARKS WILDLIFE SPECIES LIST

| Common Name | Wildlife Species | ADRP | BHRP | CCRP | EMRP | HRP | LPRP | MMRP | SCRCA | STRP | UMRP | VMRA | WTRP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Abert's Towhee** | *Melozone aberti* | | | 2017 | 2021 | 2022 | 2022 | | 2019 | 2020 | 2021 | | |
| **Acrobat Ant** | *Crematogaster laeviuscula* | | | | | 2022 | | | | | | | |
| **Agile Ground Mantis** | *Litaneutria minor* | | | | | | | | | | | | 2019 |
| **Aloeus Ox Beetle** | *Strategus aloeus* | | | | | 2019 | | | | | | | |
| **American Avocet** | *Recurvirostra americana* | | | | | | 2021 | | | | | | |
| **American Badger** | *Taxidea taxus* | | | | | 2022 | | | | | | | 2019 |
| **American Bittern** | *Botaurus lentiginosus* | | | | | 2020 | | | | | | | |
| **American Bullfrog** | *Lithobates catesbeianus* | | | | | 2012 | 2016 | | | | | | |
| **American Bushtit** | *Psaltriparus minimus* | | | | | 2019 | 2020 | | | | | | |
| **American Coot** | *Fulica americana* | | | | 2020 | 2022 | 2022 | | | | | | |
| **American Kestrel** | *Falco sparverius* | | | 2019 | 2020 | 2020 | 2022 | | 2009 | | 2021 | | 2020 |
| **American Lady** | *Vanessa virginiensis* | | | | | | | | | | 2019 | | |
| **American Peregrine Falcon** | *Falco peregrinus anatum* | | | | | | 2005 | | 2013 | | | | |
| **American Pipit** | *Anthus rubescens* | | | | | | 2022 | | | | | | |
| **American Redstart** | *Setophaga ruticilla* | | | | | 2020 | | | | | | | |
| **American Robin** | *Turdus migratorius* | | | | 2019 | 2021 | 2020 | | | | | | 2018 |
| **American Rubyspot** | *Hetaerina americana* | | | | | 2021 | 2021 | | | | | | |
| **American Snout** | *Libytheana carinenta* | | 2021 | | 2021 | 2022 | 2019 | 2022 | 2022 | 2021 | 2021 | | 2021 |
| **American Wigeon** | *Anas americana* | | | | 2020 | 2021 | 2022 | | | | | | |
| **Amethyst Dancer** | *Argia pallens* | | | | | 2021 | | | | | | | |
| **Arizona Bark Scorpion** | *Centruroides sculpturatus* | | | | | 2022 | 2021 | 2022 | | | | | 2021 |
| **Arizona Bell's Vireo** | *Vireo bellii arizonae* | | | | | 2015 | | | 2008 | | | | |
| **Arizona Carpenter Bee** | *Xylocopa californica arizonensis* | | | | | 2022 | | | | | | | |
| **Arizona Glossy Snake** | *Arizona elegans noctivaga* | | | | | | | | | | | 2013 | |
| **Arizona Leaf Beetle** | *Plagiodera arizonae* | | | | | 2022 | 2021 | | | | | | |
| **Arizona Mantis** | *Stagmomantis limbata* | | | | | 2020 | | | 2022 | | | | |
| **Arizona Pocket Mouse** | *Perognathus amplus* | | | | | | | 2014 | | | 2014 | | |

| Common Name | Wildlife Species | ADRP | BHRP | CCRP | EMRP | HRP | LPRP | MMRP | SCRCA | STRP | UMRP | VMRA | WTRP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Arizona Powdered-Skipper** | *Systasea zampa* | | | | | | 2021 | 2021 | | | | | |
| **Arizona Red-spotted Purple** | *Limenitis arthemis arizonensis* | | | | | 2022 | | | 2021 | | | | |
| **Arizona Toad** | *Anaxyrus microscaphus* | | | | | 2021 | 2010 | | | | | | |
| **Arizona Zebratail Lizard** | *Callisaurus draconoides ventralis* | | | | | 2018 | | | | | | | |
| **Arizona's Sister** | *Adelpha eulalia* | | | | | 2017 | | | | | | | |
| **Armored Stink Beetle** | *Eleodes armata* | | | | | 2022 | | | | | | | |
| **Arroyo Bluet** | *Enallagma praevarum* | | | | | 2021 | 2021 | | | | | | |
| **Ash Flower Mite** | *Eriophyes neoessigi* | | | | | 2021 | | | | | | | |
| **Ash-throated Flycatcher** | *Myiarchus cinerascens* | | | 2019 | 2020 | 2022 | 2021 | 2019 | 2008 | 2020 | 2019 | 2018 | 2022 |
| **Ashy Gray Lady Beetle** | *Olla v-nigrum* | | | | | | 2017 | | | | | | |
| **Asiatic Clam** | *Corbicula fluminea* | | 2002 | | | | 2020 | | | | | | |
| **Audubon's Warbler** | *Setophaga coronata auduboni* | | | | 2020 | 2021 | 2022 | | | | | | |
| **Aztec Dancer** | *Argia nahuana* | | | | | 2021 | 2021 | | | | | | |
| **Bailey's Pocket Mouse** | *Chaetodipus baileyi* | | | | | 2021 | | 2015 | | | 2015 | 2020 | |
| **Bald Eagle** | *Haliaeetus leucocephalus* | | | | | | 2022 | | | | 2020 | | |
| **Bald Eagle WP** | *Haliaeetus leucocephalus WPOP* | | | | 2016 | | 2016 | | | | | | |
| **Barn Owl** | *Tyto alba* | | | | | 2019 | | | | | | | |
| **Barn Swallow** | *Hirundo rustica* | | | | | 2021 | | | | | | | |
| **Barrow's Goldeneye** | *Bucephala islandica* | | | | | | 2022 | | | | | | |
| **BAT COLONY** | *BAT COLONY* | | | | | | | 1998 | 1965 | | | | |
| **Bee3** | *Calliopsis subalpina* | | | | 2021 | | 2021 | | | | | | |
| **Beet Webworm Moth** | *Spoladea recurvalis* | | | | | 2021 | | | | | | | |
| **Beetle** | *Malacopterus tenellus* | | | | | 2021 | | | | | | | |
| **Beetle** | *Osmidus guttatus* | | | | | 2018 | | | | | | | |
| **Bell's Vireo** | *Vireo bellii* | | | | | 2021 | | | 2021 | | | | |
| **Belted Kingfisher** | *Megaceryle alcyon* | | | | 2020 | 2021 | 2022 | | | | | | |
| **Bendire's Thrasher** | *Toxostoma bendirei* | | | | | | 2022 | 2014 | | | | | |
| **Bewick's Wren** | *Thryomanes bewickii* | | | | | 2018 | 2022 | | 2008 | | | | |
| **Big Brown Bat** | *Eptesicus fuscus* | | | | | 2022 | | | | | | | |

# NATURAL RESOURCE PLAN – TABLE 2. WILDLIFE SPECIES LIST

| Common Name | Wildlife Species | ADRP | BHRP | CCRP | EMRP | HRP | LPRP | MMRP | SCRCA | STRP | UMRP | VMRA | WTRP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Big Free-tailed Bat** | *Nyctinomops macrotis* | | | | | 2022 | | | | | | | |
| **Bigelowe's Tansy-Aster** | *Dieteria bigelovii var. bigelovii* | | | | | 1968 | | | | | | | |
| **Bighorn Sheep** | *Ovis canadensis* | | 2019 | | | | 2020 | | | | | | 2021 |
| **Bird Hoverfly** | *Eupeodes volucris* | | 2021 | | | | | | | 2019 | | | |
| **Black and White Click Beetle** | *Chalcolepidius webbi* | | | | | 2021 | | | | | | | |
| **Black Chafer** | *Pelidnota lugubris* | | | | | 2019 | | | | | | | |
| **Black Harvester Ant** | *Veromessor pergandei* | | 2021 | | 2021 | 2022 | | | | 2021 | | | |
| **Black Phoebe** | *Sayornis nigricans* | | | 2019 | 2020 | 2022 | 2022 | | 2008 | | | | |
| **Black Saddlebags** | *Tramea lacerata* | | | | | 2021 | | | | | | | |
| **Black Scoter** | *Melanitta americana* | | | | | | 2021 | | | | | | |
| **Black Setwing** | *Dythemis nigrescens* | | | | | | 2021 | | 2015 | | | | |
| **Black Witch Moth** | *Ascalapha odorata* | | | | | 2021 | | | | | | | |
| **Black-and-white Warbler** | *Mniotilta varia* | | | | | 2020 | | | | | | | |
| **Black-chinned Hummingbird** | *Archilochus alexandri* | | | | | 2022 | | | 2008 | | | | |
| **Black-chinned Sparrow** | *Spizella atrogularis* | | | | | | 2020 | | | | | | 2020 |
| **Black-crowned Night-Heron** | *Nycticorax nycticorax* | | | | 2020 | | 2021 | | | | | | |
| **Black-headed Grosbeak** | *Pheucticus melanocephalus* | | | | | 2021 | 2020 | | 2020 | | | | 2021 |
| **Black-necked Gartersnake** | *Thamnophis cyrtopsis* | | | | | | 2019 | | 2017 | | | | |
| **Black-necked Stilt** | *Himantopus mexicanus* | | | | 2020 | | | | | | | | |
| **Black-tailed Gnatcatcher** | *Polioptila melanura* | | | 2018 | 2020 | 2019 | 2022 | | 2009 | | 2019 | | 2020 |
| **Black-tailed Jackrabbit** | *Lepus californicus* | | | | 2020 | 2022 | 2019 | 2021 | | | 2021 | | 2020 |
| **Black-tailed Rattlesnake** | *Crotalus molossus* | | | | | | | | | 2015 | | | 2021 |
| **Black-throated Gray Warbler** | *Setophaga nigrescens* | | | | | 2018 | | | 2008 | | | | 2019 |
| **Black-throated Sparrow** | *Amphispiza bilineata* | | | 2022 | 2020 | 2022 | 2022 | 2021 | 2019 | 2022 | 2021 | 2017 | 2022 |
| **Blister Beetle** | *Epicauta polingi* | | | 2019 | | 2022 | | | | | | | |
| **Bloody Net-winged Beetle** | *Lycus sanguineus* | | | | | | | | | | 2019 | | |
| **Blue Dasher** | *Pachydiplax longipennis* | | | | | 2021 | | | | | | | |
| **Blue Grosbeak** | *Passerina caerulea* | | | | | 2020 | | | | | | | |
| **Blue-eyed Darner** | *Rhionaeschna multicolor* | | | | | 2021 | | | | | | | |
| **Blue-gray Gnatcatcher** | *Polioptila caerulea* | | | | 2020 | 2022 | 2022 | | 2008 | | 2018 | | |

| Common Name | Wildlife Species | ADRP | BHRP | CCRP | EMRP | HRP | LPRP | MMRP | SCRCA | STRP | UMRP | VMRA | WTRP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Blue-ringed Dancer** | *Argia sedula* | | | | | 2021 | 2021 | | | | | | |
| **Blue-winged Teal** | *Anas discors* | | | | | | 2020 | | | | | | |
| **Bobcat** | *Lynx rufus* | | | 2017 | 2020 | 2022 | | | 2020 | | 2013 | | |
| **Bonaparte's Gull** | *Chroicocephalus philadelphia* | | | | | | 2022 | | | | | | |
| **Bonytail chub** | *Gila elegans* | | | | | 1991 | | | | | | | |
| **Botta's Pocker Golpher** | *Thomomys bottae* | | | | | 2022 | | | | | | | |
| **Brewar's Sparrow** | *Spizella breweri* | | | | | 2022 | 2022 | 2020 | | | 2019 | 2018 | 2022 |
| **Brewer's Blackbird** | *Euphagus cyanocephalus* | | | | | 2019 | 2022 | | 2019 | | | | |
| **Bridled Titmouse** | *Baeolophus wollweberi* | | | | | 2019 | | | 2007 | | | | |
| **Broad-billed Hummingbird** | *Cynanthus latirostris* | | | | | 2021 | | | | | | | |
| **Broad-tailed Hummingbird** | *Selasphorus platycercus* | | | | | | | | 2008 | | | | |
| **Broad-winged Hawk** | *Buteo platypterus* | | | | | 2018 | | | | | | | |
| **Bronzed Cowbird** | *Molothrus aeneus* | | | | | | | | 2008 | | | | |
| **Brown Creeper** | *Certhia americana* | | | | | 2017 | 2020 | | | | | | |
| **Brown-crested Flycatcher** | *Myiarchus tyrannulus* | | | | | 2019 | | | 2008 | | | | |
| **Brown-headed Cowbird** | *Molothrus ater* | | | | 2020 | 2019 | 2020 | 2021 | 2021 | | 2022 | | |
| **Brush Deermouse** | *Peromyscus boylii* | | | | | | | 2012 | | | | | |
| **Bufflehead** | *Bucephala albeola* | | | | | 2021 | 2022 | | | | | | |
| **Bullfrog** | *Rana catesbeiana* | | | | | | 2007 | | | | | | |
| **Bullock's Oriole** | *Icterus bullockii* | | | | | 2021 | 2020 | 2021 | 2008 | | | | |
| **Burrowing Owl** | *Athene cunicularia* | | | | 2021 | | 2022 | | | | | | |
| **Cackling Goose** | *Branta hutchinsii* | | | | | | 2020 | | | | | | |
| **Cactus Longhorned Beetle** | *Moneilema gigas* | | | 2018 | | | | | | | | | |
| **Cactus Mouse** | *Peromyscus eremicus* | | | | | 2022 | | 2012 | | | | | |
| **Cactus Wren** | *Campylorhynchus brunneicapillus* | | | 2022 | 2020 | 2022 | 2022 | 2020 | 2022 | | 2021 | | 2022 |
| **California Dancer** | *Argia agrioides* | | | | | 2022 | 2021 | | | | | | |
| **California Gull** | *Larus californicus* | | | | | | 2022 | | | | | | |
| **California Harvester Ant** | *Pogonomyrmex californicus* | | | | 2019 | 2022 | 2021 | | | | | | |
| **California Kingsnake** | *Lampropeltis californiae* | | | | | 2021 | | | 2019 | | | | 2020 |

# NATURAL RESOURCE PLAN – TABLE 2. WILDLIFE SPECIES LIST

| Common Name | Wildlife Species | ADRP | BHRP | CCRP | EMRP | HRP | LPRP | MMRP | SCRCA | STRP | UMRP | VMRA | WTRP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **California Leaf-nosed bat** | *Macrotus californicus* | | | | | 2022 | | 1994 | 1965 | | | | |
| **California Mantis** | *Stagmomantis californica* | | | | | | | | | | | | 2018 |
| **California Myotis** | *Myotis californicus* | | | | | 2022 | | | | | | | |
| **California Patch** | *Chlosyne californica* | | | | 2021 | 2022 | 2022 | 2021 | 2021 | | | 2007 | |
| **California Red-shouldered Hawk** | *Buteo lineatus elegans* | | | | | 2020 | | | | | | | |
| **Calligrapher Fly** | *Toxomerus marginatus* | | | | | 2021 | | | | | | | |
| **Canada Goose** | *Branta canadensis* | | | | | | 2022 | | | | | | |
| **Canvasback** | *Aythya Valisineria* | | | | | | 2022 | | | | | | |
| **Canyon Bat** | *Parastrellus hesperus* | | | | | 2022 | | 2016 | | | | | 2020 |
| **Canyon Rubyspot** | *Hetaerina vulnerata* | | | | | 2021 | 2021 | | | | | | |
| **Canyon Towhee** | *Melozone fusca* | | | 2022 | | | 2022 | 2019 | 2009 | | 2015 | | 2020 |
| **Canyon Tree Frog** | *Hyla arenicolor* | | | | | | | | 2011 | | | | |
| **Canyon Wren** | *Catherpes mexicanus* | | | | | 2020 | 2022 | | 2019 | | | | 2021 |
| **Carmine Skimmer** | *Orthemis discolor* | | | | | 2021 | | | | | | | |
| **Cassins Kingbird** | *Tyrannus vociferans* | | | | | 2021 | | | 2008 | | | | |
| **Cassin's Vireo** | *Vireo cassinii* | | | | | 2021 | 2022 | | | | | | |
| **Cave Myotis** | *Myotis velifer* | | | | | 2022 | | 2016 | | | | | |
| **Cedar Waxwing** | *Bombycilla cedrorum* | | | | | 2021 | | | | | | | |
| **Ceraunus Blue** | *Hemiargus ceraunus* | | | | | 2021 | 2021 | 2021 | 2021 | | | | 2019 |
| **Channel Catfish** | *Ictalurus punctatus* | | | | | | 2021 | | | | | | |
| **Chaparral Goldenweed** | *Ericameria brachylepis* | | | | | | | 1974 | | | | | |
| **Charcoal Seed Bug** | *Melacoryphus lateralis* | | | 2019 | | | | | | | | | 2017 |
| **Checkered White** | *Pontia protodice* | | 2021 | | 2019 | 2021 | | 2020 | 2021 | 2019 | 2019 | | 2019 |
| **Chestnut-sided Warbler** | *Setophaga pensylvanica* | | | | | 2021 | | | | | | | |
| **Chipping Sparrow** | *Spizella passerina* | | | | 2021 | 2020 | 2022 | | 2008 | | | | |
| **Cinnamon Teal** | *Anas cyanoptera* | | | | | 2022 | 2020 | | | | | | |
| **Citrine Forktail** | *Ischnura hastata* | | | | | 2021 | | | | | | | |
| **Citrus Cicada** | *Diceroprocta apache* | | | | | 2019 | | | | | | | |
| **Clark's Grebe** | *Aechmophorus clarkii* | | | | | | 2022 | | | | | | |



MARICOPA COUNTY PARKS & RECREATION

| Common Name | Wildlife Species | ADRP | BHRP | CCRP | EMRP | HRP | LPRP | MMRP | SCRCA | STRP | UMRP | VMRA | WTRP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Clark's Spiny Lizard** | *Sceloporus clarkii* | | | | | 2021 | | | 2018 | | | | |
| **Click Beetle** | *Diplostethus opacicollis* | | | | | 2019 | | | | | | | |
| **Cliff Chipmunk** | *Neotamias dorsalis* | | | | | | | | | | 2017 | | |
| **Cloudless sulphur** | *Phoebis sennae* | | | 2021 | | 2021 | | 2021 | 2021 | | | | |
| **Coachwhip** | *Coluber flagellum* | | | | | 2022 | 2008 | 2017 | | | 2019 | | 2019 |
| **Coati (Coatimundi)** | *Nasua nasua* | | | | | | 2018 | | | | | | |
| **Common Black Hawk** | *Buteogallus anthracinus* | | | | | 2019 | | | | | | | |
| **Common Buckeye** | *Junonia coenia* | | | | | 2020 | | 2020 | 2020 | | | | |
| **Common Carp** | *Cyprinus carpio* | | | | | | 2012 | | | | | | |
| **Common Checkered-Skipper** | *Pyrgus communis* | | | | | 2022 | | 2021 | 2020 | | | | |
| **Common Chuckwalla** | *Sauromalus ater* | | | | 2020 | | | | | | 2022 | | 2022 |
| **Common Desert Centipede** | *Scolopendra polymorpha* | | | | | | | | | 2010 | | | |
| **Common Gallinule** | *Gallinula galeata* | | | | 2020 | 2018 | 2022 | | | | | | |
| **Common Goldeneye** | *Bucephala clangula* | | | | | 2021 | 2022 | | | | | | |
| **Common Green Darner** | *Anax junius* | | | | | 2021 | 2020 | | | | | | |
| **Common Ground-Dove** | *Columbina passerina* | | | | | | | | | 2020 | | | |
| **Common Loon** | *Gavia immer* | | | | | | 2022 | | | | | | |
| **Common Merganser** | *Mergus merganser* | | | | | | 2022 | | | | | | |
| **Common Milkweed Bug** | *Lygaeus kalmii* | | | | | 2021 | 2021 | | | | | | |
| **Common Pill Bug** | *Armadillidium vulgare* | | | | | 2022 | | | 2019 | | | | |
| **Common Poorwill** | *Phalaenoptilus nuttallii* | | | 2021 | | 2022 | | | 2010 | | | | 2020 |
| **Common Raven** | *Corvus corax* | | | 2019 | | 2019 | 2022 | 2021 | 2019 | | 2018 | | |
| **Common Side-blotched Lizard** | *Uta stansburiana* | | 2021 | 2022 | 2021 | 2022 | 2021 | 2022 | 2021 | 2021 | 2021 | 2021 | 2022 |
| **Common Slider** | *Trachemys scripta elegans* | | | | | 2022 | 2019 | | | | | | |
| **Common Sootywing** | *Pholisora catullus* | | | | | | | | | | | | 2017 |
| **Common Whitetail** | *Plathemis lydia* | | | | | 2019 | | | | | | | |
| **Common Yellowthroat** | *Geothlypis trichas* | | | | | 2020 | 2022 | | 2008 | | | | |
| **Convergent Lady Beetle** | *Hippodamia convergens* | | | | 2019 | 2021 | | 2021 | | | 2019 | | 2019 |
| **Cooper's Hawk** | *Accipiter cooperii* | | | | 2020 | 2022 | 2022 | | 2019 | | 2021 | | 2021 |

# NATURAL RESOURCE PLAN – TABLE 2. WILDLIFE SPECIES LIST

| Common Name | Wildlife Species | ADRP | BHRP | CCRP | EMRP | HRP | LPRP | MMRP | SCRCA | STRP | UMRP | VMRA | WTRP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Cordilleran Flycatcher** | *Empidonax occidentalis* | | | | | 2015 | | | | | | | |
| **Cossidae Moth** | *Hypopta palmata* | | | 2019 | | | | | | | | | |
| **Costas Hummingbird** | *Calypte costae* | | | | | 2021 | 2022 | 2017 | 2022 | | 2020 | 2018 | 2021 |
| **Couch's Spadefoot** | *Scaphiopus couchii* | 1995 | | 2021 | | 2021 | | | | | 2022 | | 2019 |
| **Coyote** | *Canis latrans* | | | 2017 | 2021 | 2022 | 2021 | 2021 | 2009 | 2020 | 2021 | 2021 | 2022 |
| **Crambidae Moth** | *Pseudoschinia elautalis* | | | 2019 | | 2021 | | | | | | | |
| **Cream Grasshopper** | *Cibolacris parviceps* | | | | | 2018 | | | | | | | |
| **Creosote Bush Katydid** | *Insara covilleae* | | | 2018 | | | | | | | | | |
| **Creosote Gall Midge** | *Asphondylia auripila* | | | 2017 | | 2022 | | 2021 | 2021 | 2021 | 2021 | | 2021 |
| **Creosote Gall Midge** | *Asphondylia villosa* | | | | | | | 2015 | | | | | |
| **Creosote Moth** | *Digrammia colorata* | | | 2019 | | | | 2021 | | | | | |
| **Crissal Thrasher** | *Toxostoma crissale* | | | | | 2021 | 2022 | | | | | | |
| **Curve-billed Thrasher** | *Toxostoma curvirostre* | | | 2022 | 2020 | 2019 | 2022 | 2022 | 2022 | 2021 | 2022 | | 2021 |
| **Dainty Sulphur** | *Nathalis iole* | | | 2022 | 2021 | 2022 | | 2021 | 2020 | | 2019 | | 2021 |
| **Dark Eyed Junco** | *Junco hyemalis* | | | | | 2018 | 2022 | | | | | | |
| **Dark-banded Cobubatha Moth** | *Cobubatha lixiva* | | | | | | | | | | | | 2017 |
| **Darkling Beetle** | *Pechalius dentiger* | | | | | 2020 | | | | | | | |
| **Darkling Beetle** | *Trichoton sordidum* | | | | | 2021 | | | | | | | |
| **Decollate snail** | *Rumina decollata* | | | | | 2022 | | | | | | | |
| **Desert Barrell Cactus** | *Ferocactus cylindraceus* | | 1977 | | | 2022 | | | | | | | |
| **Desert Bighorn Sheep** | *Ovis canadensis mexicana* | | | | | | 2008 | | | | | | 2020 |
| **Desert Black Swallowtail** | *Papilio polyxenes coloro* | | | | | 2021 | | | | | | | |
| **Desert Blonde Tarantula** | *Aphonopelma chalcodes* | | | 2019 | | 2022 | 2018 | 2020 | | | 2019 | | 2020 |
| **Desert Clicker Grasshopper** | *Ligurotettix coquilletti* | | | | | | | | | | | | 2018 |
| **Desert Cockroach** | *Arenivaga investigata* | | | | | 2018 | | | | | | | |
| **Desert Cottontail** | *Sylvilagus audubonii* | | | 2017 | 2020 | 2022 | | 2021 | 2022 | 2021 | 2021 | | 2019 |
| **Desert Dodder** | *Cuscuta denticulata* | | 1978 | | | | | | | | | | |
| **Desert Firetail** | *Telebasis salva* | | | | | 2021 | 2021 | | 2015 | | | | |
| **Desert Hairy Scorpion** | *Hadrurus arizonensis* | | | 2003 | 2019 | 2022 | | | | | 2019 | 2021 | 2020 |
| **Desert Harvester Ant** | *Novomessor albisetosus* | | | | | 2022 | | | | | | | |



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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Desert Horned Lizard** | *Phrynosoma platyrhinos* | | | | 2021 | | | | | | | | |
| **Desert Iguana** | *Dipsosaurus dorsalis* | | | | | 2022 | | | | | 2017 | | |
| **Desert Ironclad Beetle** | *Asbolus verrucosus* | | | | | 2022 | | | | | | | 2021 |
| **Desert Ironclad Beetle** | *Cryptoglossa variolosa* | | | | | 2019 | | | | | | | 2018 |
| **Desert Leaf-cutter Ant** | *Acromyrmex versicolor* | | 2021 | | | | 2020 | | | 2019 | | | |
| **Desert Mule Deer** | *Odocoileus hemionus eremicus* | | | 2021 | | 2020 | | | | | | | 2017 |
| **Desert Nightsnake** | *Hypsiglena chlorophaea* | | | | 2021 | 2022 | 2017 | 2015 | | 2014 | 2017 | | |
| **Desert Patchnose Snake** | *Salvadora hexalepis hexalepis* | | | | | 2022 | | | | | 2020 | | |
| **Desert Pocket Mouse** | *Chaetodipus penicillatus* | | | | | | | 2015 | | | 2015 | | |
| **Desert Pupfish** | *Cyprinodon macularius* | | | | | 1990 | 2010 | 2010 | 2009 | | | | |
| **Desert Shaggymane** | *Podaxis pistillaris* | | 2021 | | | 2017 | | | | | 2019 | | |
| **Desert Song Sparrow** | *Melospiza melodia fallax* | | | | | 2021 | | | | | | | |
| **Desert Spike Moss** | *Selaginella eremophila* | | | | 1973 | | | | | | | | |
| **Desert Spiny Lizard** | *Sceloporus magister* | | | 2017 | 2020 | 2022 | 2000 | | 2021 | | | | 2020 |
| **Desert Tortoise (Sonoran)** | *Gopherus morafkai* | | 2004 | 2021 | 2020 | 2022 | 2019 | 2021 | 2004 | 2010 | 2017 | 2019 | 2019 |
| **Diving Beetle** | *Laccophilus pictus coccinelloides* | | | | | | 2019 | | | | | | |
| **Domestic Cow** | *Bos taurus* | | | | | 2020 | | | | | | | |
| **Domestic Duck** | *Anas platyrhynchos domesticus* | | | | | 2020 | 2022 | | | | | | |
| **Domestic Goose** | *Anser anser* | | | | | | 2022 | | | | | | |
| **Domestic Muscovy Duck** | *Cairina moschata domestica* | | | | | | 2022 | | | | | | |
| **Double-banded Bycid** | *Sphaenothecus bilineatus* | | | | | 2021 | | | | | | | |
| **Double-crested Cormorant** | *Phalacrocorax auritus* | | | | 2020 | | 2022 | | | | | | |
| **Double-striped Bluet** | *Enallagma basidens* | | | | | 2022 | | | | | | | |
| **Dung Beetle** | *Digitonthophagus gazella* | | | | | 2021 | | | | | | | |
| **Dusky Flycatcher** | *Empidonax oberholseri* | | | | | 2013 | 2022 | | | | | | |
| **Dusky-capped Flycatcher** | *Myiarchus tuberculifer* | | | | | 2019 | | | | | | | |
| **Dwarf Earthstar** | *Geastrum schmidelii* | | | | | 2019 | | | | | | | |
| **Eared Grebe** | *Podiceps nigricollis* | | | | | | 2022 | | | | | | |
| **Eastern Collared Lizard** | *Crotaphytus collaris* | | | | | | 2015 | | | | 2017 | | 2019 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Eastern Desertsnail** | *Eremarionta rowelli* | | | | 2011 | 2022 | 2010 | | | | | | |
| **Eastern Phoebe** | *Sayornis phoebe* | | | | | 2007 | | | | | | | |
| **Echo Azure** | *Celastrina echo* | | | 2022 | | 2022 | | | 2022 | | | | |
| **Elf Owl** | *Micrathene whitneyi* | | | | | | 2015 | | 2010 | | 2019 | | |
| **Empress Leilia** | *Asterocampa leilia* | | | | | 2022 | | 2022 | 2022 | | 2021 | | 2021 |
| **Eufala Skipper** | *Lerodea eufala* | | | | | 2021 | | 2021 | | | | | |
| **Eurasian Collared-Dove** | *Streptopelia decaocto* | | | 2019 | 2021 | 2019 | 2022 | | 2008 | 2020 | | | |
| **European Herring Gull** | *Larus argentatus* | | | | | | 2022 | | | | | | |
| **European Starling** | *Sturnus vulgaris* | | | | 2021 | | 2022 | | 2008 | | | | 2020 |
| **Evening Grosbeak1** | *Coccothraustes vespertinus brooksi* | | | | | 2019 | | | | | | | |
| **Fall Webworm Moth** | *Hyphantria cunea* | | | | | 2020 | | | | | | | |
| **Familiar Bluet** | *Enallagma civile* | | | | | 2021 | | | | | | | |
| **Fatal Metalmark** | *Calephelis nemesis* | | | | | 2022 | 2017 | | | | | | |
| **Feral/Domestic Cat** | *Felis catus* | | | | | 2019 | | | | 2020 | | | |
| **Fiery Skipper** | *Hylephila phyleus* | | | | | 2021 | | | 2021 | | | | |
| **Filigree Skimmer** | *Pseudoleon superbus* | | | | | 2021 | 2021 | | 2015 | | | | |
| **Five-spotted Hawk Moth** | *Manduca quinquemaculatus* | | | | | 2022 | | 2021 | | | | | |
| **Flame Skimmer** | *Libellula saturata* | | | | | 2021 | 2021 | | | | 2017 | | 2016 |
| **Flathead Catfish** | *Pylodictis olivaris* | | | | | | 2018 | | | | | | |
| **Forsebia Moth** | *Forsebia cinis* | | | 2019 | | 2019 | | | | | | | |
| **Fort Verde Pocket Mouse** | *Perognathus amplus amplus* | | | | | | | 2015 | | | 2015 | | |
| **Four-spurred Assassin Bug** | *Zelus tetracanthus* | | | 2019 | | | | | | 2019 | 2019 | | |
| **Fox Sparrow** | *Passerella iliaca* | | | | | 2008 | | | | | | | |
| **Franklin's Gull** | *Leucophaeus pipixcan* | | | | | | 2021 | | | | | | |
| **Fruit Fly** | *Euarestoides acutangulus* | | | | | | | | | | 2019 | | |
| **Funereal Duskywing** | *Erynnis funeralis* | | | | | 2021 | 2019 | | 2021 | | 2021 | | 2020 |
| **Gadwall** | *Mareca strepera* | | | | | | 2022 | | | | | | |
| **Gambel's Quail** | *Callipepla gambelii* | | | 2020 | 2020 | 2022 | 2022 | 2021 | 2019 | 2020 | 2021 | | 2021 |
| **Gambel's White-crowned Sparrow** | *Zonotrichia leucophrys gambelii* | | | | | 2022 | | | | | | | |



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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Ghopher Snake** | *Pituophis catenifer* | | | | | 2021 | | 2020 | | | 2020 | | 2020 |
| **Giant Crab Spider** | *Olios giganteus* | | | | | 2022 | | | | | | | 2018 |
| **Giant Desert Centipede** | *Scolopendra heros* | | | | | | | | | | | | 2019 |
| **Giant Mesquite Bug** | *Thasus neocalifornicus* | | | | | 2022 | | | | | | | |
| **Gila Longfin Dace** | *Agosia chrysogaster chrysogaster* | | | | | 1994 | 2018 | | 2008 | | | | |
| **Gila Topminnow** | *Poeciliopsis occidentalis occidentalis* | | | | | 1993 | 2018 | 2009 | 2009 | | 2011 | | 2009 |
| **Gila Woodpecker** | *Melanerpes uropygialis* | | 2021 | 2019 | 2022 | 2022 | 2022 | 2020 | 2021 | 2021 | 2021 | | 2022 |
| **Gilbert's Skink** | *Plestiodon gilberti* | | | | | 2022 | | | | | | | |
| **Gilded Flicker** | *Colaptes chrysoides* | | | 2019 | 2020 | 2022 | 2022 | 2020 | 2010 | | 2022 | | 2022 |
| **Glechidae Moth** | *Ornativalva erubescens* | | | 2019 | | | | | | | | | |
| **Glossy Snake** | *Arizona elegans* | | | | | 2022 | | 2015 | | | | | |
| **Goldedn Paper Wasp** | *Polistes aurifer* | | | | | | | | 2021 | | | | |
| **Golden-crowned Kinglet** | *Regulus satrapa* | | | | | 2018 | | | | | | | |
| **Golden-crowned Sparrow** | *Zonotrichia atricapilla* | | | | 2019 | | | 2019 | | | | | |
| **Golden-headed Scallopwing** | *Staphylus ceos* | | | | | 2015 | | | | | | | |
| **Grasshopper Sparrow** | *Ammodramus savannarum* | | | | | 2002 | | | | | | | |
| **Gray Bird Grasshopper** | *Schistocerca nitens* | | | 2020 | | 2019 | 2022 | 2021 | 2019 | | | | 2019 |
| **Gray Catbird** | *Dumetella carolinensis* | | | | | 2019 | | | | | | | |
| **Gray Flycatcher** | *Empidonax wrightii* | | | | | 2012 | 2022 | | 2019 | | | | |
| **Gray Fox** | *Urocyon cinereoargenteus* | | | 2017 | 2020 | 2021 | | | | 2020 | 2013 | | 2019 |
| **Gray Hairstreak** | *Strymon melinus* | | | | 2021 | 2022 | 2021 | 2021 | | | 2020 | | 2021 |
| **Gray Hawk** | *Buteo plagiatus* | | | | | 2021 | | | | | | | |
| **Gray Sanddragon** | *Progomphus borealis* | | | | | 2021 | | | | | | | |
| **Gray Vireo** | *Vireo vicinior* | | | | | | | | | | | | 2018 |
| **Great Basin Collared Lizard** | *Crotaphytus bicinctores* | | | | | 2022 | | | | | | | 2021 |
| **Great Blue Heron** | *Ardea herodias* | | | | 2020 | 2021 | 2022 | | 2008 | | | | |
| **Great Crested Flycatcher** | *Myiarchus crinitus* | | | | | 2009 | | | | | | | |
| **Great Egret** | *Ardea alba* | | | | 2020 | 2021 | 2022 | | | | | | |
| **Great Horned Owl** | *Bubo virginianus* | | | 2019 | 2021 | 2022 | 2022 | 2020 | | 2020 | 2021 | | 2017 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Great Plains Toad** | *Anaxyrus cognatus* | 1995 | | | | | | | | | | | |
| **Great Pondhawk** | *Erythemis vesiculosa* | | | | | 2021 | | | | | | | |
| **Great Purple Hairstreak** | *Atlides halesus* | | | | 2021 | 2021 | | 2021 | | | | | 2021 |
| **Great Southern White** | *Ascia monuste* | | | | | 2021 | | | | | | | |
| **Great Spreadwing** | *Archilestes grandis* | | | 2022 | | 2021 | 2021 | | 2021 | | | | |
| **Greater Earless Lizard** | *Cophosaurus texanus* | | | | | 2022 | 2022 | | | | 2019 | | |
| **Greater Roadrunner** | *Geococcyx californianus* | | | 2017 | 2020 | 2020 | 2022 | | 2008 | 2020 | 2019 | | 2021 |
| **Greater Scaup** | *Aythya marila* | | | | | | 2022 | | | | | | |
| **Greater White-fronted Goose** | *Anser albifrons* | | | | | 2022 | 2020 | | | | | | |
| **Greater Yellowlegs** | *Tringa melanoleuca* | | | | | | 2022 | | 2008 | | | | |
| **Great-tailed Grackle** | *Quiscalus mexicanus* | | | | 2020 | | 2022 | | 2008 | | | | |
| **Green Blister Beetle** | *Lytta stygica* | | | | | 2019 | | | | | | | |
| **Green Heron** | *Butorides virescens* | | | | 2020 | 2021 | 2022 | | | | | | |
| **Green Peach Beetle** | *Cotinis mutabilis* | | | | | 2022 | | | | | | | |
| **Green Pubescent Ground Beetle** | *Chlaenius sericeus* | | | | | 2018 | | | | | | | |
| **Green Sunfish** | *Lepomis cyanellus* | | | | | | 2018 | | | | | | |
| **Green Valley Grasshopper** | *Schistocerca shoshone* | | | | | 2021 | | | | | | | |
| **Green-tailed Towhee** | *Pipilo chlorurus* | | | | | 2021 | 2020 | | 2008 | | | | 2020 |
| **Green-winged Teal** | *Anas carolinensis* | | | | 2020 | | 2022 | | | | | | |
| **Grotella Moth** | *Grotella binda* | | | | | 2018 | | | | | | | |
| **Grotella Moth** | *Grotella tricolor* | | | | | | | | | | | | 2017 |
| **Groundsnake** | *Sonora semiannulata* | | | | | 2022 | | | | | | 2014 | 2019 |
| **Hackberry Gall** | *Leuronota maculata* | | | | | 2021 | | | | | | | |
| **Hairy Maggot Blowfly** | *Chrysomya rufifacies* | | | | | 2018 | | | | | | | |
| **Hammond's Flycatcher** | *Empidonax hammondii* | | | | | 2018 | | | | | | | |
| **Harris's Antelope Squirrel** | *Ammospermophilus harrisii* | | | 2017 | 2020 | 2022 | 2018 | 2017 | | | 2021 | | 2022 |
| **Harris's Hawk** | *Parabuteo unicinctus* | | | | | 2021 | 2020 | 2021 | 2021 | | 2022 | | |
| **Hepatic Tanager** | *Piranga flava* | | | | | 2021 | | | | | | | |
| **Hermit Thrush** | *Catharus guttatus* | | | | 2021 | 2022 | 2022 | | 2007 | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Hermit Warbler** | *Setophaga occidentalis* | | | | | 2020 | 2020 | | | | | | |
| **HIGH NETTING CONCENTRATION** | *BAT FORAGING AREA* | | | | | 2002 | | | | | | | |
| **Hoary Bat** | *Lasiurus cinereus* | | | | | 2022 | | | | | | | 2020 |
| **Hohokam Agave** | *Agave murpheyi* | | | | | 1991 | 1991 | | | | | | |
| **Honey-tailed Striped-sweat Bee** | *Agapostemon melliventris* | | | | | | | 2021 | | | | | |
| **Hooded Merganser** | *Lophodytes cucullatus* | | | | | | 2022 | | | | | | |
| **Hooded Oriole** | *Icterus cucullatus* | | | | | 2021 | | | 2008 | | | | |
| **Hooded Skunk** | *Mephitis macroura* | | | | | 2021 | | | | | | | |
| **Hooded Warbler** | *Setophaga citrina* | | | | | 2019 | | | | | | | |
| **Horned Grebe** | *Podiceps auritus* | | | | | | 2022 | | | | | | |
| **Horned Lark** | *Eremophila alpestris* | | | | | | 2022 | | | | | | |
| **House Finch** | *Haemorhous mexicanus* | | | 2022 | 2020 | 2022 | 2022 | 2021 | 2009 | | 2022 | 2017 | 2021 |
| **House Sparrow** | *Passer domesticus* | | | | 2020 | 2021 | 2022 | | 2021 | | 2022 | | |
| **House Wren** | *Troglodytes aedon* | | | | | 2015 | 2022 | | 2008 | | | | |
| **Hubbard's Silk Moth** | *Syssphinx hubbardi* | | | 2015 | | | | | | | | | |
| **Hutton's Vireo** | *Vireo huttoni* | | | | | 2021 | 2020 | | | | | | |
| **Hyaline Grass Bug** | *Liorhyssus hyalinus* | | | | | | | 2021 | | | | | |
| **Iceland Gull** | *Larus glaucoides* | | | | | | 2018 | | | | | | |
| **Iceland Gull (Thayer's)** | *Larus glaucoides thayeri* | | | | | | 2018 | | | | | | |
| **Inca Dove** | *Columbina inca* | | | | | 2008 | 2022 | | 2008 | | | | |
| **Indigo Bunting** | *Passerina cyanea* | | | | | 2013 | | | | | | | |
| **Iron Cross Blister Beetle** | *Tegrodera aloga* | | | | | 2020 | | | | | | 2020 | |
| **Isabelle's bromeliad fly** | *Copestylum isabellina* | | | | | | | | | 2021 | | | |
| **Javelina** | *Pecari tajacu* | | | 2017 | | 2022 | 2008 | | | 2020 | 2013 | 2021 | 2019 |
| **Joined Underwing Moth** | *Catocala junctura* | | | | | 2017 | | | | | | | |
| **Jumping Spider** | *Metaphidippus chera* | | | 2022 | | | | | | 2021 | | | |
| **June Bug** | *Cyclocephala melanocephala* | | | | | 2021 | | | | | | | |
| **Juno Buck Moth** | *Hemileuca juno* | | | | | 2021 | | | | | | | |
| **Kentucky Warbler** | *Geothlypis formosa* | | | | | 2007 | | | | | | | |
| **Killdeer** | *Charadrius vociferus* | | | | 2020 | 2022 | 2022 | | 2009 | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Kissing Bug** | *Triatoma rubida* | | | | | 2021 | | | | | | | |
| **Kit Fox** | *Vulpes macrotis* | | | | | 2022 | | | | | | 2021 | |
| **Kiwa Dancer** | *Argia immunda* | | | | | 2021 | 2021 | | | | | | |
| **Ladder-backed Woodpecker** | *Dryobates scalaris* | | | 2019 | 2020 | 2022 | 2022 | 2022 | 2018 | | 2015 | | 2021 |
| **Lark Bunting** | *Calamospiza melanocorys* | | | | | | 2020 | | 2012 | | 2019 | | 2019 |
| **Lark Sparrow** | *Chondestes grammacus* | | | | 2022 | 2015 | 2022 | 2021 | 2009 | | | | |
| **Lavender Dancer** | *Argia hinei* | | | | | 2021 | 2021 | | | | | | |
| **Lawrence's Goldfinch** | *Spinus lawrencei* | | | | | 2021 | | | | | | | 2022 |
| **Lazuli Bunting** | *Passerina amoena* | | | | | 2019 | | | 2008 | | | | |
| **Le Conte's Thrasher** | *Toxostoma lecontei* | | | | 2020 | | | | | | | | |
| **Leaf Beetle** | *Mimosestes amicus* | | | | | 2021 | | | | | | | |
| **Leafhopper Assassin Bug** | *Zelus renardii* | | | | | 2022 | | | | | 2021 | | |
| **Least Bittern** | *Ixobrychus exilis* | | | | 2020 | | 2022 | | | | | | |
| **Least Sandpiper** | *Calidris minutilla* | | | | 2020 | 2022 | 2022 | | | | | | |
| **Leda Ministreak** | *Ministrymon leda* | | | | | 2021 | | | | | | | |
| **Lesser Goldfinch** | *Spinus psaltria* | | | | | 2022 | 2022 | | 2021 | | 2022 | | |
| **Lesser Long-nosed Bat** | *Leptonycteris yerbabuenae* | | | | | | | 1992 | | | | | |
| **Lesser Nighthawk** | *Chordeiles acutipennis* | | | 2019 | | 2022 | | | 2010 | | | | |
| **Lesser Scaup** | *Aythya affinis* | | | | | | 2022 | | | | | | |
| **Lewis's Woodpecker** | *Melanerpes lewis* | | | 2015 | | 2021 | | | | | | | |
| **Lincoln's Sparrow** | *Melospiza lincolnii* | | | | 2020 | 2021 | 2020 | | | | | | |
| **Lobed Fleabane** | *Erigeron lobatus* | | | | 1973 | | 1973 | | | | | | |
| **Loggerhead Shrike** | *Lanius ludovicianus* | | | | 2020 | 2009 | 2022 | 2021 | | 2020 | | | 2022 |
| **Long-billed Curlew** | *Numenius americanus* | | | | | | 2021 | | | | | | |
| **Long-billed dowitcher** | *Limnodromus scolopaceus* | | | | | | 2022 | | | | | | |
| **Long-eared Myotis** | *Myotis evotis* | | | | | 2020 | | | | | | | |
| **Longfin Dace** | *Agosia chrysogaster* | | | | | 2022 | | | | | | | |
| **Longhorn Cactus Fly** | *Odontoloxozus longicornis* | | | | | | | 2017 | | | | | |
| **Long-jawed Longhorn Beetle** | *Trachyderes mandibularis* | | | | | 2019 | | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Long-legged Myotis** | *Myotis volans* | | | | | 2022 | | | | | | | |
| **Long-nosed Leopard Lizard** | *Gambelia wislizenii* | | | | | | 2021 | | | | | | |
| **Long-nosed Snake** | *Rhinocheilus lecontei* | | | | | 2022 | | 2016 | | | 2022 | 2014 | 2020 |
| **Long-tailed Brush Lizard** | *Urosaurus graciosus* | | | | | 2007 | | | | | | | |
| **Long-tailed Jaeger** | *Stercorarius longicaudus* | | | | | | 2019 | | | | | | |
| **Lowland Leopard Frog** | *Lithobates yavapaiensis* | | | | | 2022 | 2017 | | 2011 | | | | |
| **Lucy's Warbler** | *Leiothlypis luciae* | | | | | 2022 | | | | | | | |
| **Lucy's Warbler** | *Oreothlypis luciae* | | | | 2019 | 2019 | | | 2008 | | 2020 | | |
| **MacGillivray's Warbler** | *Geothlypis tolmiei* | | | | | 2021 | | | 2008 | | | | |
| **Mallard** | *Anas platyrhynchos* | | | | 2020 | 2022 | 2022 | | 2008 | | | | |
| **Maricopa Tiger Beetle** | *Cicindela oregona maricopa* | | | | | 2021 | | | | | | | |
| **Marine Blue** | *Leptotes marina* | | | | | 2022 | | 2021 | 2018 | 2021 | 2019 | | 2021 |
| **Marsh Purslane** | *Ludwigia palustris* | | | | | 2007 | | | | | | | |
| **Marsh Wren** | *Cistothorus palustris* | | | | 2020 | 2015 | 2022 | | | | | | |
| **Master Blister Beetle** | *Lytta magister* | | | | 2019 | 2022 | 2021 | | | 2019 | 2017 | | 2022 |
| **Mediterranean Mantis** | *Iris oratoria* | | | | 2016 | 2021 | | | | | | | |
| **Mediterranean Red Bug** | *Scantius aegyptius* | | | | | 2021 | | | | | | | |
| **Merriam's Kangaroo Rat** | *Dipodomys merriami* | | | | 2020 | 2022 | | 2015 | | | 2015 | | |
| **Metallic Wood-bore Beetle** | *Acmaeodera alicia* | | | 2021 | | | | 2021 | | | | | 2017 |
| **Metallic Wood-bore Beetle** | *Acmaeodera gibbula* | | | | | 2021 | | 2021 | | | | | 2017 |
| **Mexican Amberwing** | *Perithemis intensa* | | | | 2021 | 2021 | | | 2015 | | | | |
| **Mexican Forktail** | *Ischnura demorsa* | | | | | 2021 | | | | | | | |
| **Mexican Free-tailed Bat** | *Tadarida brasiliensis* | | | | | 2022 | | | | | | | 2020 |
| **Mexican Hog-nosed Snake** | *Heterodon kennerlyi* | | | | | | 2006 | | | | | | |
| **Mexican Woodrat** | *Neotoma mexicana* | | | | | | | 2015 | | | | | |
| **Mexican Yellow** | *Abaeis mexicana* | | | | | 2022 | | | 2021 | | | | |
| **Miniature Buttercup** | *Camissoniopsis micrantha* | | | | | 2008 | | 2005 | 2010 | | | | |
| **Mohave Rattlesnake** | *Crotalus scutulatus scutulatus* | | | | | | | | | | | 2013 | |
| **Mojave Rattlesnake** | *Crotalus scutulatus* | | | | | 2022 | | 2018 | | | | | 2019 |

# NATURAL RESOURCE PLAN – TABLE 2. WILDLIFE SPECIES LIST

| Common Name | Wildlife Species | ADRP | BHRP | CCRP | EMRP | HRP | LPRP | MMRP | SCRCA | STRP | UMRP | VMRA | WTRP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Monarch** | *Danaus plexippus* | | | | | 2021 | 2016 | | | | | | |
| **Monotypic Moth** | *Heteranassa mima* | | | | | 2021 | | | | | | | |
| **Moth** | *Apotolype brevicrista* | | | | | 2018 | | | | | | | |
| **Mountain Bluebird** | *Sialia currucoides* | | | | 2016 | | 2022 | | | | | | |
| **Mountain Lion** | *Puma concolor* | | | | | 2019 | | | 2021 | | | | |
| **Mourning Cloak** | *Nymphalis antiopa* | | | | | 2022 | | | | | | | |
| **Mourning Dove** | *Zenaida macroura* | | | 2022 | 2021 | 2022 | 2022 | 2021 | 2010 | 2021 | 2022 | | 2022 |
| **Mule Deer** | *Odocoileus hemionus* | | | 2017 | | 2022 | | 2019 | 2017 | | 2020 | 2019 | 2022 |
| **Mule Fat Blister** | *Aceria baccharices* | | | | | 2021 | | | | | | | |
| **Nashville Warbler** | *Oreothlypis ruficapilla* | | | | | 2019 | 2022 | | 2008 | | | | |
| **Neon Skimmer** | *Libellula croceipennis* | | | | | 2021 | 2021 | | 2021 | | | | |
| **Neotropic Cormorant** | *Phalacrocorax brasilianus* | | | | 2020 | 2019 | 2022 | | | | | | |
| **Nevada Nomia** | *Dieunomia nevadensis arizonensis* | | | | | | | 2021 | | | | | |
| **Noble Scoliid Wasp** | *Scolia nobilitata* | | | | 2021 | | | | | | | | |
| **Noname Ant** | *Novomessor cockerelli* | | | | 2021 | 2020 | | | | | | | |
| **Noname Bug** | *Oncerometopus nigriclavus* | | | | | | | 2021 | | | | | |
| **Northern Cardinal** | *Cardinalis cardinalis* | | | | | 2022 | 2022 | 2021 | 2021 | | 2019 | | |
| **Northern Flicker** | *Colaptes auratus* | | | 2019 | | 2021 | 2022 | | | | 2021 | | 2017 |
| **Northern Grasshopper Mouse** | *Onychomys leucogaster* | | | | | | | 2015 | | | | | |
| **Northern Harrier** | *Circus Hudsonius* | | | | | | 2022 | | | | | | |
| **Northern Mallard** | *Anas platyrhynchos platyrhynchos* | | | | | | 2018 | | | | | | |
| **Northern Mexican Gartersnake** | *Thamnophis eques megalops* | | | | | | 1985 | | | | | | |
| **Northern Mockingbird** | *Mimus polyglottos* | | | | 2022 | 2019 | 2022 | | 2008 | 2020 | 2019 | | 2022 |
| **Northern Pintail** | *Anas Acuta* | | | | | 2022 | 2022 | | | | | | |
| **Northern Rough-winged Swallow** | *Stelgidopteryx serripennis* | | | | 2022 | 2021 | 2022 | | 2008 | | | | |
| **Northern Saw-whet Owl** | *Aegolius acadicus* | | | | | 2019 | | | | | | | |
| **Northern Shoveler** | *Anas clypeata* | | | | | | 2022 | | | | | | |
| **Northern Waterthrush** | *Parkesia noveboracensis* | | | | | 2021 | | | | | | | |
| **Northern White-Skipper** | *Helioptes ericetorum* | | | | | 2022 | 2014 | | | | | | |

| Common Name | Wildlife Species | ADRP | BHRP | CCRP | EMRP | HRP | LPRP | MMRP | SCRCA | STRP | UMRP | VMRA | WTRP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Oleander Aphid** | *Aphis nerii* | | | | | 2021 | | | | | 2017 | | |
| **Olive-sided Flycatcher** | *Contopus cooperi* | | | | | 2019 | | | 2021 | | | | 2019 |
| **Orange Skipperling** | *Copaeodes aurantiaca* | | | | | | | | 2021 | | | | |
| **Orange Sulphur** | *Colias eurytheme* | | | 2021 | | 2021 | 2021 | | | | | | 2021 |
| **Orange-Crowned Warbler** | *Oreothlypis celata* | | | | 2020 | 2019 | 2022 | | 2007 | | 2019 | | |
| **Ornate Checkered Beetle** | *Trichodes ornatus* | | | | | 2022 | | | | | | | 2019 |
| **Ornate Tree Lizard** | *Urosaurus ornatus* | | | | 2022 | 2022 | 2016 | 2019 | 2022 | | 2021 | | 2021 |
| **Osprey** | *Pandion haliaetus* | | | | 2020 | 2021 | 2022 | | | | | | |
| **Ovenbird** | *Seiurus aurocapilla* | | | | | 2020 | | | | | | | |
| **Owlet Moth** | *Hemeroplanis incusalis* | | | 2019 | | | | | | | | | |
| **Oyster Mushroom** | *Pleurotus ostreatus* | | | | | 2019 | | | | | | | |
| **Pacific Forktail** | *Ischnura cervula* | | | | | 2021 | | | | | | | |
| **Pacific-slope Flycatcher** | *Empidonax difficilis* | | | | 2019 | 2019 | | | | | | | |
| **Painted Bunting** | *Passerina ciris* | | | | | 2021 | | | | | | | |
| **Painted Damsel** | *Hesperagrion heterodoxum* | | | | | 2019 | | | | | | | |
| **Painted Lady** | *Vanessa cardui* | | | | 2019 | 2022 | 2019 | 2021 | 2021 | | 2022 | | 2020 |
| **Painted Redstart** | *Myioborus pictus* | | | | | 2021 | | | | | | | |
| **Pale Townsend's Big-eared Bat** | *Corynorhinus townsendii pallescens* | | | | | | | 2019 | | | | | |
| **Pale-faced Clubskimmer** | *Brechmorhoga mendax* | | | | | 2021 | 2021 | | | | | | |
| **Pallid Bat** | *Antrozous pallidus* | | | | | 2022 | | | | | | | 2019 |
| **Pallid-winged Grasshopper** | *Trimerotropis pallidipennis* | | | 2019 | 2021 | 2022 | | 2021 | | | 2019 | | 2022 |
| **Palmer's Metalmark** | *Apodemia palmerii* | | | | | 2021 | | | | | | | |
| **Palo Verde Borer** | *Derobrachus geminatus* | | | 2015 | 2021 | | | | | | | | |
| **Palo Verde Webworm** | *Faculta inaequalis* | | | 2019 | | | | | | | | | 2017 |
| **Pepsine Spider Wasp** | *Pepsis grossa* | | | | | 2019 | | | | | | | |
| **Peregrine Falcon** | *Falco peregrinus* | | | | | | 2020 | | | | | 2017 | |
| **Phainopepla** | *Phainopepla nitens* | | | 2018 | | 2022 | 2022 | 2022 | 2009 | 2018 | 2022 | 2021 | 2022 |
| **Pictured Spur-throat Grasshopper** | *Melanoplus pictus* | | | | | | | | 2019 | | | | |
| **Pied-billed Grebe** | *Podilymbus podiceps* | | | | 2020 | 2022 | 2022 | | | | | | |

# NATURAL RESOURCE PLAN – TABLE 2. WILDLIFE SPECIES LIST

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Pine Siskin** | *Spinus pinus* | | | | | 2021 | 2020 | | | | | | |
| **Pipevine Swallowtail** | *Battus philenor* | | | | 2021 | 2022 | 2021 | 2021 | 2022 | | | | |
| **Plateau Dragonlet** | *Erythrodiplax basifusca* | | | | | 2021 | | | 2021 | | | | |
| **Plumbeous Vireo** | *Vireo plumbeus* | | | | | 2022 | | | 2008 | | | | |
| **Pocketed Free-tailed Bat** | *Nyctinomops femorosaccus* | | | | | 2022 | | | | | | | |
| **Potter Wasp** | *Euodynerus pratensis* | | | | | | | | | | | | 2017 |
| **Powdered Dancer** | *Argia moesta* | | | | | 2021 | 2020 | | | | | | |
| **Prairie Falcon** | *Falco mexicanus* | | | | | | 2022 | | 2007 | | | | |
| **Praying Mantis** | *Litaneutria ocularis* | | | | | 2022 | | | | | | | 2019 |
| **Prothonatary Warbler** | *Protonotaria citrea* | | | | | 2021 | | | | | | | |
| **Purple Bromeliad Fly** | *Copestylum violaceum* | | | | 2021 | | | | | | | | |
| **Pyrrhuloxia** | *Cardinalis sinuatus* | | | | | 2020 | | | | | 2019 | | |
| **Quagga Mussel** | *Dreissena bugensis* | | | | | | 2020 | | | | | | |
| **Queen** | *Danaus gilippus* | | 2021 | 2021 | 2021 | 2022 | 2022 | 2022 | 2021 | 2021 | 2021 | | 2021 |
| **Raccoon** | *Procyon lotor* | | | | 2020 | 2022 | 2021 | | | | | | |
| **Rambur's Forktail** | *Ischnura ramburii* | | | | | 2018 | | | | | | | |
| **Razorback sucker** | *Xyrauchen texanus* | | | | | 1990 | | | | | | | |
| **Reakirt's Blue** | *Echinargus isola* | | 2021 | | 2021 | 2022 | | | 2021 | | | 2007 | |
| **Red Admiral** | *Vanessa atalanta* | | | | | 2022 | 2019 | 2019 | | | | | 2019 |
| **Red and Black Beetle** | *Aulicus edwardsii* | | | 2021 | | | | | | | | | |
| **Red Coachwhip** | *Coluber flagellum piceus* | | | | | 2017 | 2019 | | | | 2008 | | |
| **Red Rock Skimmer** | *Paltothemis lineatipes* | | | | | 2021 | 2021 | | 2021 | | | | |
| **Red Saddlebags** | *Tramea onusta* | | | | | 2022 | | | | | | | |
| **Red Swamp Crayfish** | *Procambarus clarkii* | | | | | 2021 | | | | | | | |
| **Red Velvet Ant (Wasp)** | *Dasymutilla magnifica* | | | | | 2022 | | | 2020 | | | | 2018 |
| **Red Velvet Ant (Wasp)** | *Dasymutilla nogalensis* | | | | | 2019 | | | | | | | |
| **Red-breasted Merganser** | *Mergus serrator* | | | | | | 2022 | | | | | | |
| **Red-breasted Nuthatch** | *Sitta canadensis* | | | | | 2020 | | | | | | | |
| **Red-eyed Vireo** | *Vireo olivaceus* | | | | | | | | 2008 | | | | |
| **Redhead** | *Aythya americana* | | | | | | 2022 | | | | | | |

| Common Name | Wildlife Species | ADRP | BHRP | CCRP | EMRP | HRP | LPRP | MMRP | SCRCA | STRP | UMRP | VMRA | WTRP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Red-legged Centris** | *Centris rhodopus* | | | | | | | | | | | | 2017 |
| **Red-naped Sapsucker** | *Sphyrapicus nuchalis* | | | | 2020 | 2021 | 2022 | | | | | | |
| **Red-necked Grebe** | *Podiceps grisegena* | | | | | | 2022 | | | | | | |
| **Red-shouldered Hawk** | *Buteo lineatus* | | | | | 2021 | | | | | | | |
| **Red-shouldered Stink Bug** | *Thyanta custator* | | | 2019 | | 2022 | | | | | | | |
| **Red-spotted Toad** | *Anaxyrus punctatus* | 1995 | | 2021 | | 2022 | 2019 | 2018 | 2021 | | 2020 | 2015 | 2022 |
| **Red-tailed Hawk** | *Buteo jamaicensis* | 2011 | | 2021 | 2020 | 2022 | 2022 | 2021 | 2019 | 2020 | 2021 | | 2021 |
| **Red-tailed Pennant** | *Brachymesia furcata* | | | | | 2021 | | | | | | | |
| **Red-throated Loon** | *Gavia stellata* | | | | | | 2018 | | | | | | |
| **Red-winged Blackbird** | *Agelaius phoeniceus* | | | | 2020 | 2021 | 2022 | | | | | | |
| **Red-winged Grasshopper** | *Arphia pseudonietana* | | | | | 2017 | | | | | | | |
| **Regal Horned Lizard** | *Phrynosoma solare* | | | | | 2022 | | 2019 | 2012 | 2021 | | | 2020 |
| **Ring-billed Gull** | *Larus delawarensis* | | | | | | 2022 | | | | | | |
| **Ring-necked duck** | *Aythya collaris* | | | 2019 | | 2021 | 2022 | | | | | | |
| **Ringtail** | *Bassariscus astutus* | | | | | 2022 | | | | | | | |
| **Rio Grande Leopard Frog** | *Lithobates berlandieri* | | | | | 2020 | 2020 | | | | 2020 | | |
| **Robber Fly** | *Efferia albibarbis* | | | | | 2020 | | | 2015 | | | | |
| **Rock Pigeon** | *Columba livia* | | | 2019 | | 2019 | 2022 | | | | | | |
| **Rock Pocket Mouse** | *Chaetodipus intermedius* | | | | | | | 2015 | | | | | |
| **Rock Squirrel** | *Otospermophilus variegatus* | | | 2017 | 2020 | 2022 | 2022 | 2018 | | | 2019 | | 2020 |
| **Rock Wren** | *Salpinctes obsoletus* | | | 2019 | 2020 | 2018 | 2022 | | 2019 | | 2020 | | 2022 |
| **Roseate Skimmer** | *Orthemis ferruginea* | | | | | 2021 | | | | | | | |
| **Rose-breasted Grosbeak** | *Pheucticus ludovicianus* | | | | | 2021 | | | | | | | |
| **Rosy-faced Lovebird** | *Agapornis roseicollis* | | | | | | | | | | 2021 | | |
| **Rough Harvester Ant** | *Pogonomyrmex rugosus* | | | | 2021 | | | 2021 | | 2021 | | | 2021 |
| **Round-tailed Ground Squirrel** | *Spermophilus tereticaudus* | | | | 2020 | | | | | 2020 | | | |
| **Round-tailed Ground Squirrel** | *Xerospermophilus tereticaudus* | | | | 2021 | 2022 | | | | | | | |
| **Ruby-crowned Kinglet** | *Regulus calendula* | | | 2022 | 2020 | 2022 | 2022 | | 2019 | | | 2018 | 2021 |
| **Ruddy Duck** | *Oxyura jamaicensis* | | | | 2020 | | 2022 | | | | | | |

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| Common Name | Wildlife Species | ADRP | BHRP | CCRP | EMRP | HRP | LPRP | MMRP | SCRCA | STRP | UMRP | VMRA | WTRP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Rufous Hummingbird** | *Selasphorus rufus* | | | | | 2021 | | | | | | | |
| **Rufous-backed Robin** | *Turdus rufopalliatus* | | | | | 2021 | | | | | | | |
| **Rufous-banded Pyralid Moth** | *Mimoschinia rufofascialis* | | | | | 2021 | | 2021 | | | | | |
| **Rufous-crowned Sparrow** | *Aimophila ruficeps* | | | | | 2020 | 2022 | | | | | 2021 | |
| **Sage Thrasher** | *Oreoscoptes montanus* | | | | 2019 | | | | | | | | 2017 |
| **Sagebrush Sparrow** | *Artemisiospiza nevadensis* | | | | | | 2022 | 2020 | | | | | |
| **Saltbush Wolly-stem Gall** | *Asphondylia floccosa* | | | | 2021 | 2015 | | | | | 2019 | | |
| **Satyr Comma** | *Polygonia satyrus* | | | | | 2020 | | | | | | | |
| **Savannah Sparrow** | *Passerculus sandwichensis* | | | | | | 2020 | 2019 | | | | | |
| **Say's Phoebe** | *Sayornis saya* | | 2021 | 2019 | 2020 | 2022 | 2022 | | 2019 | | | | |
| **Scott's Oriole** | *Icterus parisorum* | | | | | 2020 | | | | | | 2018 | |
| **Semirelict Underwing Moth** | *Catocala semirelicta* | | | | | 2018 | | | | | | | |
| **Serpent Ringtail** | *Erpetogomphus lampropeltis* | | | | | 2021 | 2021 | | | | | | |
| **Seven-spotted Lady Beetle** | *Coccinella septempunctata* | | | | | 2022 | | | | | | | 2022 |
| **Sharp-shinned Hawk** | *Accipiter striatus* | | 2021 | 2019 | 2020 | 2021 | 2022 | | 2008 | | | | 2019 |
| **Shasta Pyrausta Moth** | *Pyrausta pseudonythesalis* | | | | | 2021 | | | | | | | |
| **Short-billed Gulll** | *Larus canus* | | | | | | 2022 | | | | | | |
| **Sidewinder** | *Crotalus cerastes* | | | | | 2022 | | | | | | 2020 | 2018 |
| **Silver-haired bat** | *Lasionycteris noctivagans* | | | | | 2022 | | | | | | | |
| **Sleepy Orange** | *Abaeis nicippe* | | | 2021 | 2016 | 2022 | 2022 | 2021 | 2021 | | 2021 | | 2020 |
| **Smiths' Black-headed Snake** | *Tantilla hobartsmithi* | | | | | 2020 | | | | | | | |
| **Snow Goose** | *Anser caerulescens* | | | | | | 2022 | | | | | | |
| **Snow Goose** | *Chen caerulescens* | | | | | | 2020 | | | | | | |
| **Snowy Egret** | *Egretta thula* | | | | | 2019 | 2021 | | | | | | |
| **Song Sparrow** | *Melospiza melodia* | | | | 2020 | 2022 | 2022 | | 2008 | | | | |
| **Sonora Mud Turtle** | *Kinosternon sonoriense* | | | | | 2022 | | | | | | | |
| **Sonoran Collared Lizard** | *Crotaphytus nebrius* | | | | 2004 | | | | | | | | |
| **Sonoran Coralsnake** | *Micruroides euryxanthus* | | | | | 2021 | | | | | 2017 | 2013 | |
| **Sonoran Desert Toad** | *Incilius alvarius* | 1995 | | | | 2021 | 1998 | | | | | | |
| **Sonoran Gophersnake** | *Pituophis catenifer affinis* | | | | | 2022 | | 2013 | | | | | |



MARICOPA COUNTY PARKS & RECREATION

| Common Name | Wildlife Species | ADRP | BHRP | CCRP | EMRP | HRP | LPRP | MMRP | SCRCA | STRP | UMRP | VMRA | WTRP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sonoran Lyresnake** | *Trimorphodon lambda* | | | | 2020 | 2022 | 1999 | | | | | 2017 | |
| **Sonoran Whipsnake** | *Coluber bilineatus* | | | | | | | | 2008 | | | | |
| **Sora** | *Porzana carolina* | | | | | 2021 | 2022 | | | | | | |
| **Southern Dogface** | *Zerene cesonia* | | | 2022 | | 2021 | 2021 | | 2021 | | 2015 | | |
| **Southern Fire Ant** | *Solenopsis xyloni* | | | | 2018 | | 2021 | 2021 | | | 2021 | | |
| **Southern House Spider** | *Kukulcania hibernalis* | | | | | 2017 | | | | | | | |
| **Southern Small Milkweed Bug** | *Lygaeus reclivatus* | | | 2021 | | 2021 | | | | | | | |
| **Southwest Viceroy** | *Limenitis archippus obsoleta* | | | | | 2022 | | | 2021 | | | | |
| **Southwestern Orangetip** | *Anthocharis thoosa* | | | | | 2020 | | | | | | | 2020 |
| **Southwestern Speckeld Rattlesnake** | *Crotalus pyrrhus* | | | 2020 | | 2019 | 2017 | | | | | | 2020 |
| **Southwestern Willow Flycatcher** | *Empidonax traillii extimus* | | | | | 2018 | 2015 | | | | | | |
| **Soutwestern Flatid Planthoper** | *Flatormenis saucia* | | | | | | | | | | | | 2017 |
| **Speckled Rattlesnake** | *Crotalus (mitchellii) pyrrhus* | | | | | 2021 | 2003 | | | | | | 2015 |
| **Spider Wasp** | *Xerochares expulsus* | | | | | 2020 | | | | | | | |
| **Spiny Softshell** | *Apalone spinifera* | | | | | | 2021 | | | | | | |
| **Splitgill Mushroom** | *Schizophyllum commune* | | | | | 2020 | | | | | | | |
| **Spotless Lady Beetle** | *Cycloneda sanguinea* | | | | | 2018 | | | | | | | |
| **Spotted Bird Grasshopper** | *Schistocerca lineata* | | | 2019 | | | | | | | | | |
| **Spotted Cucumber Beetle** | *Diabrotica undecimpunctata* | | | | | 2019 | | | | | | | |
| **Spotted Sandpiper** | *Actitis macularius* | | | | 2020 | 2021 | 2022 | | | | | | |
| **Spotted Towhee** | *Pipilo maculatus* | | | | | 2021 | 2022 | | 2019 | | | | 2021 |
| **Spot-winged Glider** | *Pantala hymenaea* | | | | | 2021 | | | | | | | |
| **Springwater Dancer** | *Argia plana* | | | | | 2022 | 2021 | | 2015 | | | | |
| **Squaw Peak Talussnail** | *Maricopella allynsmithi* | 2015 | | 2011 | | | | | | | | | |
| **Staghorn Cholla Moth** | *Euscirrhopterus cosyra* | | | | | 2018 | | | | | | 2021 | 2021 |
| **Steel-blue Cricket Hunter Wasp** | *Chlorion aerarium* | | | | | 2019 | | | | | | | |
| **Striped Skunk** | *Mephitis mephitis* | | | 2021 | | 2022 | | | | | | | |
| **Striped Willow Leaf Beetle** | *Disonycha alternata* | | | | | 2018 | | | | | | | |
| **Stripe-tailed Scorpion** | *Paravaejovis spinigerus* | | 2021 | 2022 | 2020 | 2022 | 2022 | | 2019 | 2021 | 2020 | | 2021 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Summer Tanager** | *Piranga rubra* | | | | | 2021 | | | 2008 | | | | |
| **Sunburst Diving Beetle** | *Thermonectus marmoratus* | | | | | 2022 | 2019 | | | | | | |
| **Superstition Mountains Scorpion** | *Superstitionia donensis* | | | 2022 | | | | | | | | | |
| **Surf Scoter** | *Melanitta perspicillata* | | | | | | 2020 | | | | | | |
| **Swainson's Thrush** | *Catharus ustulatus* | | | | | 2021 | | | | | | | |
| **Swamp Sparrow** | *Melospiza georgiana* | | | | | 2019 | | | | | | | |
| **Tailed Orange** | *Pyrisitia proterpia* | | | | | 2022 | | | | | | | |
| **Tailess Whip Scorpion** | *Paraphrynus carolynae* | | | 2014 | | | | 2021 | | | | 2021 | 2021 |
| **Thick-billed Kingbird** | *Tyrannus crassirostris* | | | | | 2018 | | | | | | | |
| **Three-lined Potato Beetle** | *Lema daturaphila* | | | | | 2022 | | | | | | | |
| **Tiger Rattlesnake** | *Crotalus tigris* | | | | 2020 | | 1999 | | | 2014 | 2021 | | |
| **Tiny Checkerspot** | *Dymasia dymas* | | | | | | | 2021 | | | | | |
| **Toad Bug** | *Gelastocoris rotundatus* | | | | | 2022 | | | | | | | |
| **Tobacco Hornworm** | *Manduca sexta* | | | | | | | 2021 | | | | | |
| **Townsend's Big-eared Bat** | *Corynorhinus townsendii* | | | | | 2022 | | | | | | | |
| **Townsend's Solitaire** | *Myadestes townsendi* | | | | | 2020 | | | | | | | |
| **Townsend's Warbler** | *Setophaga townsendi* | | | | 2021 | 2021 | | | 2008 | | | | |
| **Trantula Hawk** | *Pepsis thisbe* | | | 2021 | | 2021 | | | | | | 2018 | |
| **Treehopper** | *Centrodontus atlas* | | | | | | 2021 | | | | | | |
| **Tropical Kingbird** | *Tyrannus melancholicus* | | | | | 2021 | | | | | | | |
| **Tucson Shovel-nosed Snake** | *Chionactis occipitalis klauberi* | | | | | | | | | | | 2016 | |
| **Turkestan Cockroach** | *Shelfordella lateralis* | | | | | 2022 | | | | | | | |
| **Turkey Vulture** | *Cathartes aura* | | | | 2020 | 2022 | 2021 | | 2008 | | 2019 | 2018 | 2020 |
| **Twelve-lined Ofatulena** | *Ofatulena duodecemstriata* | | | 2019 | | | | | | | | | |
| **Twelve-spotted Skimmer** | *Libellula pulchella* | | | | | 2019 | | | | | | | |
| **Underwood's Mastiff Bat** | *Eumops underwoodi* | | | | | 2020 | | | | | | | |
| **Unknown** | *Apantesis incorrupta* | | | | | 2013 | | | | | | | |
| **Variable Groundsnake** | *Sonora semiannulata semiannulata* | | | | | | | 2014 | | | | | |
| **Variable Sandsnake** | *Chilomeniscus stramineus* | | | | | 2017 | | 2015 | | | | 2014 | 2018 |

| Common Name | Wildlife Species | ADRP | BHRP | CCRP | EMRP | HRP | LPRP | MMRP | SCRCA | STRP | UMRP | VMRA | WTRP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Variegated Fritillary** | *Euptoieta claudia* | | | | | 2021 | | | 2021 | | | | |
| **Variegated Meadowhawk** | *Sympetrum corruptum* | | | | 2016 | 2020 | 2021 | | 2021 | 2021 | 2018 | | 2019 |
| **Velvet Ant** | *Dasymutilla zelaya* | | | | | 2019 | | | | | | | |
| **Verdin** | *Auriparus flaviceps* | | 2021 | 2018 | 2021 | 2022 | 2022 | 2021 | 2019 | | 2019 | | 2022 |
| **Vermilion Flycatcher** | *Pyrocephalus rubinus* | | | | 2022 | 2022 | 2022 | | 2008 | | | | |
| **Vesper Sparrow** | *Pooecetes gramineus* | | | | | | 2020 | | 2008 | | | | |
| **Violet-clouded Skipper** | *Lerodea arabus* | | | | | 2008 | | | | | | | |
| **Violet-green Swallow** | *Tachycineta thalassina* | | | | | 2018 | | | 2008 | | | | |
| **Virginia Rail** | *Rallus limicola* | | | | 2020 | 2021 | 2022 | | | | | | |
| **Virginia's Warbler** | *Oreothlypis virginiae* | | | | | 2018 | | | 2008 | | | | |
| **Virile Crayfish** | *Faxonius virilis* | | | | | | 2020 | | | | | | |
| **Warbling Vireo** | *Vireo gilvus* | | | | | 2021 | | | 2008 | | | | 2021 |
| **West Coast Lady** | *Vanessa annabella* | | | | | | | | | | 2014 | | |
| **Western Banded Gecko** | *Coleonyx variegatus* | | | 2022 | 2016 | 2022 | | 2017 | | | 2021 | 2020 | 2020 |
| **Western Black Horse Fly** | *Tabanus punctifer* | | | | | 2019 | | | | | | | |
| **Western Black Widow** | *Latrodectus hesperus* | | | | 2021 | 2022 | | | | | 2021 | | |
| **Western Black-necked Gartersnake** | *Thamnophis cyrtopsis cyrtopsis* | | | | | 2018 | | | 2017 | | | | |
| **Western Bluebird** | *Sialia mexicana* | | | | 2020 | 2020 | 2022 | | | | | | |
| **Western Burrowing Owl** | *Athene cunicularia hypugaea* | | | | 2016 | | | | | | | | |
| **Western Diamond-back Rattlesnake** | *Crotalus atrox* | | | 2020 | 2021 | 2022 | 2019 | 2021 | 2021 | 2021 | 2021 | 2017 | 2020 |
| **Western Grebe** | *Aechmophorus occidentalis* | | | | | | 2022 | | | | | | |
| **Western Honey Bee** | *Apis mellifera* | | | 2022 | 2021 | 2022 | 2021 | 2021 | 2022 | 2021 | 2020 | 2007 | 2022 |
| **Western Kingbird** | *Tyrannus verticalis* | | | | 2019 | 2019 | | 2020 | 2008 | | | | |
| **Western Leaf-footed Bug** | *Leptoglossus clypealis* | | | | | 2022 | | | | | | | |
| **Western Meadowlark** | *Sturnella neglecta* | | | | | | 2022 | | | | | | |
| **Western Mosquitofish** | *Gambusia affinis* | | | | | 2022 | | | | | | | |
| **Western Patch-nosed Snake** | *Salvadora hexalepis* | | | | | 2022 | 1998 | 2020 | | 2021 | 2020 | 2020 | 2021 |
| **Western Pondhawk** | *Erythemis collocata* | | | | | 2021 | | | | | | | |
| **Western Poplar Sphinx** | *Pachysphinx occidentalis* | | | | | 2022 | | | | | | | |

# NATURAL RESOURCE PLAN – TABLE 2. WILDLIFE SPECIES LIST

| Common Name | Wildlife Species | ADRP | BHRP | CCRP | EMRP | HRP | LPRP | MMRP | SCRCA | STRP | UMRP | VMRA | WTRP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Western Pygmy-Blue** | *Brephidium exilis* | | 2021 | | 2021 | 2021 | | | | | | | |
| **Western Red Bat** | *Lasiurus blossevillii* | | | | | 2022 | | | | | | | 2020 |
| **Western Red-tailed Skink** | *Plestiodon gilberti rubricaudatus* | | | | | 2011 | | | | | | | |
| **Western Screech-Owl** | *Megascops kennicottii* | | | 2014 | 2020 | | 2022 | | | | 2019 | | |
| **Western Screech-Owl** | *Otus kennicottii* | | | 2019 | | | 2020 | | | | | | |
| **Western Side-blotched Lizard** | *Uta stansburiana elegans* | | 2013 | | | | | | | | | | |
| **Western Small-footed Myotis** | *Myotis ciliobrum* | | | | | 2022 | | | | | | | |
| **Western Spotted Orb Weaver** | *Neoscona oaxacensis* | | | | | 2021 | | | | 2021 | | | |
| **Western Spotted Skunk** | *Spilogale gracilis* | | | | | 2021 | | | | | | | |
| **Western Tanager** | *Piranga ludoviciana* | | | | | 2021 | | | 2008 | | | | 2018 |
| **Western Threadsnake** | *Rena humilis* | | | | | | | | | | | 2013 | |
| **Western Whiptail** | *Aspidoscelis tigris* | | 2013 | 2015 | 2021 | 2022 | 2006 | 2020 | 2021 | 2021 | 2021 | 2021 | 2021 |
| **Western Wood-peewee** | *Contopus sordidulus* | | | | | 2019 | | | 2008 | | | | |
| **Western Yellow Bat** | *Lasiurus xanthinus* | | | | | 2022 | | | | | | | |
| **White Throated Mouse or Packrat** | *Neotoma albigula* | | | | 2020 | 2022 | | 2018 | | 2020 | 2015 | 2021 | 2021 |
| **White-belted Ringtail** | *Erpetogomphus compositus* | | | | | 2021 | 2020 | | 2015 | | | | |
| **White-breasted Nuthatch** | *Sitta carolinensis* | | | | | 2022 | | | 2008 | | | | |
| **White-crowned Sparrow** | *Zonotrichia leucophrys* | | 2021 | 2017 | 2021 | 2022 | 2020 | 2016 | 2019 | | 2019 | | 2022 |
| **White-faced Ibis** | *Plegadis chihi* | | | | | 2021 | 2021 | | | 2021 | | | |
| **White-lined Bird Grasshopper** | *Schistocerca albolineata* | | | | | | | | 2021 | | | | 2018 |
| **White-lined Sphinx** | *Hyles lineata* | 2022 | | 2021 | 2018 | 2022 | 2021 | 2021 | 2018 | 2021 | 2021 | | 2017 |
| **White-throated Sparrow** | *Zonotrichia albicollis* | | | | | 2013 | 2022 | | | | | | |
| **White-throated Swift** | *Aeronautes saxatalis* | | | | | | 2022 | | 2008 | | | | 2020 |
| **White-winged Dove** | *Zenaida asiatica* | | | 2019 | 2021 | 2022 | 2016 | | 2008 | 2021 | 2021 | | 2021 |
| **White-winged Scoter** | *Melanitta deglandi* | | | | | | 2020 | | | | | | |
| **Wide-ranging Dragonfly** | *Pantala flavescens* | | | | 2021 | | | | | | | | |
| **Widow Skimmer** | *Libellula luctuosa* | | | | | 2019 | | | | | | | |
| **Wild Burro/Donkey** | *Equus asinus* | | | | | 2022 | 2022 | | | | | | |
| **Wilson's Snipe** | *Gallinago delicata* | | | | 2020 | 2013 | 2022 | | | | | | |
| **Wilson's Warbler** | *Cardellina pusilla* | | | | 2019 | 2021 | | | 2008 | | | | |

| Common Name | Wildlife Species | ADRP | BHRP | CCRP | EMRP | HRP | LPRP | MMRP | SCRCA | STRP | UMRP | VMRA | WTRP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Witch's Butter** | *Tremella mesenterica* | | | | | 2021 | | | 2016 | | | | |
| **Wolf Spider** | *Sosippus californicus* | | | | | 2022 | | | | | | | |
| **Wood Duck** | *Aix sponsa* | | | | | 2021 | | | | | | | |
| **Woodhouse's Scrub Jay** | *Aphelocoma woodhouseii* | | | | | 2022 | | | | | | | |
| **Woodhouse's Toad** | *Anaxyrus woodhousii* | | | 2017 | | 2022 | 2019 | | 2021 | | | | 2021 |
| **Yavapai Hedgehog Cactus** | *Echinocereus yavapaiensis* | | | | | | | | 2010 | | | | |
| **Yellow Cellar Slug** | *Limacus flavus* | | | | | 2021 | | | | | | | |
| **Yellow Devil Scorpion** | *Paravaejovis confusus* | | | | 2019 | | | 2020 | | | | | |
| **Yellow Paper Wasp** | *Polistes flavus* | | | 2022 | | | | | 2021 | | | | |
| **Yellow Warbler** | *Setophaga petechia* | | | | | 2021 | | | 2008 | | | | |
| **Yellow-bellied Bee Assasin** | *Apiomerus flaviventris* | | | | | | | 2021 | | | | | |
| **Yellow-billled Cuckoo (Western DPS)** | *Coccyzus americanus* | | | | | 2019 | 2015 | | | | | | |
| **Yellow-breasted Chat** | *Icteria virens* | | | | | 2021 | | | 2008 | | | | |
| **Yellow-headed Blackbird** | *Xanthocephalus xanthocephalus* | | | | | 2021 | | | | | | | |
| **Yellow-rumper Warbler** | *Setophaga coronata* | | | | 2020 | 2022 | 2022 | | 2009 | | | | 2020 |
| **Yuma Myotis** | *Myotis yumanensis* | | | | | 2022 | | | | | | | |
| **Zebra-tailed Lizard** | *Callisaurus draconoides* | | | 2005 | 2020 | 2022 | | 2021 | 2021 | | 2020 | 2021 | 2020 |
| **Zone-tailed Hawk** | *Buteo albonotatus* | | | | | 2021 | | 2018 | 2008 | | | | |

# TABLE 3: MARICOPA COUNTY PARK PLANT SPECIES LIST

| Common Name | Plant Species | Nativity | ESA_ FWS | USFS | BLM | NPL Status | GB Nature Serve | ST Nature Serve | BHRP | CCRP | EMRP | HRP | LPRP | MMRP | SCRA | STRP | UMRP | WTRP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Abram's Broomspurge** | *Euphorbia abramsiana* | Native | | | | | G4 | SNR | 1979 | | 2019 | 2021 | 1970 | 1981 | 2013 | | 2018 | 2019 |
| **Adherent Bristle Grass** | *Setaria adhaerens* | Non-native | | | | | | | | | | 1995 | | | | | | |
| **Adonis Blazingstar** | *Mentzelia multiflora* | Native | | | | | | | | | | | | 1981 | 2013 | | | |
| **African Daisy** | *Castalis tragus* | Non-native | | | | | | | | | | | | 1981 | | | | |
| **African Sumac** | *Rhus lancea* | Non-native | | | | | | | | | | 2021 | | | 2013 | | | |
| **Ajo Mountain Oak** | *Quercus ajoensis* | Native | | | | | | | | | | | | | | | | 2019 |
| **Alder Leaf Mountain Mahogany** | *Cercocarpus montanus* | Native | | | | | | | | | | | | 1981 | | | | |
| **Alkali Bulrush** | *Bolboschoenus maritimus var. paludosus* | Native | | | | | | | | | 1974 | | | | | | | |
| **Alkali Buttercup** | *Ranunculus cymbalaria* | Native | | | | | | | | | | 1995 | | | | | | |
| **Alkali Goldenbush** | *Isocoma acradenia var. acradenia* | Native | | | | | | | | | 2021 | 2021 | | 1981 | 2021 | | | 2021 |
| **Alkali Indian Paintbrush** | *Castilleja minor* | Native | | | | | | | | | | | | | 2021 | | | |
| **Alkali Sacaton** | *Sporobolus airoides* | Native | | | | | | | | | | | | | | | | 2019 |
| **Alternate Leaf Flat Sedge** | *Cyperus involucratus* | Non-native | | | | | | | | 2018 | | | | | 2013 | | | |
| **American Black Nightshade** | *Solanum americanum* | Native | | | | | | | | | 1974 | 1995 | 1970 | | 2013 | | | |
| **American Brooklime** | *Veronica americana* | Native | | | | | | | | | | 1995 | | | 2013 | | | |
| **American Screw Bean** | *Prosopis pubescens* | Native | | | | SA&HR | G5 | S4 | | | 2021 | 2022 | | | | | | |
| **American Threefold** | *Trixis californica* | Native | | | | | | | | 2022 | | 2022 | 2022 | 2022 | 2022 | 2019 | 2022 | 2021 |
| **American Wild Carrot** | *Daucus pusillus* | Native | | | | | | | 1979 | | 2019 | 1995 | 2022 | 1981 | 2013 | 2018 | 2019 | 2019 |
| **American Wild Mint** | *Mentha arvensis* | Native | | | | | | | | | | 2021 | | | | | | |
| **Angels Trumpets** | *Acleisanthes longiflora* | Native | | | | | G5 | SNR | | | | | | | | 2018 | | |
| **Annual Blue Grass** | *Poa annua* | Non-native | | | | | | | 1979 | | 1974 | | | 1981 | | | | |
| **Annual Phlox** | *Phlox gracilis subsp. gracilis* | Native | | | | | | | 1979 | | | | | | 2013 | | | |
| **Annual Rabbitsfoot Grass** | *Polypogon monspeliensis* | Non-native | | | | | | | | | 1974 | 2021 | 1970 | 1981 | 2021 | | | 2020 |



MARICOPA COUNTY PARKS & RECREATION

| Common Name | Plant Species | Nativity | ESA_ FWS | USFS | BLM | NPL Status | GB Nature Serve | ST Nature Serve | BHRP | CCRP | EMRP | HRP | LPRP | MMRP | SCRA | STRP | UMRP | WTRP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Annual Rye Grass** | *Lolium multiflorum* | Non-native | | | | | | | | | | | | | 2013 | | | |
| **Annual Windmills** | *Allionia choisyi* | Native | | | | | G5 | SNR | | | | | | | | | | 2019 |
| **Apricot Globemallow** | *Sphaeralcea ambigua subsp. ambigua* | Native | | | | | | | 1979 | | 2021 | | 2021 | 2020 | 2016 | | 2011 | 2021 |
| **Arabian Mediterranean Grass** | *Schismus arabicus* | Non-native | | | | | | | 1979 | | 1974 | | 1970 | 1981 | | 2018 | | 2019 |
| **Arid Tansy aster** | *Arida arizonica* | Native | | | | | | | | | 1974 | | | | | | | |
| **Arizona Blanket Flower** | *Gaillardia arizonica* | Native | | | | | | | | | | | | | | 2018 | | 1973 |
| **Arizona Brome** | *Bromus arizonicus* | Native | | | | | | | 1979 | | 1974 | | 1970 | 1981 | 2013 | | | 2019 |
| **Arizona Desert Wolfberry** | *Lycium exsertum* | Native | | | | | | | 1979 | 2022 | 1974 | 2022 | 1970 | 2022 | 2021 | 2022 | 2019 | 2022 |
| **Arizona Filago** | *Logfia arizonica* | Native | | | | | | | 1979 | | 1974 | | 2020 | 1981 | | 2018 | 2011 | 2019 |
| **Arizona Grapplinghook** | *Harpagonella arizonica* | Native | | | | | | | 1979 | | 1974 | 2022 | 1970 | 1981 | 2013 | 2018 | | 2019 |
| **Arizona Joint Fir** | *Ephedra fasciculata* | Native | | | | | | | 1979 | | 1974 | | 2019 | | | 2018 | 2018 | 2019 |
| **Arizona Juniper** | *Juniperus arizonica* | Native | | | | | U | U | | | | | | | 2013 | | | |
| **Arizona Liverseed Grass** | *Urochloa arizonica* | Native | | | | | | | | | | 1995 | | | 2013 | 2018 | | 2019 |
| **Arizona Lupine** | *Lupinus arizonicus subsp. arizonicus* | Native | | | | | | | | | 1974 | | | | | 2018 | | 2019 |
| **Arizona Milk Vetch** | *Astragalus arizonicus* | Native | | | | | | | | | | | | | 2013 | | | |
| **Arizona Mountainbalm** | *Monardella arizonica* | Native | | | | | | | | | 1974 | | | | | | | |
| **Arizona Mousetail** | *Myosurus cupulatus* | Native | | | | | | | | | | | | | 2013 | | | 1973 |
| **Arizona Pencil Cholla** | *Cylindropuntia arbuscula* | Native | | | | SR | | | | 2021 | | 2019 | | | 2021 | 2018 | | 1973 |
| **Arizona Pholistoma** | *Pholistoma auritum var. arizonicum* | Native | | | | | | | | | 1974 | | 2022 | 2020 | 2022 | 2018 | 2011 | 2022 |
| **Arizona Popcorn Flower** | *Plagiobothrys arizonicus* | Native | | | | | | | 1979 | | 1974 | 2022 | 1970 | 2019 | 2013 | 2018 | 2011 | 2019 |
| **Arizona Sandmat** | *Euphorbia arizonica* | Native | | | | | G4 | SNR | | | | | 1970 | | 2016 | | | 2019 |
| **Arizona scaly Cloakfern** | *Astrolepis cochisensis subsp. arizonica* | Native | | | | | | | | | 1974 | | 1970 | | | | | |
| **Arizona Spike Moss** | *Selaginella arizonica* | Native | | | | | | | 1979 | 2022 | 1974 | 2022 | 1970 | 1981 | 2021 | 2021 | 2021 | 2022 |
| **Arizona Swallow Wort** | *Metastelma arizonicum* | Native | | | | | | | | | 1974 | | | 1981 | 2013 | 2018 | 2011 | 1973 |
| **Arizona Sycamore** | *Platanus wrightii* | Native | | | | | | | | | | | | | 2021 | | | |

# NATURAL RESOURCE PLAN – TABLE 3. PLANT SPECIES LIST

| Common Name | Plant Species | Nativity | ESA_ FWS | USFS | BLM | NPL Status | GB Nature Serve | ST Nature Serve | BHRP | CCRP | EMRP | HRP | LPRP | MMRP | SCRA | STRP | UMRP | WTRP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Arizona Walnut** | *Juglans major* | Native | | | | | | | | | | 2020 | | | 2013 | | | |
| **Arizona Wild Buckwheat** | *Eriogonum arizonicum* | Native | | | | | | | | | | | 1970 | | 2013 | | | |
| **Arizona Wrightwort** | *Carlowrightia arizonica* | Native | | | | | | | | | | | 1970 | | 2019 | 2018 | | 2019 |
| **Arrow Poison** | *Sebastiania bilocularis* | Native | | | | SR | | | | | 1974 | | | | | | | |
| **Arrow Weed** | *Pluchea sericea* | Native | | | | | | | | | 1974 | 2022 | 1970 | 1981 | 2013 | | | 2019 |
| **Ashen Milkvetch** | *Astragalus tephrodes var. brachylobus* | Native | | | | | | | | | | | | | 2013 | | | |
| **Athel Tamarisk** | *Tamarix aphylla* | Non-native | | | | | | | | | 1974 | 2022 | 1970 | | 2013 | | | |
| **Australian Brome** | *Bromus arenarius* | Non-native | | | | | | | | | | 1995 | | | | | | |
| **Australian Saltbush** | *Atriplex semibaccata* | Non-native | | | | | | | | | | 1995 | 1970 | | | | | |
| **Australian Water Buttons** | *Cotula australis* | Non-native | | | | | | | | | | 2020 | | | | | | |
| **Autumn False Tansy Aster** | *Dieteria asteroides var. asteroides* | Native | | | | | | | | | | | | | 2013 | | | |
| **Banana Water Llily** | *Nymphaea mexicana* | Non-native | | | | | G3 | SNR | | | | | | | | | | 2019 |
| **Banana Yucca** | *Yucca baccata* | Native | | | | SR&HR | | | | | | | | 1981 | 2019 | | | |
| **Barbwire Russian Thistle** | *Salsola paulsenii* | Non-native | | | | | | | | | 1974 | | | | | | | |
| **Bastardsage** | *Eriogonum wrightii var. wrightii* | Native | | | | | | | | | 1974 | | | 1981 | | | | 2020 |
| **Bearded Cats Eye** | *Cryptantha barbigera* | Native | | | | | | | 1979 | | 1974 | | 1970 | 2019 | 2013 | 2018 | 2011 | 2019 |
| **Beardless Lyme Grass** | *Leymus triticoides* | Native | | | | | | | | | | 1995 | | | | | | |
| **Beardless Rabbitsfoot Grass** | *Polypogon viridis* | Non-native | | | | | | | | | | 1995 | 1970 | | 2013 | | | 1973 |
| **Beardtongue** | *Penstemon parryi* | Non-native | | | | | | | | | | 2022 | | | | | 2019 | 2019 |
| **Beavertail Prickly Pear** | *Opuntia basilaris var. basilaris* | Non-native | | | | SR | | | | | | | | | | | | 2020 |
| **Beeplant** | *Peritoma jonesii* | Native | | | | | | | | | | 1995 | | | | | | |
| **Beetle Spurge** | *Euphorbia eriantha* | Native | | | | | | | | | 1974 | | 2019 | | 2013 | 2018 | 2018 | 2021 |
| **Berlandiers wolfberry** | *Lycium berlandieri* | Native | | | | | | | | 2018 | | | 2022 | 2017 | 2013 | 2018 | 2021 | 2021 |
| **Bermuda Grass** | *Cynodon dactylon* | Non-native | | | | | | | | | | 2022 | 2005 | 1981 | 2021 | | | 2019 |
| **Bigelows Desert Trumpets** | *Linanthus bigelovii subsp. bigelovii* | Native | | | | | | | | | | 1995 | 1970 | 1981 | 2013 | 2018 | 2011 | 2019 |

| Common Name | Plant Species | Nativity | ESA_ FWS | USFS | BLM | NPL Status | GB Nature Serve | ST Nature Serve | BHRP | CCRP | EMRP | HRP | LPRP | MMRP | SCRA | STRP | UMRP | WTRP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Birch Leaf Mountain Mahogany** | *Cercocarpus montanus var. glaber* | Native | | | | | | | | | | | | | 2013 | | | |
| **Birdsfoot Trefoil** | *Lotus plebeius* | Native | | | | | | | | | | | | 2022 | | | | |
| **Biscuitroot** | *Lomatium nevadense var. parishii* | Native | | | | | | | | | | | | 1981 | 2013 | | | |
| **Black Medick** | *Medicago lupulina* | Non-native | | | | | | | | | | 1995 | | | | | | |
| **Bladder Mallow** | *Herissantia crispa* | Native | | | | | | | | | 1974 | 2021 | 1970 | 1981 | 2013 | | | 2022 |
| **Blessed Milkthistle** | *Silybum marianum* | Non-native | | | | | | | | | 1974 | 2020 | | | | | | |
| **Blister-leaf Monkeyflower** | *Erythranthe guttata* | Native | | | | | | | | | 1974 | 2022 | 2021 | 1981 | 2021 | | | 2019 |
| **Blond Plantain** | *Plantago ovata var. ovata* | Native | | | | | | | 1979 | | 2020 | 1995 | 2017 | 2019 | 2013 | 2018 | 2011 | 2020 |
| **Blue Elderberry** | *Sambucus cerulea* | Native | | | | | | | | | | 2022 | | | | | | |
| **Blue Grass** | *Poa bigelovii* | Native | | | | | | | 1979 | | 1974 | | 1970 | 1981 | 2013 | 2018 | 2011 | 2019 |
| **Blue Palo Verde** | *Parkinsonia florida* | Native | | | | SA | | | 2021 | 2017 | 2021 | 2022 | 2018 | 1981 | 2016 | 2021 | 2021 | 2019 |
| **Blue Panicum** | *Panicum antidotale* | Non-native | | | | | | | | | | 1995 | | | | | | |
| **Blue Three-awn** | *Aristida purpurea var. nealleyi* | Native | | | | | T4 | SNR | | | | | | 1981 | | 2018 | | 2019 |
| **Blue Water Speedwell** | *Veronica anagallis-aquatica* | Non-native | | | | | | | | | 2021 | 2021 | 1970 | | 2013 | | | |
| **Blunt Tansy Mustard** | *Descurainia obtusa* | Native | | | | | | | | | | 1995 | | | | | | |
| **Bracted Bedstraw** | *Galium microphyllum* | Native | | | | | | | | | | | | | 2013 | | | |
| **Branched Centaury** | *Centaurium pulchellum* | Non-native | | | | | | | | | | | 1970 | | | | | |
| **Branching Phacelia** | *Phacelia ramosissima var. latifolia* | Native | | | | | | | | | 1974 | 2022 | | | | | | |
| **Bread Wheat** | *Triticum aestivum* | Non-native | | | | | | | | | 1974 | | | | | | | |
| **Brightwhite** | *Prenanthella exigua* | Native | | | | | | | | | | | 1970 | | | | | |
| **Bristly Combseed** | *Pectocarya setosa* | Native | | | | | | | | | | 1995 | | 1981 | | 2018 | | 1973 |
| **Bristly Fiddleneck** | *Amsinckia tessellata var. tessellata* | Native | | | | | U | U | | 2019 | 2021 | 2022 | | 2020 | 2013 | | | 2022 |
| **Bristly Fruit Scaleseed** | *Spermolepis echinata* | Native | | | | | | | | | | | 1970 | | | | | |
| **Brittle Spineflower** | *Chorizanthe brevicornu var. brevicornu* | Native | | | | | | | 1979 | | 1974 | 2022 | 1970 | 1981 | 2013 | 2019 | 2019 | 2020 |
| **Brittlebush** | *Encelia farinosa var. farinosa* | Native | | | | | | | 2021 | 2022 | 2022 | 2022 | 2022 | 2022 | 2022 | 2022 | 2022 | 2022 |
| **Brittlebush** | *Encelia farinosa var. phenicodonta* | Native | | | | | | | 1979 | | | | 1970 | | | | 2011 | 2019 |

# NATURAL RESOURCE PLAN – TABLE 3. PLANT SPECIES LIST

| Common Name | Plant Species | Nativity | ESA_ FWS | USFS | BLM | NPL Status | GB Nature Serve | ST Nature Serve | BHRP | CCRP | EMRP | HRP | LPRP | MMRP | SCRA | STRP | UMRP | WTRP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Broad Flower Pincushion** | *Chaenactis stevioides* | Native | | | | | | | 1979 | | 2019 | 1995 | 1970 | 2020 | | 2018 | 2011 | 2019 |
| **Broad Fruit Combseed** | *Pectocarya platycarpa* | Native | | | | | | | 1979 | | 2021 | 2019 | 2020 | 1981 | 2013 | 2018 | 2011 | 2020 |
| **Broad Leaf Cat Tail** | *Typha latifolia* | Native | | | | | | | | | | | 1970 | | | | | |
| **Broadpod Whitlow grass** | *Draba platycarpa* | Native | | | | | | | | | | 1995 | | | | | | |
| **Broom Corn** | *Sorghum bicolor* | Non-native | | | | | | | | | 1974 | 1995 | | | | 2018 | 2019 | |
| **Brown Plume Wire Lettuce** | *Stephanomeria pauciflora* | Native | | | | | | | | 2021 | | 2022 | 2014 | 2019 | 2013 | | | 2021 |
| **Browneyes** | *Chylismia claviformis subsp. aurantiaca* | Native | | | | | | | | | 1974 | | 1970 | | | | | 2019 |
| **Brownfoot** | *Acourtia wrightii* | Native | | | | | G5 | SNR | 1979 | 2017 | 1974 | 2022 | | 2019 | 2016 | 2018 | | 2020 |
| **Buckhorn Cholla** | *Cylindropuntia acanthocarpa* | Native | | | | | | | | 2022 | 2022 | 2022 | 2022 | 2021 | 2021 | 2022 | 2022 | 2022 |
| **Buckhorn Cholla** | *Cylindropuntia acanthocarpa var. major* | Native | | | | SR | | | | | | | | 2016 | | | | 2019 |
| **Buckhorn Cholla** | *Cylindropuntia acanthocarpa var. thornberi* | Native | | | | SR | | | | | | | | 1981 | 2019 | | | |
| **Buenos Aires Conzya** | *Conyza bonariensis* | Non-native | | | | | | | | | | 1995 | | | | | | |
| **Buffelgrass** | *PENNISETUM CILIARE* | Native | | | | | | | 2004 | 2019 | | 2022 | 2022 | 2020 | 2013 | 2019 | 2020 | 2022 |
| **Bundle Hedgehog Cactus** | *Echinocereus fasciculatus* | Native | | | | SR | U | U | | | | | | 2017 | 2013 | | 2018 | |
| **Bunny Ear Prickly Pear** | *Opuntia microdasys* | Non-native | | | | | | | | | | | | | | 2018 | | |
| **Burr Medick** | *Medicago minima* | Non-native | | | | | | | | | | 1995 | | | | | | |
| **Burrowbush** | *Ambrosia monogyra* | Native | | | | | G5 | SNR | | | 1974 | 2021 | 1970 | 2022 | 2022 | | | |
| **Bush Muhly** | *Muhlenbergia porteri* | Native | | | | | | | | | 1974 | 1995 | 1970 | | 2013 | 2018 | 2011 | 1973 |
| **Cactus Apple** | *Opuntia engelmannii var. engelmannii* | Native | | | | SR | | | | 2022 | 1974 | 1995 | 2022 | 2018 | 2021 | 2021 | 2021 | 2021 |
| **Cactus Apple** | *Opuntia engelmannii var. flavispina* | Native | | | | SR | | | | | | | 2019 | | | | | 2019 |
| **Caliche Globemallow** | *Sphaeralcea laxa* | Native | | | | | | | | | 1974 | | | | | | 2011 | |
| **Calico** | *Loeseliastrum schottii* | Native | | | | | | | | | | 1995 | | | | | | |
| **California Barrel Cactus** | *Ferocactus cylindraceus var. cylindraceus* | Native | | | | SR | | | 1979 | 2022 | 2021 | 2022 | 2022 | 2021 | 2022 | 2021 | 2022 | 2022 |
| **California Brickellbush** | *Brickellia californica* | Native | | | | | | | | | | 2021 | | | 2013 | | | 2018 |
| **California Brome** | *Bromus carinatus* | Native | | | | | | | | | 1974 | 1995 | 1970 | 1981 | | | | |



MARICOPA COUNTY PARKS & RECREATION

| Common Name | Plant Species | Nativity | ESA_ FWS | USFS | BLM | NPL Status | GB Nature Serve | ST Nature Serve | BHRP | CCRP | EMRP | HRP | LPRP | MMRP | SCRA | STRP | UMRP | WTRP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **California Caltrop** | *Kallstroemia californica* | Native | | | | | | | | | | | 1970 | | | 2018 | | 1973 |
| **California cloak fern** | *Notholaena californica subsp. californica* | Native | | | | | | | | | | | | 1981 | | | 2011 | 1973 |
| **California Cotton-rose** | *Logfia californica* | Native | | | | | G5 | SNR | 1979 | | 1974 | | 1970 | 1981 | 2013 | 2018 | 2011 | 2019 |
| **California Cottontop** | *Digitaria californica* | Native | | | | | | | | | 1974 | | | | 2013 | | | 1973 |
| **California Creamcups** | *Platystemon californicus* | Native | | | | | | | | | | 2017 | 1970 | | | | | |
| **California Fagonbush** | *Fagonia laevis* | Native | | | | | | | 1979 | | 2019 | | 1970 | | | 2018 | | 2021 |
| **California Fan Palm** | *Washingtonia filifera* | Native | | | | SR | G4 | S1 | | | | 2021 | | | | | | |
| **California Loosestrife** | *Lythrum californicum* | Native | | | | | | | | | | 1995 | 1970 | | 2019 | | | |
| **California Mustard** | *Guillenia lasiophylla* | Native | | | | | | | | | | | | | 2013 | | | |
| **California Plumeseed** | *Rafinesquia californica* | Native | | | | | | | | | | | | | 2020 | | | 2019 |
| **California Poppy** | *Eschscholzia californica subsp. californica* | Non-native | | | | | | | | | 2020 | | 2022 | 2022 | 2018 | | | 2022 |
| **California Suncup** | *Eulobus californicus* | Native | | | | | | | 1979 | 2016 | 1974 | 1995 | 2018 | 2019 | 2013 | 2019 | 2019 | 2021 |
| **California Wood Club Rush** | *Schoenoplectus californicus* | Native | | | | | | | | | | | 1970 | | | | | |
| **Camphorweed Golden-aster** | *Heterotheca subaxillaris subsp. latifolia* | Native | | | | | G5 | SNR | 1979 | | 1974 | 1995 | 1970 | 1981 | 2013 | 2018 | | |
| **Canadian Horseweed** | *Conyza canadensis var. glabrata* | Native | | | | | | | | | 1974 | 1995 | 1970 | 1981 | 2013 | | | 1973 |
| **Candy Barrel Cactus** | *Ferocactus wislizeni* | Native | | | | SR | G4 | S3 | | | 1974 | | | | | 2018 | | |
| **Cane Beard Grass** | *Bothriochloa barbinodis* | Native | | | | | | | 1979 | | | | | 1981 | 2013 | | | 1973 |
| **Canyon Fairyfan** | *Clarkia epilobioides* | Native | | | | | | | | | | | 1970 | | 2013 | | | |
| **Canyon Grape** | *Vitis arizonica* | Native | | | | | | | | | | | | | 2013 | | | |
| **Canyon Morning-glory** | *Ipomoea barbatisepala* | Native | | | | | | | | | | | | | 2013 | | | |
| **Canyon Ragweed** | *Ambrosia ambrosioides* | Native | | | | | G5 | SNR | 1979 | | 1974 | 2022 | 2022 | 2022 | 2021 | 2018 | 2022 | 2022 |
| **Cape Marigold** | *Dimorphotheca sinuata* | Non-native | | | | | | | | 2019 | | | | | 2013 | | 2019 | 2019 |
| **Careless Weed** | *Amaranthus palmeri* | Native | | | | | G5 | SNR | 1979 | 2021 | 1974 | 2021 | 1970 | | | 2018 | | 2019 |
| **Carolina Cranes Bill** | *Geranium carolinianum* | Native | | | | | | | | | | | | | 2021 | | | |
| **Carpet Vervain** | *Verbena bracteata* | Native | | | | | | | | | | 1995 | | 1981 | 2013 | | | |

# NATURAL RESOURCE PLAN – TABLE 3. PLANT SPECIES LIST

| Common Name | Plant Species | Nativity | ESA_ FWS | USFS | BLM | NPL Status | GB Nature Serve | ST Nature Serve | BHRP | CCRP | EMRP | HRP | LPRP | MMRP | SCRA | STRP | UMRP | WTRP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Carrizo Mountain Sandmat** | *Chamaesyce pediculifera* | Native | | | | | | | | | | 2022 | 2021 | | 2022 | | | |
| **Castor Bean** | *Ricinus communis* | Non-native | | | | | | | | | 1974 | | 1970 | | | | 2011 | |
| **Cat Claw Mimosa** | *Mimosa aculeaticarpa var. biuncifera* | Native | | | | | | | | | | 1995 | 1970 | | 2013 | | | |
| **Catclaw Acacia** | *Acacia greggii var. greggii* | Native | | | | | G5 | SNR | | | 2021 | 2022 | | 2021 | 2021 | 2021 | 2019 | 2022 |
| **Cattle Saltbrush** | *Atriplex polycarpa* | Native | | | | | | | 2021 | | 2021 | | | | | | | |
| **Chairmaker Wood Club Rush** | *Schoenoplectus americanus* | Native | | | | | | | | | | 1995 | | | | | | 2019 |
| **Chalk Dudleya** | *Dudleya arizonica* | Native | | | | | | | | | 1974 | | | | | | | 2022 |
| **Chaparral Bush Mallow** | *Malacothamnus fasciculatus* | Native | | | | | | | | | | | | | 2013 | | | |
| **Cheat Grass** | *Bromus tectorum* | Non-native | | | | | | | | | | 1995 | | | | | | |
| **Cheeseweed Mallow** | *Malva parviflora* | Non-native | | | | | | | 1979 | | 2019 | 2022 | 2020 | 1981 | 2022 | 2020 | | 2020 |
| **Chia** | *Salvia columbariae var. columbariae* | Native | | | | | | | | 2015 | | 2020 | | 2020 | 2013 | | 2020 | 2020 |
| **Chilean Brome** | *Bromus berterianus* | Non-native | | | | | | | | | | | | 1981 | 2013 | | | |
| **Chinchweed** | *Pectis rusbyi* | Native | | | | | | | | | | | | | | | | 2019 |
| **Chiricahua Mountain Sandmat** | *Chamaesyce florida* | Native | | | | | | | | | | 2021 | | | 2013 | | | 2019 |
| **Christmas Cholla** | *Cylindropuntia leptocaulis* | Native | | | | SR | | | 1979 | 2022 | 1974 | 2022 | 2020 | 2021 | 2021 | 2018 | 2019 | 2022 |
| **Chuckwalla Combseed** | *Pectocarya heterocarpa* | Native | | | | | | | 1979 | | 1974 | | 1970 | 2019 | 2013 | 2018 | | 2019 |
| **Clammy Wormseed** | *Dysphania pumilio* | Non-native | | | | | | | | | | | 1970 | | | | | |
| **Clasping Venus Looking Glass** | *Triodanis perfoliata var. biflora* | Native | | | | | | | | | | 1995 | | | | | | 1973 |
| **Cleftleaf Wild Heliotrope** | *Phacelia crenulata var. minutiflora* | Native | | | | | | | | 2022 | 2020 | 2019 | 2021 | 2020 | 2013 | | 2022 | 2019 |
| **Climbing Milkweed** | *Funastrum cynanchoides* | Native | | | | | | | | | | 2022 | | | | | | 2019 |
| **Climbing Milkweed** | *Funastrum heterophyllum* | Native | | | | | | | 1979 | 2022 | 2021 | 2022 | 1970 | 2016 | 2013 | 2018 | 2011 | 2020 |
| **Clock Face Prickly Pear** | *Opuntia chlorotica* | Native | | | | SR | | | | | 1974 | 2022 | | | 2013 | | | 2019 |
| **Clustered Bracket** | *Inonotus cuticularis* | Unknown | | | | | | | | | | 2021 | | | | | | |
| **Coast Range Wild Cabbage** | *Caulanthus lasiophyllus* | Native | | | | | | | | | 2022 | 2022 | 2018 | 2019 | 2013 | 2018 | 2019 | 2020 |
| **Coastal Birdsfoot Trefoil** | *Acmispon maritimus var. brevivexillus* | Native | | | | | | | 1979 | 2017 | 1974 | | 1970 | 2019 | 2013 | 2019 | 2019 | 2021 |

| Common Name | Plant Species | Nativity | ESA_ FWS | USFS | BLM | NPL Status | GB Nature Serve | ST Nature Serve | BHRP | CCRP | EMRP | HRP | LPRP | MMRP | SCRA | STRP | UMRP | WTRP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Coastal Salt Grass** | *Distichlis spicata* | Native | | | | | | | | | | 1995 | | | | | | |
| **Cochise scaly Cloakfern** | *Astrolepis cochisensis subsp. cochisensis* | Native | | | | | | | | | 1974 | | 1970 | 1981 | 2013 | 2018 | | 1973 |
| **Common Chickweed** | *Stellaria media* | Non-native | | | | | | | | | | | | | 2013 | | | |
| **Common Dandelion** | *Taraxacum officinale* | Non-native | | | | | | | | | | 2021 | | | | | | |
| **Common Duckweed** | *Lemna minor* | Native | | | | | | | | | | | 1970 | | | | | |
| **Common Elderberry** | *Sambucus canadensis* | Native | | | | | | | | | 1974 | 1995 | | | | | | |
| **Common Fiddleneck** | *Amsinckia intermedia* | Native | | | | | G5 | SNR | 1979 | 2019 | 2020 | 2019 | 2020 | 2019 | 2021 | 2018 | 2020 | 2021 |
| **Common Fig** | *Ficus carica* | Non-native | | | | | | | | | | 2019 | | | | | | |
| **Common Mediterranean Grass** | *Schismus barbatus* | Non-native | | | | | | | 1979 | | 1974 | 2022 | 2020 | 2019 | 2013 | 2018 | 2019 | 2020 |
| **Common Mock Pussypaws** | *Cistanthe monandra* | Native | | | | | | | | | 1974 | 1995 | 1970 | | 2013 | 2018 | | 2019 |
| **Common Panic Grass** | *Panicum capillare* | Native | | | | | | | | | | 1995 | | | | | | |
| **Common Reed** | *Phragmites australis* | Native | | | | | | | | | | | | | 2021 | | | |
| **Common Sowthistle** | *Sonchus oleraceus* | Non-native | | | | | | | | 2022 | 1974 | 2022 | 2022 | 2020 | 2013 | 2018 | 2011 | 2020 |
| **Common Sunflower** | *Helianthus annuus* | Native | | | | | | | | | 1974 | 1995 | 1970 | 2021 | 2018 | 2018 | | 1973 |
| **Common Threesquare** | *Schoenoplectus pungens var. longispicatus* | Native | | | | | | | | | | | | | 2013 | | | |
| **Common Timothy** | *Phleum pratense* | Non-native | | | | | | | | | | | | | | | | 2019 |
| **Coopers Broomrape** | *Orobanche cooperi subsp. cooperi* | Native | | | | | | | | 2019 | 1974 | 2022 | 2019 | 2019 | 2013 | | 2020 | 2020 |
| **Corkseed Cactus** | *Mammillaria tetrancistra* | Native | | | | SR | | | 1979 | | | | | | | | | 1973 |
| **Corn Mustard** | *SINAPIS ARVENSIS* | Non-native | | | | | | | | | | | | | | 2018 | | |
| **Cotton Batting Plant** | *Pseudognaphalium stramineum* | Native | | | | | | | | | | 1995 | | | | | | |
| **Coulters Brickellbush** | *Brickellia coulteri* | Native | | | | | | | | | | 2022 | | 1981 | 2021 | | 2021 | 2022 |
| **Coulters Globemallow** | *Sphaeralcea coulteri* | Native | | | | | | | 1979 | | 1974 | 1995 | 2020 | 1981 | | 2018 | 2019 | 2019 |
| **Cow Clover** | *Trifolium wormskioldii* | Native | | | | | | | | | | | | 1981 | | | | |
| **Cowpen Crownbeard** | *Verbesina encelioides subsp. exauriculata* | Native | | | | | | | 1979 | | 2021 | 2021 | 1970 | | 2013 | 2018 | | |

# NATURAL RESOURCE PLAN – TABLE 3. PLANT SPECIES LIST

| Common Name | Plant Species | Nativity | ESA_ FWS | USFS | BLM | NPL Status | GB Nature Serve | ST Nature Serve | BHRP | CCRP | EMRP | HRP | LPRP | MMRP | SCRA | STRP | UMRP | WTRP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Cow-tongue Prickly Pear** | *Opuntia engelmannii var. linguiformis* | Non-native | | | | | GNR | U | | | | | | | 2013 | | | |
| **Coyote Gourd** | *Cucurbita palmata* | Native | | | | | | | | | | 1995 | | | | | | |
| **Coyote Tobacco** | *Nicotiana attenuata* | Native | | | | | | | 1979 | | | | | | | | | |
| **Creeping Zinnia** | *Sanvitalia abertii* | Native | | | | | | | | | | 2021 | | | | | | |
| **Creosote Bush** | *Larrea tridentata var. tridentata* | Native | | | | | | | 2021 | 2022 | 2022 | 2022 | 2022 | 2022 | 2021 | 2022 | 2022 | 2022 |
| **Creosote Bush Cats eye** | *Johnstonella angustifolia* | Native | | | | | | | | | 2021 | | | | | 2018 | 2019 | 2020 |
| **Crest-rib Morning-glory** | *Ipomoea costellata* | Native | | | | | | | | | | 1995 | | | 2013 | | | |
| **Crossflower** | *Chorispora tenella* | Non-native | | | | | | | | | | 1995 | | | | | | |
| **Crucifixion Thorn** | *Canotia holacantha* | Native | | | | | | | 1979 | 2019 | 1974 | 2022 | 2021 | 2020 | 2013 | | | 2019 |
| **Cultivated Flax** | *Linum usitatissimum* | Non-native | | | | | | | | | | 1995 | | | | | | |
| **Curly Dock** | *Rumex crispus* | Non-native | | | | | | | | | | 2020 | | 1981 | 2013 | | | |
| **Curly Mesquite** | *Hilaria belangeri var. belangeri* | Native | | | | | | | | | | | 1970 | | 2013 | | | |
| **Curve Nut Combseed** | *Pectocarya recurvata* | Native | | | | | | | 1979 | 2017 | 2020 | 2022 | 2020 | 2020 | 2013 | 2018 | 2020 | 2022 |
| **Cut Leaf Ground Cherry** | *Physalis angulata* | Native | | | | | | | | | 1974 | | 1970 | | | | | |
| **Cut Leaf Nightshade** | *Solanum triflorum* | Native | | | | | | | | | | | 1970 | | | | | |
| **Dainty Desert Hideseed** | *Eucrypta micrantha* | Native | | | | | | | | | 1974 | | 1970 | | | 2018 | | 2019 |
| **Dakota Mock Vervain** | *Glandularia bipinnatifida var. bipinnatifida* | Native | | | | | | | | | | 1995 | | 1981 | | | | |
| **Darning Needle Cholla** | *Cylindropuntia ramosissima* | Native | | | | SR | | | 1979 | | 1974 | | | | | | | |
| **Date Palm** | *Phoenix dactylifera* | Non-native | | | | | GNR | SNR | | | 1974 | | | | | | | |
| **Deer Grass** | *Muhlenbergia rigens* | Native | | | | | | | | | | 1995 | | | 2021 | | | 1973 |
| **Dense False Gily Flower** | *Allophyllum gilioides subsp. giliodes* | Native | | | | | G4 | SNR | | | | | | | 2013 | | | |
| **Desert Agave** | *Agave simplex* | Native | | | | | GNR | SNR | | | 1974 | | | 1981 | | | | 2021 |
| **Desert Beardtongue** | *Penstemon pseudospectabilis subsp. connatifolius* | Native | | | | | | | | | | 1995 | | | 2013 | | | |
| **Desert Broom** | *Baccharis sarothroides* | Native | | | | | | | 1979 | 2021 | 1974 | 2022 | 2021 | 2019 | 2021 | 2018 | 2011 | 2019 |
| **Desert Chicory** | *Rafinesquia neomexicana* | Native | | | | | | | 1979 | 2022 | 2019 | 1995 | 1970 | 2022 | 2013 | 2018 | 2017 | 2022 |
| **Desert Dandelion** | *Malacothrix stebbinsii* | Native | | | | | | | | | 1974 | | 1970 | | | | | 1973 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Desert Evening Primrose** | *Oenothera primiveris subsp. primiveris* | Native | | | | | | | | | 1974 | 2022 | 1970 | 1981 | 2013 | 2018 | | 2019 |
| **Desert Fescue** | *Vulpia microstachys var. microstachys* | Native | | | | | | | | | | | | | | | | 2019 |
| **Desert Goosefoot** | *Chenopodium pratericola* | Native | | | | | | | | | | | | | | 2018 | | |
| **Desert Honeysuckle** | *Anisacanthus thurberi* | Native | | | | | G4 | SNR | | | | | | | 2013 | | | |
| **Desert Horse Purslane** | *Trianthema portulacastrum* | Native | | | | | | | | 2021 | 2021 | 2021 | | | | 2018 | | |
| **Desert Indian Paintbrush** | *Castilleja chromosa* | Native | | | | | | | | | | | | | 2021 | | | |
| **Desert Ironwood** | *Olneya tesota* | Native | | | | | | | 2021 | 2021 | 2022 | 2022 | 2021 | 2021 | 2021 | 2022 | 2022 | 2022 |
| **Desert Lavender** | *Condea emoryi* | Native | | | | | | | 1979 | 2022 | 1974 | 2022 | 2022 | 1981 | 2021 | 2022 | 2021 | 2021 |
| **Desert Lily** | *Hesperocallis undulata* | Native | | | | SR | | | 1979 | | 1974 | | | | | | | 1973 |
| **Desert Love Grass** | *Eragrostis pectinacea var. miserrima* | Native | | | | | | | | | | 1995 | | | | | | |
| **Desert Mariposa Lily** | *Calochortus kennedyi var. kennedyi* | Native | | | | SR | | | | 2019 | | 2014 | 2020 | 1981 | 2020 | | | 2019 |
| **Desert Needle Grass** | *Pappostipa speciosa var. media* | Native | | | | | | | | | 1974 | 1995 | | | 2013 | | | 2019 |
| **Desert Olive** | *Forestiera shrevei* | Native | | | | | | | | | 1974 | | | | | | | 1973 |
| **Desert Palafox** | *Palafoxia arida var. arida* | Native | | | | | | | | | 1974 | | 1970 | | | | | |
| **Desert Rose-mallow** | *Hibiscus coulteri* | Native | | | | | | | | 2021 | 1974 | | 1970 | | 2021 | | | 2019 |
| **Desert Sand Verbena** | *Abronia villosa var. villosa* | Native | | | | | T4 | SNR | | | | | | | | | | 2019 |
| **Desert Shaggymane** | *Podaxis pistillaris* | Unknown | | | | | | | | | | 2021 | | | | | | |
| **Desert Silverbush** | *Ditaxis claryana* | Native | | | | | G3 | SNR | | | | | | | | | | 2019 |
| **Desert Spike Moss** | *Selaginella eremophila* | Native | | | | | | | 1979 | | | | | | | | | 1973 |
| **Desert Starvine** | *Brandegea bigelovii* | Native | | | | | | | 2021 | | 1974 | 2022 | 1970 | 1981 | | | | 2019 |
| **Desert Thimbleweed** | *Anemone tuberosa* | Native | | | | | G5 | SNR | | | | | | 1981 | 2022 | | | 2019 |
| **Desert Thorn Apple** | *Datura discolor* | Native | | | | | | | 1979 | | 1974 | 2021 | 1970 | 2021 | | 2018 | 2021 | 1973 |
| **Desert Tobacco** | *Nicotiana obtusifolia* | Native | | | | | | | 1979 | | 1974 | 2022 | 2022 | 2019 | 2021 | 2018 | 2019 | 2022 |
| **Desert Vine** | *Janusia gracilis* | Native | | | | | | | | | 1974 | 2022 | 1970 | 1981 | 2018 | 2018 | 2011 | 2020 |
| **Desert Willow** | *Chilopsis linearis subsp. arcuata* | Native | | | | SA | | | | | 2011 | 2021 | | | | | | |
| **Desert Wolfberry** | *Lycium californicum var. arizonicum* | Native | | | | | U | U | 1979 | | | | | | | | | |

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| Common Name | Plant Species | Nativity | ESA_ FWS | USFS | BLM | NPL Status | GB Nature Serve | ST Nature Serve | BHRP | CCRP | EMRP | HRP | LPRP | MMRP | SCRA | STRP | UMRP | WTRP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Desertbells** | *Phacelia campanularia* | Native | | | | | | | | | | | | | | | 2019 | |
| **Desertsnow** | *Linanthus demissus* | Native | | | | | | | | | 1974 | | 1970 | | 2013 | 2018 | | |
| **Desert-thorn** | *Lycium fremontii* | Native | | | | | | | | | 1974 | 1995 | 2021 | 1981 | | 2018 | | 2019 |
| **Devils Canyon Muhly** | *Muhlenbergia appressa* | Native | | | | | | | | | | | 1970 | | | | | |
| **Distant Scorpion Weed** | *Phacelia distans* | Native | | | | | | | 1979 | 2022 | 2021 | 2020 | 2022 | 2022 | 2022 | 2019 | 2022 | 2022 |
| **Ditch Rabbitsfoot Grass** | *Polypogon interruptus* | Native | | | | | | | | | | 1995 | | | | | | |
| **Dock Leaf Smartweed** | *Persicaria lapathifolia* | Native | | | | | | | | | 1974 | 1995 | | | 2013 | | | |
| **Dogs Mouth** | *Pseudorontium cyathiferum* | Native | | | | | | | | | 1974 | | | | | | | |
| **Doubleclaw** | *Proboscidea parviflora* | Native | | | | | | | | | | 2021 | | | 2021 | | | 1973 |
| **Douglas' Ragwort** | *Senecio flaccidus var. douglasii* | Native | | | | | T3 | U | | | | 2017 | | | | | | |
| **Douglas' Stitchwort** | *Sabulina douglasii* | Native | | | | | | | | | | | | 1981 | | | | |
| **Dutchmans Pipe** | *Aristolochia watsonii* | Native | | | | | G4 | SNR | 1979 | | | 2022 | 1970 | 1981 | 2021 | | 2011 | 1973 |
| **Dwarf Ayenia** | *Ayenia insulicola* | Non-native | | | | | | | | | | | 1970 | | | | | 2019 |
| **Dwarf Desert Peony** | *Acourtia nana* | Native | | | | | G5 | SNR | | | | | | 1981 | | | | |
| **Dwarf False Pennyroyal** | *Hedeoma nana subsp. nana* | Native | | | | | | | | | | | 1970 | 1981 | 2020 | | | 1973 |
| **Dwarf Indian Mallow** | *Abutilon parvulum* | Native | | | | | G5 | SNR | | | | 2021 | | | | | | 1973 |
| **Dwarf White Milk Vetch** | *Astragalus didymocarpus* | Native | | | | | | | | | | | 1970 | 1981 | | 2018 | | 1973 |
| **Eastern Mojave buckwheat** | *Eriogonum fasciculatum var. polifolium* | Native | | | | | | | | 2022 | 1974 | 2022 | 1970 | 2021 | 2022 | 2019 | 2022 | 2022 |
| **Eastwood Fescue** | *Vulpia microstachys var. ciliata* | Native | | | | | | | | | | | 1970 | 1981 | 2013 | | | 1973 |
| **Eatons penstemon** | *Penstemon eatonii subsp. undosus* | Native | | | | | | | | | | 1995 | | | | | | |
| **Eight Flower Six Weeks Grass** | *Vulpia octoflora var. octoflora* | Native | | | | | | | | | | | | 1981 | | | | |
| **Elegant Sunburst Lichen** | *Rusavskia elegans* | Unknown | | | | | | | | | | | | | 2021 | | | |
| **Elephant Tree** | *Bursera microphylla* | Native | | | | | | | | | 1974 | | | | | | | 2019 |
| **Emoryi's Barrel Cactus** | *Ferocactus emoryi* | Native | | | | SR | G4 | S1 | | | 1974 | | | | | | | |
| **Engelmanns Hedgehog Cactus** | *Echinocereus engelmannii var. acicularis* | Native | | | | SR | T4 | S3 | 1979 | | 1974 | | 1970 | | | 2018 | 2011 | |



MARICOPA COUNTY PARKS & RECREATION

| Common Name | Plant Species | Nativity | ESA_ FWS | USFS | BLM | NPL Status | GB Nature Serve | ST Nature Serve | BHRP | CCRP | EMRP | HRP | LPRP | MMRP | SCRA | STRP | UMRP | WTRP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Erect Spiderling** | *Boerhavia erecta* | Native | | | | | | | | | 2021 | 2021 | 2021 | | | | | 2017 |
| **Evening Primrose** | *Oenothera elata subsp. hirsutissima* | Native | | | | | | | | | | 1995 | | | 2019 | | | |
| **Eveningsnow** | *Linanthus dichotomus* | Native | | | | | | | | | | | | | | | | 1973 |
| **Fairy Duster** | *Calliandra eriophylla* | Native | | | | | | | | 2022 | | | 2021 | 2021 | 2021 | | 2022 | 2022 |
| **Fairyswords** | *Myriopteris lindheimeri* | Native | | | | | | | | | | | | | | | | 2021 |
| **False Daisy** | *Eclipta prostrata* | Native | | | | | | | | | 1974 | 1995 | 1970 | | | | | |
| **False Fluff Grass** | *Dasyochloa pulchella* | Native | | | | | | | 1979 | 2022 | 1974 | 2022 | 1970 | 2021 | 2013 | 2018 | 2022 | 2020 |
| **False Hedge Parsley** | *Yabea microcarpa* | Native | | | | | | | | | | | 1970 | | | | | 1973 |
| **False Monkey Flower** | *Mimetanthe pilosa* | Native | | | | | | | | | | 2021 | | | | | | |
| **False Prairie Clover** | *Marina parryi* | Native | | | | | | | | 2022 | 1974 | 2022 | 1970 | 1981 | 2013 | | 2019 | 2022 |
| **False Willow** | *Baccharis salicifolia* | Native | | | | | | | | | 1974 | 2022 | 2021 | 1981 | 2013 | | | 1973 |
| **False Willow** | *Baccharis sergiloides* | Native | | | | | | | | | | | 1970 | | 2013 | | | 1973 |
| **Fan Leaf Crinklemat** | *Tiquilia plicata* | Native | | | | | | | | | 1974 | 2021 | | | | | | |
| **Feather Windmill Grass** | *Chloris virgata* | Native | | | | | | | | | | 1995 | | | | | | 1973 |
| **Few-flowered Bluedicks** | *Dichelostemma capitatum subsp. pauciflorum* | Native | | | | SR | | | 1979 | 2022 | 2020 | 2020 | 2022 | 2022 | 2021 | 2018 | 2019 | 2022 |
| **Filaree** | *Erodium cicutarium* | Non-native | | | | | | | 2021 | 2018 | | 2022 | 2020 | 2020 | 2013 | 2019 | 2020 | 2022 |
| **Finger-leaf Gourd** | *Cucurbita digitata* | Native | | | | | | | 1979 | | 1974 | 1995 | 1970 | 2021 | | | 2011 | 1973 |
| **Firecracker penstemon** | *Penstemon eatonii subsp. exsertus* | Native | | | | | | | | 2022 | | | 2022 | | 2022 | | | |
| **Five Horn Smotherweed** | *Bassia hyssopifolia* | Non-native | | | | | | | | | | 1995 | | | | | | |
| **Five Needle Pricklyleaf** | *Thymophylla pentachaeta var. belenidium* | Native | | | | | | | | | | | 2022 | | | | 2019 | |
| **Five Stamen Tamarisk** | *TAMARIX CHINENSIS* | Non-native | | | | | | | | | | | | 2015 | | | | |
| **fivewing spiderling** | *Boerhavia intermedia* | Native | | | | | | | 1979 | | 1974 | 1995 | 1970 | | | 2018 | | 2019 |
| **Flat Globe Dodder** | *Cuscuta umbellata* | Native | | | | | | | | | | | | | | | | 1973 |
| **Flat Spine Burr Ragweed** | *Ambrosia acanthicarpa* | Native | | | | | G5 | SNR | | | | 1995 | | | | | | |
| **Flatcrown Buckwheat** | *Eriogonum deflexum var. deflexum* | Native | | | | | | | 1979 | | 1974 | 2022 | 1970 | 1981 | 2021 | 2018 | 2019 | 2019 |
| **Flatspine Stickseed** | *Lappula occidentalis var. occidentalis* | Native | | | | | | | | | | | 1970 | | | | | |

# NATURAL RESOURCE PLAN – TABLE 3. PLANT SPECIES LIST

| Common Name | Plant Species | Nativity | ESA_ FWS | USFS | BLM | NPL Status | GB Nature Serve | ST Nature Serve | BHRP | CCRP | EMRP | HRP | LPRP | MMRP | SCRA | STRP | UMRP | WTRP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Floating Primrose-willow** | *Ludwigia peploides* | Non-native | | | | | | | | | | 2021 | | | | | | |
| **Floating Primrose-willow** | *Ludwigia peploides subsp. peploides* | Non-native | | | | | | | | | 1974 | 1995 | | | | | | |
| **Florida Hopbush** | *Dodonaea viscosa* | Native | | | | | | | | | | | | 1981 | 2022 | | | |
| **Florida Pellitory** | *Parietaria floridana* | Non-native | | | | | G5 | U | | | | | | | | | | 2019 |
| **Flowering Flax** | *Linum grandiflorum* | Non-native | | | | | | | | | | | | 2019 | | | | 2019 |
| **Foothill Deerweed** | *Acmispon brachycarpus* | Native | | | | | | | | | | 2022 | 1970 | 1981 | 2013 | 2018 | 2011 | 2019 |
| **Foothillls Palo Verde** | *Parkinsonia microphylla* | Native | | | | SA | | | 2021 | 2021 | 2021 | 2022 | 2019 | 2022 | 2022 | 2021 | 2022 | 2021 |
| **Fountaingrass** | *PENNISETUM SETACEUM* | Non-native | | | | | | | | 2019 | | | 2019 | 2020 | 2013 | | 2020 | 2021 |
| **Four Wing Saltbush** | *Atriplex canescens var. canescens* | Native | | | | | | | | | | 2022 | | 1981 | 2013 | | 2018 | 2019 |
| **Fremont Cottonwood** | *Populus fremontii subsp. fremontii* | Native | | | | | | | | | 1974 | 2022 | 1970 | 1981 | 2022 | | | 1973 |
| **Fringed Amaranth** | *Amaranthus fimbriatus* | Native | | | | | G5 | SNR | | | 2021 | 2021 | | 2019 | 2013 | 2021 | 2018 | 2021 |
| **Fringed Redmaids** | *Calandrinia ciliata* | Native | | | | | | | | | | | 1970 | 1981 | 2013 | 2018 | 2011 | 2019 |
| **Fringed Willowherb** | *Epilobium ciliatum subsp. ciliatum* | Native | | | | | | | | | | 1995 | | | | | | |
| **Garden Tomato** | *Solanum lycopersicum* | Non-native | | | | | | | | | 1974 | | | | | | | |
| **Giant Reed** | *ARUNDO DONAX* | Non-native | | | | | G5 | IS | | | 1974 | | 1970 | | 2013 | | | |
| **Gila County Liveforever** | *Dudleya saxosa subsp. collomiae* | Native | | | | SR | T4 | S4 | | | | | 1970 | | 2013 | | | |
| **Gila Globemallow** | *Sphaeralcea rusbyi subsp. gilensis* | Native | | | | | | | | | | | | | 2016 | | | |
| **Gila Manroot** | *Marah gilensis* | Native | | | | | | | | | | 2022 | 1970 | 2020 | 2021 | | 2011 | 2019 |
| **Giraffehead** | *Lamium amplexicaule* | Non-native | | | | | | | | | | 2021 | | | 2013 | | | |
| **Glandleaf Milkwort** | *Polygala macradenia* | Native | | | | | | | | | | 2022 | | | | | | 1973 |
| **Globemallow** | *Sphaeralcea emoryi* | Native | | | | | | | | | | | | 1981 | | | | 2019 |
| **Globemallow** | *Sphaeralcea rusbyi subsp. rusbyi* | Native | | | | | | | | | | | | | 2013 | | | |
| **Golden Cholla** | *Cylindropuntia echinocarpa* | Native | | | | SR | | | | | | | 2022 | | | | | 1973 |
| **Golden Flower Century Plant** | *Agave chrysantha* | Native | | | | SR | G4 | S4 | | | | | | | 2013 | | | |
| **Golden Linanthus** | *Leptosiphon chrysanthus subsp. chrysanthus* | Native | | | | | | | | | | 2022 | | 1981 | | | | |
| **Gooddings Black Willow** | *Salix gooddingii* | Native | | | | | | | | | 1974 | 2022 | 2019 | 1981 | 2021 | | | 2019 |

| Common Name | Plant Species | Nativity | ESA_ FWS | USFS | BLM | NPL Status | GB Nature Serve | ST Nature Serve | BHRP | CCRP | EMRP | HRP | LPRP | MMRP | SCRA | STRP | UMRP | WTRP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Gooddings Tansyaster** | *Xanthisma spinulosum var. gooddingii* | Native | | | | | | | | 2021 | | 2022 | | 2022 | 2021 | | | 2020 |
| **Goodings Mock Vervain** | *Glandularia gooddingii* | Native | | | | | | | | | 1974 | | | | 2013 | | | |
| **Goosefoot** | *Chenopodium berlandieri var. zschackei* | Native | | | | | | | | | 1974 | | 1970 | | | 2018 | | |
| **Goosefoot** | *Chenopodium fremontii* | Native | | | | | | | | | | | | 1981 | 2013 | | | |
| **Goosefoot** | *Chenopodium watsonii* | Native | | | | | | | | | | | 1970 | | | | | |
| **Gordons Bladderpod** | *Physaria gordonii* | Native | | | | | | | 1979 | | 1974 | | 1970 | | 2013 | | | 2019 |
| **Graceful Lip Fern** | *Myriopteris yavapensis* | Native | | | | | | | | | | | | | | | | |
| **Grannyvine** | *IPOMOEA TRICOLOR* | Non-native | | | | | | | | | | 1995 | | | | | | |
| **Grass Leaf Sleepy Daisy** | *Xanthisma gracile* | Native | | | | | | | 1979 | | | 1995 | | | | | | |
| **Gravel Bar Cats Eye** | *Cryptantha decipiens* | Native | | | | | | | | | 1974 | | 1970 | 1981 | 2013 | 2018 | | 2018 |
| **Great Brome** | *Bromus diandrus* | Non-native | | | | | | | | | | 2021 | | | 2021 | | | |
| **Great Mullein** | *Verbascum thapsus* | Non-native | | | | | | | | | | 2021 | | | 2013 | | | |
| **Great Plains False Willow** | *Baccharis salicina* | Native | | | | | | | | | | 1995 | | | | | | |
| **Great Plantain** | *Plantago major* | Non-native | | | | | | | | | | 1995 | | | | | | |
| **Greater Periwinkle** | *Vinca major* | Non-native | | | | | | | | | | 1995 | | | | | | |
| **Green Spot Nightshade** | *Solanum douglasii* | Native | | | | | | | | | | | 1970 | 1981 | | | | |
| **Green Sprangletop** | *Disakisperma dubium* | Native | | | | | | | | | | 1995 | | | 2013 | | | |
| **Guadalupe Cryptantha** | *Cryptantha maritima var. maritima* | Native | | | | | | | | | | | | | | | | 2019 |
| **Guadalupe Cryptantha** | *Cryptantha maritima var. pilosa* | Native | | | | | | | 1979 | | 1974 | | 1970 | 1981 | | 2018 | | 1973 |
| **Gumhead** | *Gymnosperma glutinosum* | Native | | | | | | | | | 1974 | | | | | 2018 | | |
| **Hackberry Beardtongue** | *Penstemon subulatus* | Native | | | | | | | | 2022 | | 2022 | 2017 | 1981 | 2013 | | | 2021 |
| **Hairy Crab Grass** | *Digitaria sanguinalis* | Non-native | | | | | | | | | | 1995 | | | | | | |
| **Hairy Desert Sunflower** | *Geraea canescens* | Native | | | | | | | | | 2019 | | | | | | | |
| **Hairy Prairie Clover** | *Dalea mollis* | Native | | | | | | | 1979 | | 1974 | | 1970 | | | 2018 | | |
| **Hairy Purslane Speedwell** | *Veronica peregrina subsp. xalapensis* | Native | | | | | | | | | | | | 1981 | 2013 | | | 1973 |
| **Hairy Rupturewort** | *Herniaria hirsuta* | Non-native | | | | | | | | | | | | 1981 | 2013 | | | |

# NATURAL RESOURCE PLAN – TABLE 3. PLANT SPECIES LIST

| Common Name | Plant Species | Nativity | ESA_ FWS | USFS | BLM | NPL Status | GB Nature Serve | ST Nature Serve | BHRP | CCRP | EMRP | HRP | LPRP | MMRP | SCRA | STRP | UMRP | WTRP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Hairy Rupturewort** | *Herniaria hirsuta subsp. cinerea* | Non-native | | | | | | | | | | 1995 | 1970 | | | 2018 | | |
| **Hairy Wild Sensitive Plant** | *Senna covesii* | Native | | | | | | | | 2021 | 2022 | 2022 | 2022 | 2020 | 2021 | 2021 | 2021 | 2022 |
| **Hairypod Pepper Grass** | *Lepidium lasiocarpum var. lasiocarpum* | Native | | | | | | | 1979 | | | 1995 | | 2019 | 2013 | | 2019 | 2019 |
| **Halfmoon Milk Vetch** | *Astragalus allochrous var. playanus* | Native | | | | | | | | | | 1995 | | 1981 | | | | |
| **Head Sandmat** | *Chamaesyce capitellata* | Native | | | | | | | 1979 | 2022 | | 2021 | 2022 | 1981 | 2022 | 2018 | 2011 | 1973 |
| **Heartleaf Suncup** | *Eremothera cardiophylla* | Native | | | | | | | | | | | | | 2013 | | | |
| **Hemp** | *Cannabis sativa* | Non-native | | | | | | | | | | | | | 2013 | 2018 | | |
| **Hidden Flower Scorpion Weed** | *Phacelia cryptantha* | Native | | | | | | | | | | | | | 2013 | | | |
| **Hillside Vervain** | *Verbena neomexicana var. xylopoda* | Native | | | | | | | | | | | | | 2013 | | | |
| **Hoary Bowlesia** | *Bowlesia incana* | Native | | | | | | | 1979 | 2018 | 2022 | 2022 | 2022 | 2017 | 2013 | 2018 | 2019 | 2019 |
| **Hohokam Century Plant** | *Agave murpheyi* | Native | SC | S | S | HS | G2 | S2 | | | | 1995 | | | 2013 | | | |
| **Hollow Leaf Annual Lupine** | *Lupinus succulentus* | Native | | | | | | | | | | | | | 2013 | | | 2019 |
| **Horned Nightshade** | *Solanum rostratum* | Native | | | | | | | | | | 2021 | 1970 | | | | | |
| **Horned Pondweed** | *Zannichellia palustris* | Native | | | | | | | | | 1974 | 1995 | 1970 | 1981 | | | | |
| **Hummingbird Bush** | *Justicia californica* | Native | | | | | | | | 2022 | 1974 | 2022 | | 2022 | 2022 | 2021 | 2022 | |
| **Hyssop Leaf Sandmat** | *Chamaesyce hyssopifolia* | Native | | | | | | | | | | 2021 | | | | | | |
| **Indian Hedge Mustard** | *Sisymbrium orientale* | Non-native | | | | | | | | | | | | | 2013 | | | |
| **Indian Mallow** | *Abutilon incanum subsp. incanum* | Native | | | | | U | U | | | 1974 | 2022 | 2022 | 1981 | 2021 | | 2021 | 2019 |
| **Indian Pipeweed** | *Eriogonum inflatum* | Native | | | | | | | 1979 | 2018 | 1974 | 2020 | 1970 | 1981 | 2013 | 2018 | 2011 | 2019 |
| **Indian Sweetclover** | *Melilotus indicus* | Non-native | | | | | | | | | 1974 | 1995 | 1970 | 1981 | 2021 | | | 2019 |
| **Inflated Duckweed** | *Lemna gibba* | Native | | | | | | | | | 1974 | | 1970 | | | | | |
| **Innocent Weed** | *Cenchrus longispinus* | Native | | | | | | | | | | 1995 | | | | | | |
| **Iodine Bush** | *Allenrolfea occidentalis* | Native | | | | | G4 | SNR | 1979 | | | | | | | | | |
| **Iris Leaf Rush** | *Juncus xiphioides* | Native | | | | | | | | | | 1995 | | | 2013 | | | |
| **Ivy Leaf Ground Cherry** | *Physalis hederifolia* | Native | | | | | | | | | | | | | | | 2018 | 2019 |
| **Japanese brome** | *Bromus japonicus* | Non-native | | | | | | | | | | 1995 | | | | | | |

| Common Name | Plant Species | Nativity | ESA_ FWS | USFS | BLM | NPL Status | GB Nature Serve | ST Nature Serve | BHRP | CCRP | EMRP | HRP | LPRP | MMRP | SCRA | STRP | UMRP | WTRP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Jersey Rabbit Tobacco** | *Pseudognaphalium luteoalbum* | Non-native | | | | | | | | | | 1995 | | | 2013 | | | |
| **Jerusalem Oak** | *Dysphania botrys* | Non-native | | | | | | | | | | 1995 | 1970 | | | | | |
| **Johnson Grass** | *SORGHUM HALEPENSE* | Non-native | | | | | | | 1979 | | 1974 | 1995 | | | | | | |
| **Joint Leaf Rush** | *Juncus articulatus* | Native | | | | | | | | | | 1995 | | | | | | |
| **Jointed Crown Grass** | *Paspalum distichum* | Native | | | | | | | | | | 1995 | | | | | | |
| **Jojoba** | *Simmondsia chinensis* | Native | | | | | | | 1979 | 2022 | | 2022 | 2018 | 2021 | 2022 | | 2022 | 2022 |
| **Jones Blazingstar** | *Mentzelia jonesii* | Native | | | | | | | | | | 1995 | 1970 | | | | | 1973 |
| **Jumping Cholla** | *Cylindropuntia fulgida* | Native | | | | SR | | | | | | 2021 | 2019 | | 2022 | 2021 | 2022 | 2019 |
| **Jumping Cholla** | *Cylindropuntia fulgida var. fulgida* | Native | | | | SR | | | | | | | | 1981 | 2013 | | | |
| **Jungle Rice** | *Echinochloa colona* | Non-native | | | | | | | | | | 1995 | 1970 | 1981 | 2013 | 2018 | | |
| **Kindlingweed** | *Gutierrezia sarothrae* | Native | | | | | | | 1979 | | 1974 | 2022 | 1970 | 1981 | 2016 | | | 2019 |
| **Lacy Scorpion Weed** | *Phacelia tanacetifolia* | Native | | | | | | | | | | | | | | | | 2019 |
| **Lambs Quarters** | *Chenopodium album* | Non-native | | | | | | | | | | | | | | | | 2020 |
| **Large Barnyard Grass** | *Echinochloa crus-galli* | Non-native | | | | | | | | | 1974 | 2019 | | | 2013 | | 2011 | |
| **Large Bract Spiderling** | *Boerhavia wrightii* | Native | | | | | | | | | | | | 1981 | | 2018 | | 1973 |
| **Large Flower Pincushion** | *Chaenactis macrantha* | Native | | | | | | | | | | | 1970 | | | | | |
| **Large Seed Dodder** | *Cuscuta indecora* | Native | | | | | | | | | | 2021 | | 1981 | 2013 | | | |
| **Large Spike Bristle Grass** | *Setaria macrostachya* | Native | | | | | | | | | | | | 1981 | | | | |
| **Larkspur** | *Delphinium parishii subsp. parishii* | Native | | | | | | | | 2019 | 1974 | | 2019 | 1981 | 2013 | 2018 | 2011 | 2020 |
| **Las Animas Nakedwood** | *Colubrina californica* | Native | | | | | | | | | | | | | | 2018 | | |
| **Lawn American Aster** | *Symphyotrichum subulatum var. ligulatum* | Native | | | | | | | | | 1974 | 1995 | 1970 | | | | | |
| **Lehmann Love Grass** | *Eragrostis lehmanniana* | Non-native | | | | | | | | | | | | | 2013 | | | |
| **Lemmons Ragwort** | *Senecio lemmonii* | Native | | | | | | | | | 1974 | | 1970 | 1981 | 2020 | 2018 | | 2019 |
| **Leporinum Barley** | *Hordeum murinum subsp. leporinum* | Non-native | | | | | | | | | 1974 | | 1970 | 1981 | | | 2011 | 2019 |
| **Lesser Canary Grass** | *Phalaris minor* | Non-native | | | | | | | 1979 | | 1974 | 1995 | | | 2013 | 2018 | | 2019 |
| **Lesser Pepperwort** | *Lepidium didymum* | Non-native | | | | | | | | | | 2019 | | | | | | |

# NATURAL RESOURCE PLAN – TABLE 3. PLANT SPECIES LIST

| Common Name | Plant Species | Nativity | ESA_ FWS | USFS | BLM | NPL Status | GB Nature Serve | ST Nature Serve | BHRP | CCRP | EMRP | HRP | LPRP | MMRP | SCRA | STRP | UMRP | WTRP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Lesser Wire Lettuce** | *Stephanomeria tenuifolia* | Native | | | | | | | | | | | | | | | | 2019 |
| **Lesser Yellowthroat Gilia** | *Gilia flavocincta subsp. australis* | Native | | | | | | | | | | | | | | | | 1973 |
| **Lesser Yellowthroat Gilia** | *Gilia flavocincta subsp. flavocincta* | Native | | | | | GNR | SNR | 1979 | | 2020 | 2020 | 2022 | 1981 | 2021 | 2019 | 2019 | 2020 |
| **Lettuce** | *Claytonia perfoliata subsp. mexicana* | Native | | | | | | | | | | 2022 | | 1981 | 2013 | | | 2021 |
| **Lilac Chastetree** | *Vitex agnus-castus* | Non-native | | | | | | | | | | 2017 | | | | | | |
| **Limestone Bedstraw** | *Galium proliferum* | Native | | | | | | | | | | | 1970 | | 2013 | | | 2019 |
| **Limestone Scorpion Weed** | *Phacelia affinis* | Native | | | | | | | | | | | 1970 | | 2013 | | | 2019 |
| **Lindleys False Silverpuffs** | *Uropappus lindleyi* | Native | | | | | | | 1979 | | 1974 | 2020 | 2016 | 1981 | 2013 | 2018 | 2011 | 2021 |
| **Line Leaf Whitepuff** | *Oligomeris linifolia* | Native | | | | | | | 1979 | | 1974 | | | | | 2018 | 2011 | 1973 |
| **Lip Fern** | *Myriopteris covillei* | Native | | | | | | | | | 1974 | | | 1981 | 2021 | | | 2021 |
| **Lip Fern** | *Myriopteris parryi* | Native | | | | | | | 1979 | | 1974 | | 1970 | 1981 | | 2018 | 2011 | 2021 |
| **Little Barley** | *Hordeum pusillum* | Native | | | | | | | | | | | 1970 | 1981 | | | | |
| **Little Desert Trumpet** | *Eriogonum trichopes* | Native | | | | | | | | | | | | 1981 | | | | 1973 |
| **Little Gily-flower** | *Gilia minor* | Native | | | | | | | 1979 | | | | | | | | | |
| **Little Hogweed** | *Portulaca oleracea* | Non-native | | | | | | | | | | | 2021 | | 2013 | | | 1973 |
| **Little Red-stem Monkeyflower** | *Erythranthe rubella* | Native | | | | | | | | | | | | | 2013 | | | |
| **Little Seed Muhly** | *Muhlenbergia microsperma* | Native | | | | | | | 1979 | | 1974 | | 1970 | 1981 | | 2018 | 2011 | 2019 |
| **Lobe Leaf Groundsel** | *Packera multilobata* | Native | | | | | | | | | | 1995 | | | | | | |
| **Lobed Fleabane** | *Erigeron lobatus* | Native | | | | | | | | | 1974 | | 1970 | | | | | 2019 |
| **London Rocket** | *Sisymbrium irio* | Non-native | | | | | | | 1979 | 2019 | 2022 | 2022 | 1970 | 2022 | 2022 | 2022 | 2019 | 2020 |
| **Long Capsule Mooncup** | *Eremothera chamaenerioides* | Native | | | | | | | | | 1974 | | 1970 | 1981 | 2013 | 2018 | 2011 | 1973 |
| **Longleaf False Goldeneye** | *Heliomeris longifolia var. annua* | Native | | | | | | | | | | 1995 | 1970 | | 2013 | | | |
| **Longleaf Joint Fir** | *Ephedra trifurca* | Native | | | | | | | | | 2021 | | 1970 | | | | | 2017 |
| **Loomis Thimblehead** | *Hymenothrix loomisii* | Native | | | | | | | | | | | | | 2013 | | | |
| **Lotebush** | *Sarcomphalus obtusifolius var. canescens* | Native | | | | | | | 1979 | | 1974 | 2022 | 1970 | 2021 | 2021 | 2018 | | 2019 |

| Common Name | Plant Species | Nativity | ESA_ FWS | USFS | BLM | NPL Status | GB Nature Serve | ST Nature Serve | BHRP | CCRP | EMRP | HRP | LPRP | MMRP | SCRA | STRP | UMRP | WTRP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Lotebush** | *Ziziphus obtusifolia* | Native | | | | | | | | | | 2020 | | | | | | |
| **Louisiana Vetch** | *Vicia ludoviciana subsp. ludoviciana* | Native | | | | | | | | | | | | | 2013 | | | |
| **Lyreleaf Jewel-flower** | *Streptanthus carinatus subsp. arizonicus* | Native | | | | | | | | | | | | | | 2018 | | |
| **Malta Star Thistle** | *CENTAUREA MELITENSIS* | Non-native | | | | | | | | 2022 | 2019 | 2021 | 1970 | 2022 | 2020 | | | |
| **Many Bristle Chinchweed** | *Pectis papposa var. papposa* | Native | | | | | | | 1979 | | 1974 | 2021 | 1970 | 1981 | | 2018 | 2018 | 2021 |
| **Many Flower Skyrocket** | *Ipomopsis multiflora* | Native | | | | | | | | | | | | | 2013 | | | |
| **Many-flowered Monkeyflower** | *Erythranthe floribunda* | Native | | | | | | | | | | 2022 | | | | | | |
| **Maricopa Desert Trumpets** | *Linanthus maricopensis* | Native | | | | | U | U | | | | 2019 | | | | | | |
| **Mat Amaranth** | *Amaranthus blitoides* | Native | | | | | GNR | IS | | | | | 1970 | 1981 | 2013 | | | 1973 |
| **Maxons Goldback Fern** | *Pentagramma triangularis subsp. maxonii* | Native | | | | | | | | | 1974 | | | 1981 | | | | 2019 |
| **May Grass** | *Phalaris caroliniana* | Native | | | | | | | | | | | | | | | | 1973 |
| **Mealy Gosefoot** | *Chenopodium incanum var. incanum* | Native | | | | | | | | | | 1995 | 1970 | | | | | |
| **Melonleaf Nightshade** | *Solanum heterodoxum var. setigeroides* | Native | | | | | | | | | | 2021 | | | | | | |
| **Menzies' Pepper-grass** | *Lepidium virginicum subsp. menziesii* | Native | | | | | T5 | SNR | | | | 1995 | 1970 | 1981 | | | 2011 | |
| **Menzies' Red Maids** | *Calandrinia menziesii* | Native | | | | | | | | 2022 | | | 2020 | | | | 2020 | 2020 |
| **Mesa Tansy Aster** | *Machaeranthera tagetina* | Native | | | | | | | | | | | | | 2013 | | | |
| **Mesquite Mistletoe** | *Phoradendron californicum* | Native | | | | | | | 1979 | | 2021 | 2022 | 1970 | 2021 | 2021 | 2021 | 2022 | 2021 |
| **Mexican Bladder-sage** | *Scutellaria mexicana* | Native | | | | | | | | | | 2022 | 1970 | | 2013 | | | 2020 |
| **Mexican Fireweed** | *Bassia scoparia* | Non-native | | | | | | | | | | | | | 2013 | | | |
| **Mexican Gold Poppy** | *Eschscholzia californica subsp. mexicana* | Native | | | | | | | 1979 | 2022 | 2019 | 2022 | 2022 | 2019 | 2021 | 2018 | 2020 | 2022 |
| **Mexican Love Grass** | *Eragrostis mexicana subsp. mexicana* | Native | | | | | | | | | | | | 1981 | | | | |
| **Mexican Love Grass** | *Eragrostis mexicana subsp. virescens* | Native | | | | | | | 1979 | | 1974 | | | | | | | |
| **Mexican Manzanita** | *Arctostaphylos pungens* | Native | | | | | G5 | SNR | | | | | | | | | 2011 | |
| **Mexican Palo Verde** | *Parkinsonia aculeata* | Native | | | | | | | | | | 2021 | | | | | | |
| **Mexican Panicgrass** | *Panicum hirticaule subsp. hirticaule* | Native | | | | | | | | | | | | | 2013 | | | 1973 |

# NATURAL RESOURCE PLAN – TABLE 3. PLANT SPECIES LIST

| Common Name | Plant Species | Nativity | ESA_ FWS | USFS | BLM | NPL Status | GB Nature Serve | ST Nature Serve | BHRP | CCRP | EMRP | HRP | LPRP | MMRP | SCRA | STRP | UMRP | WTRP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Mexican Sprangletop** | *Diplachne fusca subsp. uninervia* | Native | | | | | | | | | 1974 | 1995 | 1970 | | | | | 1973 |
| **Mexican Tea** | *Dysphania ambrosioides* | Native | | | | | | | | | 1974 | | | | | | | |
| **Mexican Wormwood** | *Artemisia ludoviciana subsp. mexicana* | Native | | | | | T5 | SNR | | | | 2022 | | | 2021 | | | 1973 |
| **Miners Pepperwort** | *Lepidium densiflorum* | Native | | | | | | | | | | | | | 2013 | | | |
| **Miniature Suncup** | *Camissonia micrantha* | Non-native | | | | | | | | | | 1995 | 1970 | 1981 | 2013 | | 2011 | |
| **Miniature Woolstar** | *Eriastrum diffusum* | Native | | | | | | | | | 1974 | 2020 | 1970 | 2022 | 2013 | 2018 | 2020 | 2019 |
| **Mint Vervain** | *Verbena menthifolia* | Native | | | | | | | | | | | 1970 | | | | | |
| **Mistletoe** | *Phoradendron serotinum subsp. macrophyllum* | Native | | | | | | | | | | 2021 | | | | | | |
| **Moapa Bladderpod** | *Physaria tenella* | Native | | | | | | | 1979 | | 2020 | 2022 | 1970 | 1981 | 2013 | 2018 | | 2019 |
| **Mojave Ceanothus** | *Ceanothus vestitus* | Native | | | | | | | | | | | | | 2013 | | | |
| **Mojave Desertstar** | *Monoptilon bellioides* | Native | | | | | | | 1979 | 2022 | 1974 | 2022 | 1970 | 2019 | | 2018 | 2011 | 2019 |
| **Mojave Lupine** | *Lupinus sparsiflorus subsp. mohavensis* | Native | | | | | | | 1979 | 2019 | 2022 | 2022 | 2022 | 2022 | 2022 | 2019 | 2022 | 2022 |
| **Mojave Milkweed** | *Asclepias nyctaginifolia* | Native | | | | | | | | | | | | 1981 | | | | |
| **Mojave Popcorn Flower** | *Plagiobothrys jonesii* | Native | | | | | | | | | | | 1970 | 1981 | | | | 2019 |
| **Mojave Ragwort** | *Senecio mohavensis* | Native | | | | | | | | | 1974 | | | | | | | |
| **Mojave Sage** | *Salvia mohavensis* | Native | | | | | | | | | 1974 | | | | | | | |
| **Mormon neddlegrass** | *Eriocoma arida* | Native | | | | | G5 | SNR | | | 1974 | | | | | | | |
| **Morningbride** | *Chaenactis fremontii* | Native | | | | | | | | | | | | | | | | 2017 |
| **Mountain Brome** | *Bromus marginatus* | Native | | | | | | | | | | | 1970 | 1981 | | 2018 | | 2019 |
| **Mountain Neststraw** | *Stylocline gnaphaloides* | Native | | | | | | | | | | | | 2019 | | | 2011 | |
| **Mountain Pink** | *Zeltnera calycosa* | Native | | | | | | | | | | 2021 | 2021 | | 2021 | | | 2019 |
| **Narrow Leaf Goosefoot** | *Chenopodium leptophyllum* | Native | | | | | | | | | 1974 | 1995 | 1970 | | | | | 1973 |
| **Narrow Leaf Heath Goldenrod** | *Ericameria linearifolia* | Native | | | | | | | | | | | | | 2013 | | | |
| **Narrow Leaf Willow** | *Salix exigua* | Native | | | | | | | | | | | | | | | | 1973 |
| **Narrow Leaflet Bean** | *Phaseolus angustissimus* | Native | | | | | | | | | | | | | 2013 | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Narrow Spike Dropseed** | *Sporobolus contractus* | Native | | | | | | | | | | 1995 | | | | | | 1973 |
| **Narrowleaf Dock** | *Rumex stenophyllus* | Non-native | | | | | | | | | 1974 | | | | | | | |
| **Narrowleaf Silverbush** | *Ditaxis lanceolata* | Native | | | | | G5 | SNR | 1979 | | 1974 | | 2019 | 2017 | 2021 | 2018 | 2011 | 2022 |
| **Narrow-leafed Yerba Santa** | *Eriodictyon angustifolium* | Native | | | | | | | | | | | | | 2013 | | | |
| **Needle Goldfields** | *Lasthenia gracilis* | Native | | | | | | | 1979 | | | | 1970 | 2019 | 2013 | 2018 | 2011 | 2019 |
| **Needle Grama** | *Bouteloua aristidoides var. aristidoides* | Native | | | | | | | | | | 2021 | | | 2013 | | | 2021 |
| **Net Leaf Hackberry** | *Celtis reticulata* | Native | | | | | | | | | | 2022 | | | 2013 | | | |
| **Nettle Leaf Mock Goosefoot** | *Chenopodium murale* | Non-native | | | | | | | 1979 | | 1974 | 1995 | 1970 | 1981 | | 2018 | | 2020 |
| **Nevada Cats Eye** | *Cryptantha nevadensis* | Native | | | | | | | | | | | | 1981 | | | | 1973 |
| **New Mexico Copperleaf** | *Acalypha neomexicana* | Native | | | | | G4 | SNR | | | | 2021 | | | 2013 | | | |
| **New Mexico Goosefoot** | *Chenopodium neomexicanum* | Native | | | | | | | | | | | | | | | | 2019 |
| **New Mexico Silverbush** | *Ditaxis neomexicana* | Native | | | | | G5 | SNR | 1979 | | 1974 | 1995 | 1970 | 1981 | 2013 | 2018 | 2018 | 2020 |
| **New Mexico Thistle** | *Cirsium neomexicanum* | Native | | | | | | | | | | 2022 | | 2020 | 2020 | | | 2020 |
| **Newberrys Velvet Mallow** | *Horsfordia newberryi* | Native | | | | | | | | | 1974 | | 1970 | | | 2018 | | 2021 |
| **Night Blooming Cereus** | *Peniocereus greggii var. transmontanus* | Native | | | | SR | T3 | S3 | | | | 2022 | | 1981 | | | | 2019 |
| **Night Scented Stock** | *Matthiola longipetala* | Non-native | | | | | | | | | | | | | | | | 2019 |
| **Nodding Wild Rye** | *Elymus canadensis var. candensis* | Native | | | | | | | | | | 1995 | | | | | | |
| **Nuttails Snapdragon** | *Sairocarpus pusillus* | Native | | | | | | | | | | | | 1981 | | | | |
| **Nuttall Poverty Weed** | *Blitum nuttallianum* | Native | | | | | | | | | 1974 | | 1970 | | 2013 | | | 2019 |
| **Oak Creek Groundsel** | *Packera quercetorum* | Native | | | | | | | | | | | | | 2013 | | | |
| **Oakwoods Gooseberry** | *Ribes quercetorum* | Native | | | | | | | | | 1974 | | | | | | | |
| **Oat** | *Avena sativa* | Non-native | | | | | | | | | | 1995 | 1970 | | | 2018 | | |
| **Oblong-leaf False Pennyroyal** | *Hedeoma oblongifolia* | Native | | | | | | | | | | | | | 2013 | | | |
| **Ocotillo** | *Fouquieria splendens* | Native | | | | SR | | | 2021 | 2022 | 2011 | 2022 | 2022 | 2022 | 2022 | 2022 | 2022 | 2022 |
| **Old Man in the Spring** | *Senecio vulgaris* | Non-native | | | | | | | | | | | | | 2013 | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Onionweed** | *ASPHODELUS FISTULOSUS* | Non-native | | | | | | | | | | | 2020 | | | | | |
| **Orange Caltrop** | *Kallstroemia grandiflora* | Native | | | | | | | | | | 2021 | | | 2013 | | | 2019 |
| **Orcutts Lupine** | *Lupinus concinnus subsp. orcuttii* | Native | | | | | | | 1979 | | | 2022 | 1970 | 1981 | 2021 | 2018 | 2019 | 2019 |
| **Pacific fescue** | *Vulpia microstachys var. pauciflora* | Native | | | | | | | | | | | 1970 | 1981 | 2013 | | 2011 | 1973 |
| **Paintbrush** | *Castilleja minor var. minor* | Native | | | | | | | | | | 2021 | | | | | | |
| **Paiute False Bindweed** | *Calystegia longipes* | Native | | | | | | | | | | | | | 2013 | | | |
| **Paleface** | *Hibiscus denudatus* | Native | | | | | | | | | 1974 | | 1970 | | | | 2022 | 2019 |
| **Pearl Millet** | *Pennisetum glaucum* | Non-native | | | | | | | | | 1974 | | | | | | | |
| **Pearl Oyster Mushroom** | *Pleurotus ostreatus* | Unknown | | | | | | | | | | 2021 | | | | | | |
| **Pebble Pincushion** | *Chaenactis carphoclinia var. carphoclinia* | Native | | | | | | | | 2022 | | | | 2019 | 2013 | | | 2019 |
| **Pedicellate Scorpion Weed** | *Phacelia pedicellata* | Native | | | | | | | | | 1974 | | | | 2013 | | | |
| **Peebles Browneyes** | *Chylismia claviformis subsp. peeblesii* | Native | | | | | | | | | 1974 | 1995 | | | | | | |
| **Perennial Rockcress** | *Boechera perennans* | Native | | | | | G5 | SNR | | | 1974 | | 1970 | 1981 | | | | 2019 |
| **Perennial Rye Grass** | *Lolium perenne subsp. perenne* | Non-native | | | | | | | | | 1974 | 1995 | 1970 | | | | | |
| **Pin Point Clover** | *Trifolium gracilentum var. gracilentum* | Native | | | | | | | | | | | | | 2013 | | | |
| **Pincushion Cactus** | *Mammillaria grahamii var. grahamii* | Native | | | | SR | T4 | SNR | 1979 | 2022 | 2022 | 2022 | 2022 | 2021 | 2022 | 2020 | 2022 | 2020 |
| **Pineapple Weed** | *Matricaria discoidea* | Non-native | | | | | | | | | 1974 | | 1970 | 1981 | | | | |
| **Pit Seed Goosefoot** | *Chenopodium berlandieri* | Native | | | | | | | | | | | | 1981 | | | | |
| **Plains Blackfoot** | *Melampodium leucanthum* | Native | | | | | | | | | | 2022 | 1970 | 1981 | 2020 | | | 2019 |
| **Plains Love Grass** | *Eragrostis intermedia* | Native | | | | | | | | | | 2021 | | | | | | |
| **Polished Willow** | *Salix laevigata* | Native | | | | | | | | | | | | | 2013 | | | |
| **Poormans Pepperwort** | *Lepidium virginicum* | Native | | | | | | | | | | 2019 | | 1981 | 2013 | | 2019 | 1973 |
| **Poverty Three-awn** | *Aristida divaricata* | Native | | | | | G4 | SNR | | | | | | 2016 | | | | |
| **Prairie False Oat** | *Sphenopholis interrupta* | Native | | | | | | | | | | | | 1981 | | | | |
| **Prairie Wedgescale** | *Sphenopholis obtusata* | Native | | | | | | | | | | 1995 | | | | | | |
| **Prickly Lettuce** | *Lactuca serriola* | Non-native | | | | | | | | | 1974 | 2022 | 1970 | 1981 | 2013 | 2018 | | |

| Common Name | Plant Species | Nativity | ESA_ FWS | USFS | BLM | NPL Status | GB Nature Serve | ST Nature Serve | BHRP | CCRP | EMRP | HRP | LPRP | MMRP | SCRA | STRP | UMRP | WTRP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Prickly Russian Thistle** | *Salsola tragus* | Non-native | | | | | | | | 2021 | 1974 | 1995 | 1970 | 1981 | 2013 | 2018 | 2019 | 2019 |
| **Pringles Popcorn Flower** | *Plagiobothrys pringlei* | Native | | | | | | | | | | | 2020 | 1981 | | | 2011 | |
| **Prostrate Knotweed** | *Polygonum aviculare* | Non-native | | | | | | | | | 1974 | | 1970 | 1981 | 2013 | | | |
| **Prostrate Sandmat** | *Chamaesyce prostrata* | Native | | | | | | | | | | 1995 | | | | | | |
| **Puncturevine** | *TRIBULUS TERRESTRIS* | Non-native | | | | | | | | | 1974 | 2021 | 2018 | | 2013 | 2018 | | 2019 |
| **Purple Bladderpod** | *Physaria purpurea* | Native | | | | | | | | | 1974 | | | | | | | |
| **Purple Fiddleleaf** | *Nama demissa var. demissa* | Native | | | | | | | 1979 | | 1974 | 1995 | 1970 | | | | | |
| **Purple Owls Clover** | *Castilleja exserta subsp. exserta* | Native | | | | | | | 1979 | 2020 | 1974 | 2022 | 2022 | 2022 | 2022 | | | 2022 |
| **Purple Three-awn** | *Aristida purpurea var. purpurea* | Native | | | | | T5 | SNR | 1979 | 2021 | 1974 | | 1970 | | 2021 | 2018 | | 2019 |
| **Purplestem Phacelia** | *Phacelia ambigua* | Native | | | | | | | | | 2019 | | | | 2013 | 2019 | 2019 | 2019 |
| **Pygmy Poppy** | *Eschscholzia minutiflora* | Native | | | | | | | | | | | | 2019 | | 2019 | | 2019 |
| **Radish** | *Raphanus sativus* | Non-native | | | | | | | | | 1974 | | | | | | | |
| **Ragged Rockflower** | *Crossosoma bigelovii* | Native | | | | | | | | | | 2022 | | 1981 | 2020 | | | 2021 |
| **Rancheria Clover** | *Trifolium albopurpureum var. albopurpureum* | Native | | | | | | | | | | | | | 2013 | | | |
| **Rayless Goldenhead** | *Acamptopappus sphaerocephalus* | Native | | | | | G5 | SNR | | | | | | | | | | 2019 |
| **Rayless Goldenhead** | *Acamptopappus sphaerocephalus var. sphaerocephalus* | Native | | | | | T4 | SNR | | | | | | 1981 | | | | |
| **Red Brome** | *BROMUS RUBENS* | Non-native | | | | | | | 1979 | 2021 | 1974 | 2022 | 1996 | 2021 | 2021 | 2019 | 2019 | 2021 |
| **Red Fescue** | *Festuca rubra* | Non-native | | | | | G5 | SNR | | | 1974 | | | | | | | |
| **Red Grama** | *Bouteloua trifida var. trifida* | Native | | | | | | | | | | | | | | | | 1973 |
| **Red Root Flat Sedge** | *Cyperus erythrorhizos* | Native | | | | | | | | | | 1995 | | | | | | |
| **Red Seed Plantain** | *Plantago rhodosperma* | Native | | | | | | | | | | 1995 | | | 2013 | | | |
| **Red Sprangletop** | *Leptochloa panicea subsp. brachiata* | Native | | | | | | | | | 1974 | 1995 | 1970 | | 2013 | 2018 | | 2019 |
| **Redberry Desert-thorn** | *Lycium andersonii var. andersonii* | Native | | | | | | | | 2018 | 2020 | 2022 | | | | | | 2021 |
| **Redberry Desert-thorn** | *Lycium andersonii var. deserticola* | Native | | | | | | | | | 1974 | | 1970 | | | | | 2019 |
| **Redberry Juniper** | *Juniperus coahuilensis* | Native | | | | | G4 | SNR | | | | | | 1981 | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Rescue Grass** | *Bromus catharticus* | Non-native | | | | | | | | | 1974 | 1995 | | | 2013 | | | |
| **Rib Seed Sandmat** | *Chamaesyce glyptosperma* | Native | | | | | | | | | | 1995 | | | | | | |
| **Ridge Spineflower** | *Chorizanthe rigida* | Native | | | | | | | 1979 | | 2020 | 2022 | 1970 | 1981 | | 2019 | 2011 | 2019 |
| **Rillita Pellitory** | *Parietaria hespera var. hespera* | Native | | | | | | | 1979 | 2018 | 1974 | 2022 | 1970 | 2017 | 2013 | 2018 | 2011 | 2020 |
| **Rillita Pellitory** | *Parietaria pensylvanica* | Native | | | | | | | | | 1974 | | | | | | | |
| **Rock Gily-flower** | *Gilia scopulorum* | Native | | | | | | | | | | | | | | 2018 | | 2019 |
| **Rock Sage** | *Salvia pinguifolia* | Native | | | | | | | | | 1974 | | | | | | | |
| **Rockdaisy** | *Perityle emoryi* | Native | | | | | | | 1979 | 2019 | 2020 | | 2022 | 1981 | 2018 | 2018 | 2019 | 2022 |
| **Rocket Salad** | *Eruca vesicaria* | Non-native | | | | | | | | | | | 2020 | | | | | |
| **Rose Globemallow** | *Sphaeralcea ambigua subsp. rosacea* | Native | | | | | | | 1979 | 2022 | 2022 | | | | | | | |
| **Rosy Gily-flower** | *Gilia sinuata* | Native | | | | | | | 1979 | | 1974 | 1995 | 1970 | | | | | |
| **Roth Grama** | *Bouteloua barbata var. rothrockii* | Native | | | | | | | | | | | | | 2013 | | | |
| **Rough Bristle Grass** | *Setaria verticillata* | Non-native | | | | | | | | | | 1995 | | | | | | |
| **Rough Cockleburr** | *Xanthium strumarium* | Native | | | | | | | | | 1974 | 2021 | 2022 | 1981 | 2021 | | | |
| **Rough Fiddleleaf** | *Nama hispidum* | Native | | | | | | | | | | | | 1981 | | | | 1973 |
| **Rough Fleabane** | *Erigeron divergens* | Native | | | | | | | | | 1974 | 2022 | 1970 | | 2013 | | | 2021 |
| **Rough Joint Fir** | *Ephedra aspera* | Native | | | | | | | | 2022 | 2020 | 2022 | | 2020 | 2013 | | | 2019 |
| **Rough Menodora** | *Menodora scabra* | Native | | | | | | | | 2021 | 1974 | 2022 | 1970 | 1981 | 2021 | 2019 | | 2020 |
| **Rush Milkweed** | *Asclepias subulata* | Native | | | | | | | | 2022 | | 2022 | | 2020 | | 2022 | 2021 | 2021 |
| **Rusty Flat Sedge** | *Cyperus odoratus* | Native | | | | | | | | | | 1995 | | | | | | |
| **Sacred Thorn Apple** | *Datura wrightii* | Native | | | | | | | 1979 | | 1974 | 2022 | 2021 | 2021 | 2013 | | 2011 | |
| **Safflower** | *Carthamus tinctorius* | Non-native | | | | | | | | | | | | | | | | 1973 |
| **Sago False Pondweed** | *Stuckenia pectinata* | Native | | | | | | | | | | | | 1981 | | | | |
| **Saguaro** | *Carnegiea gigantea* | Native | | | | HS&SR | | | 2021 | 2022 | 2022 | 2022 | 2022 | 2022 | 2022 | 2022 | 2022 | 2022 |
| **Sahara Mustard** | *BRASSICA TOURNEFORTII* | Non-native | | | | | | | 2002 | 2019 | 2021 | 2022 | 2019 | 2020 | 2022 | 2020 | 2019 | 2022 |
| **Saints Cactus** | *Echinocereus engelmannii* | Native | | | | | | | | 2018 | 2020 | 2022 | 2018 | 2019 | 2018 | 2019 | 2020 | 2022 |
| **Salt Cedar** | *TAMARIX RAMOSISSIMA* | Non-native | | | | | | | | | 2019 | 2019 | | 2020 | 2021 | | | 2021 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Saltmarsh Sandspurry** | *Spergularia salina* | Native | | | | | | | | | 2021 | | | | | | | |
| **San Felipe Dogweed** | *Adenophyllum porophylloides* | Native | | | | | G5 | SNR | 1979 | | 1974 | 2022 | 1970 | 2022 | 2013 | 2018 | 2018 | 2021 |
| **San Joaquin Snakeweed** | *Gutierrezia californica* | Native | | | | | | | | | | | 1970 | | | | | |
| **Sand Dock** | *Rumex hymenosepalus* | Native | | | | | | | | | 1974 | 2022 | | 2022 | 2016 | | | |
| **Sand Dropseed** | *Sporobolus cryptandrus* | Native | | | | | | | | | 1974 | 1995 | | | 2013 | | | |
| **Sand Fringepod** | *Thysanocarpus curvipes* | Native | | | | | | | 1979 | | 1974 | 1995 | 1970 | 1981 | 2013 | 2019 | 2011 | 2022 |
| **Sand Pygmyweed** | *Crassula connata* | Native | | | | | | | | | | | | 1981 | 2013 | | | 2020 |
| **Sand Spike Rush** | *Eleocharis montevidensis* | Native | | | | | | | | | | 1995 | | | | | | |
| **Sandwash Groundsel** | *Senecio flaccidus var. monoensis* | Native | | | | | | | | | | 2022 | 1970 | 2016 | 2013 | | | |
| **Sandyseed Clammyweed** | *Polanisia dodecandra subsp. trachysperma* | Native | | | | | | | | | | 2021 | 2020 | | 2020 | | | |
| **Santa Catalina Indian Mallow** | *Abutilon palmeri* | Native | | | | | G4 | SNR | | | | 2021 | | | | | | 2020 |
| **Santa Catalina Mountain Phlox** | *Phlox tenuifolia* | Native | | | | | | | | | | | | 1981 | 2013 | | | |
| **Santa Catalina Mountain Pink** | *Zeltnera nudicaulis* | Native | | | | | | | | | | | 1970 | | 2013 | | | |
| **Santa Catalini Desert Thorn** | *Lycium brevipes var. brevipes* | Native | | | | | | | | | | | 1970 | | | | | |
| **Santa Rita three-awn** | *Aristida californica var. glabrata* | Native | | | | | T4 | SNR | | | | 1995 | | | | | | |
| **Scarlet Evening Primrose** | *Oenothera suffrutescens* | Native | | | | | | | | | | 2021 | | | | | | |
| **Scarlet Four O'clock** | *Mirabilis coccinea* | Native | | | | | | | | | 1974 | | | | 2013 | | | 2019 |
| **Scarlet Pimpernel** | *Anagallis arvensis* | Non-native | | | | | GNR | IS | | | | | | | 2013 | | | |
| **Scarlet Spiderling** | *Boerhavia coccinea* | Native | | | | | | | | | | 2022 | 2022 | 1981 | 2013 | | | 2019 |
| **Scented Beardtongue** | *Penstemon palmeri* | Non-native | | | | | | | | | | | | | 2013 | | | |
| **Scrambled Eggs** | *Corydalis aurea subsp. aurea* | Native | | | | | | | | | | 2022 | | | 2013 | | | |
| **Seaside Heliotrope** | *Heliotropium curassavicum var. oculatum* | Native | | | | | | | | | 2021 | 2021 | 2021 | 1981 | | | | |
| **Seaside Petunia** | *Calibrachoa parviflora* | Native | | | | | | | | | 1974 | 2022 | 2018 | | 2013 | | | |
| **Sharp Dock** | *Rumex conglomeratus* | Non-native | | | | | | | | | 1974 | | | | | | | |
| **Sharp Leaf Ground Cherry** | *Physalis acutifolia* | Native | | | | | | | | | 1974 | | | | | | | |
| **Shepherds Purse** | *Capsella bursa-pastoris* | Non-native | | | | | | | | | | 2022 | | | 2019 | | | |

# NATURAL RESOURCE PLAN – TABLE 3. PLANT SPECIES LIST

| Common Name | Plant Species | Nativity | ESA_ FWS | USFS | BLM | NPL Status | GB Nature Serve | ST Nature Serve | BHRP | CCRP | EMRP | HRP | LPRP | MMRP | SCRA | STRP | UMRP | WTRP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Shiny Starwort** | ***Stellaria nitens*** | Native | | | | | | | | | 1974 | | 1970 | | 2013 | | | 1973 |
| **Showy Desert Marigold** | ***Baileya multiradiata*** | Native | | | | | | | | 2022 | 2022 | 2022 | 2022 | 2020 | 2021 | | 2022 | 1973 |
| **Showy Four O'Clock** | *Mirabilis multiflora var. multiflora* | Native | | | | | | | | | | | | | 2013 | | | |
| **Shredding Suncup** | *Eremothera boothii subsp. condensata* | Native | | | | | | | 1979 | | 1974 | | 1970 | | | | | 1973 |
| **Shredding Suncup** | *Eremothera boothii subsp. decorticans* | Native | | | | | | | | | 1974 | | | | | | | |
| **Shrine Jimmyweed** | *Isocoma tenuisecta* | Native | | | | | | | | | | | | | | 2018 | | |
| **Shrub Live Oak** | *Quercus turbinella* | Native | | | | | | | | | | 2021 | | 1981 | 2013 | | | 2019 |
| **Shrubby Camphorweed** | *Pluchea odorata var. odorata* | Native | | | | | | | | | 1974 | 1995 | 1970 | | | | | |
| **Shrubby Deer Vetch** | *Acmispon rigidus* | Native | | | | | | | 1979 | 2019 | 1974 | 2022 | | 1981 | 2022 | 2018 | 2011 | 2021 |
| **Shrubby Goldeneye** | *Bahiopsis parishii* | Native | | | | | | | 1979 | 2021 | 1974 | 2022 | 1970 | 1981 | 2022 | | 2021 | 2022 |
| **Shrubby Indian Mallow** | *Abutilon abutiloides* | Native | | | | | G5 | SNR | | | | | | 1981 | | | | 2021 |
| **Shrubby Purslane** | *Portulaca suffrutescens* | Native | | | | | | | | | | 1995 | | | | | | |
| **Shrubby Seepweed** | *Suaeda nigra* | Native | | | | | | | 1979 | | 1974 | 1995 | | | | | | |
| **Side Oats Grama** | *Bouteloua curtipendula var. caespitosa* | Native | | | | | | | | | | 1995 | | | 2013 | | | 1973 |
| **Sierran Woolly Indian Paintbrush** | *Castilleja lanata subsp. lanata* | Native | | | | | | | | | | 1995 | | | 2018 | | | 1973 |
| **Silk Cotton Purslane** | *Portulaca halimoides* | Native | | | | | | | | | | 1995 | | | | | | |
| **Silver Leaf Nightshade** | *Solanum elaeagnifolium* | Native | | | | | | | | | 1974 | 2021 | 1970 | | | 2018 | | 1973 |
| **Silver Sheath Knotweed** | *Polygonum argyrocoleon* | Non-native | | | | | | | | | | | 1970 | | | | | |
| **Six Weeks Grama** | *Bouteloua barbata var. barbata* | Native | | | | | | | | | | 2021 | | | 2013 | | | 2021 |
| **Six Weeks Three-awn** | *Aristida adscensionis* | Native | | | | | G5 | SNR | 1979 | | 1974 | 2022 | 1970 | 2022 | 2013 | 2018 | 2018 | 2021 |
| **Sixweeks Fescue** | *Vulpia octoflora var. hirtella* | Native | | | | | | | 1979 | 2017 | 2019 | 2022 | 1970 | 1981 | 2013 | | | 2020 |
| **Skunkbush Sumac** | *Rhus aromatica var. trilobata* | Native | | | | | | | | | | | | | | | | |
| **Sky Blue Scorpion Weed** | *Phacelia caerulea* | Native | | | | | | | | | | | 1970 | | | | | |
| **Sleepy Catchfly** | *Silene antirrhina* | Native | | | | | | | | 2019 | 1974 | 1995 | 1970 | 1981 | 2021 | 2018 | | 2019 |
| **Slender Poreleaf** | *Porophyllum gracile* | Native | | | | | | | | 2022 | 1974 | 2022 | 1970 | 2021 | 2013 | 2018 | 2018 | 2020 |

| Common Name | Plant Species | Nativity | ESA_ FWS | USFS | BLM | NPL Status | GB Nature Serve | ST Nature Serve | BHRP | CCRP | EMRP | HRP | LPRP | MMRP | SCRA | STRP | UMRP | WTRP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Slim Tridens** | *Tridens muticus var. elongatus* | Native | | | | | | | | | | | | | | | | 2019 |
| **Slim Tridens** | *Tridens muticus var. muticus* | Native | | | | | | | | | 1974 | 1995 | 1970 | | 2019 | 2018 | | 2019 |
| **Slimjim Bean** | *Phaseolus filiformis* | Native | | | | | | | | | | | | | | | 2011 | |
| **Slimlobe Bahia** | *Bahia biternata* | Native | | | | | | | | | | | | | 2013 | | | |
| **Small Coastal Germander** | *Teucrium cubense var. densum* | Native | | | | | | | | | 1974 | | | | | | | |
| **Small Flower Fiddleneck** | *Amsinckia menziesii* | Native | | | | | G5 | SNR | | | | 2019 | 2022 | | | | | 2022 |
| **Small Flowered Stock** | *Matthiola parviflora* | Non-native | | | | | | | | 2022 | | | | 2019 | | | | |
| **Small Seed Sandmat** | *Chamaesyce polycarpa* | Native | | | | | | | | 2021 | 2019 | 2022 | 2022 | 2022 | | 2021 | 2022 | 2021 |
| **Small-flower Ratany** | *Krameria erecta* | Native | | | | | G5 | SNR | | 2017 | 1974 | 2022 | 2021 | 1981 | 2013 | | 2011 | 2019 |
| **Smallflowered Milkvetch** | *Astragalus nuttallianus var. austrinus* | Native | | | | | | | | | | 2022 | 2022 | | | | | |
| **Smooth Barley** | *Hordeum murinum subsp. glaucum* | Non-native | | | | | | | 1979 | | | 1995 | | | 2013 | 2018 | | |
| **Smooth Desert Dandelion** | *Malacothrix glabrata* | Native | | | | | | | | | 1974 | | | | | 2018 | | 2019 |
| **Smooth Scouring Rush** | *Equisetum laevigatum* | Native | | | | | | | | | | 1995 | | | | | | |
| **Snapdragon Penstemon** | *Keckiella antirrhinoides subsp. microphylla* | Native | | | | | | | | | 1974 | | 1970 | 1981 | 2020 | | | 2022 |
| **Snapdragon Vine** | *Maurandya antirrhiniflora* | Native | | | | | | | | | | 2022 | | | 2021 | | | 1973 |
| **Soap Aloe** | *Aloe maculata* | Non-native | | | | | U | U | | | | | | | 2013 | | | |
| **Soaptree Yucca** | *Yucca elata var. elata* | Native | | | | SR | | | | | | 2021 | | 1981 | | | | |
| **Soft Prairie Clover** | *Dalea mollissima* | Native | | | | | | | 1979 | | | | 1970 | | | | | 1973 |
| **Sonoran Desert Dandelion** | *Malacothrix sonorae* | Native | | | | | | | | | 1974 | 1995 | | | | | | 1973 |
| **Sonoran Prickly-poppy** | *Argemone gracilenta* | Native | | | | | G4 | SNR | | | | | | | | 2018 | 2011 | |
| **Sonoran Sandmat** | *Chamaesyce micromera* | Native | | | | | | | | | 2021 | | | | | 2018 | | 2019 |
| **Sorrel Wild Buckwheat** | *Eriogonum polycladon* | Native | | | | | | | | | | 1995 | | | | | | |
| **South American Mock Vervain** | *Glandularia pulchella* | Native | | | | | | | | | | 1995 | | | | | | |
| **Southern Cat Tail** | *Typha domingensis* | Native | | | | | | | | | 1974 | 1995 | 1970 | 1981 | 2013 | | | 2019 |
| **Southern Jimmyweed** | *Isocoma pluriflora* | Native | | | | | | | | | 1974 | | | | | | | |

# NATURAL RESOURCE PLAN – TABLE 3. PLANT SPECIES LIST

| Common Name | Plant Species | Nativity | ESA_ FWS | USFS | BLM | NPL Status | GB Nature Serve | ST Nature Serve | BHRP | CCRP | EMRP | HRP | LPRP | MMRP | SCRA | STRP | UMRP | WTRP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Southern Sandburr** | *Cenchrus echinatus* | Native | | | | | | | | | | | 1970 | | | | | |
| **Southwestern Annual Saltmarsh Aster** | *Symphyotrichum subulatum var. parviflorum* | Native | | | | | | | | | | | | | 2013 | | | |
| **Southwestern Prickly-poppy** | *Argemone pleiacantha subsp. ambigua* | Native | | | | | T3 | SNR | | | | 2021 | | | | 2018 | 2011 | |
| **Southwestern Prickly-poppy** | *Argemone pleiacantha subsp. pleiacantha* | Native | | | | | T4 | SNR | | | | 2019 | | | 2021 | | 2019 | |
| **Spear Leaf Brickellbush** | *Brickellia atractyloides* | Native | | | | | | | | | 1974 | | 1970 | | 2013 | | | 2019 |
| **Spearleaf** | *Matelea parvifolia* | Non-native | | | | | | | | 2020 | 1974 | | 1970 | 2021 | 2021 | | 2011 | 2019 |
| **Spider Three-awn** | *Aristida ternipes var. ternipes* | Native | | | | | T5 | SNR | | | | | | | | | | 1973 |
| **Spiderling** | *Boerhavia coulteri* | Native | | | | | | | | | | 2021 | | | | | | 2019 |
| **SpiderThree-awn** | *Aristida ternipes var. gentilis* | Native | | | | | U | U | | | | 1995 | | | | | | |
| **Spike Rush** | *Eleocharis parishii* | Native | | | | | | | | | | 1995 | 1970 | | | | | |
| **Spiny Cliffbrake** | *Pellaea truncata* | Native | | | | | | | | 2021 | 1974 | | 1970 | 1981 | 2013 | | | 2021 |
| **Spiny Hackberry** | *Celtis pallida* | Native | | | | | | | | | | 2022 | | 2022 | 2021 | 2018 | | 2021 |
| **Spiny Leaf Sow Thistle** | *Sonchus asper* | Non-native | | | | | | | | | 1974 | 2021 | 1970 | 1981 | 2013 | 2018 | 2019 | 1973 |
| **Spinytooth Clover** | *Trifolium mucronatum subsp. lacerum* | Native | | | | | | | | | | | 1970 | | 2013 | | | |
| **Splitgill Mushroom** | *Schizophyllum commune* | Unknown | | | | | | | | | | 2021 | | | | | | |
| **Spotted Hideseed** | *Eucrypta chrysanthemifolia var. bipinnatifida* | Native | | | | | | | 1979 | 2017 | 1974 | 1995 | 2017 | 1981 | 2013 | 2018 | 2011 | 2019 |
| **Spotted Hideseed** | *Eucrypta chrysanthemifolia var. chrysanthemifolia* | Native | | | | | GNR | SNR | | | | | | 2017 | | | | |
| **Spotted LadyThumb** | *Persicaria maculosa* | Non-native | | | | | | | | | | 1995 | 1970 | | | | | |
| **Spotted Langloisia** | *Langloisia setosissima subsp. setosissima* | Native | | | | | | | 1979 | | 1974 | | 1970 | | | | 2011 | |
| **Spotted Wild Buckwheat** | *Eriogonum maculatum* | Native | | | | | | | | | | 1995 | 1970 | | | | | |
| **Spreading Amaranth** | *Amaranthus crassipes* | Native | | | | | G5 | SNR | | | | | | | | | | 1973 |
| **Spreading Fanpetals** | *Sida abutifolia* | Non-native | | | | | | | | | | | | | 2013 | | | |
| **Spreading Sweetjuice** | *Glinus radiatus* | Native | | | | | | | | | | | | 1981 | | | | |
| **Spring Pygmy Cudweed** | *Diaperia verna var. verna* | Native | | | | | | | | | | | | 1981 | | | | |
| **Squaw Broospurge** | *Chamaesyce melanadenia* | Native | | | | | | | | | 1974 | 1995 | 1970 | 2015 | 2021 | | | |

| Common Name | Plant Species | Nativity | ESA_ FWS | USFS | BLM | NPL Status | GB Nature Serve | ST Nature Serve | BHRP | CCRP | EMRP | HRP | LPRP | MMRP | SCRA | STRP | UMRP | WTRP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Star Bedstraw** | *Galium stellatum var. eremicum* | Native | | | | | T4 | SNR | 1979 | | 1974 | | 1970 | 1981 | 2013 | 2018 | 2011 | 2020 |
| **Star Cloak Fern** | *Notholaena standleyi* | Native | | | | | | | | | 1974 | | 1970 | 1981 | 2013 | 2018 | 2021 | 2022 |
| **Star Gily-flower** | *Gilia stellata* | Native | | | | | | | 1979 | 2022 | 1974 | | 1970 | 1981 | 2013 | | | 2019 |
| **Sticky Sprangletop** | *Dinebra viscida* | Native | | | | | | | | | 1974 | | | 1981 | | | | 1973 |
| **Sticky Willy** | *Galium aparine* | Native | | | | | | | | | | 2022 | 1970 | 1981 | 2013 | | | 2019 |
| **Stink Grass** | *Eragrostis cilianensis* | Non-native | | | | | | | | | | 2021 | 1970 | | 2013 | | | 1973 |
| **Stinknet** | *ONCOSIPHON PILULIFERUM* | Native | | | | | | | | 2022 | 2022 | 2022 | 2022 | 2020 | 2022 | | 2020 | 2022 |
| **Straw Colored Flat Sedge** | *Cyperus strigosus* | Native | | | | | | | | | 1974 | | 1970 | | | | | |
| **Strawberry Hedgehog Cactus** | *Echinocereus engelmannii var. engelmannii* | Native | | | | SR | T4 | S4 | | 2022 | 2022 | 2022 | 2022 | 2022 | 2022 | 2022 | 2022 | 2022 |
| **Streambed Bristle Grass** | *Setaria leucopila* | Native | | | | | | | | | 1974 | 1995 | | | 2013 | | | 1973 |
| **Strigose Deerweed** | *Acmispon strigosus var. tomentellus* | Native | | | | | | | 1979 | 2021 | 1974 | 1995 | 1970 | 1981 | | 2018 | 2011 | 2019 |
| **Sugar Sumac** | *Rhus ovata* | Native | | | | | | | | | | | | | 2013 | | | |
| **Sweetbush** | *Bebbia juncea var. aspera* | Native | | | | | | | | 2022 | 1974 | 2022 | 2021 | 2019 | 2021 | 2018 | 2021 | 2021 |
| **Tall Hedge Mustard** | *Sisymbrium altissimum* | Non-native | | | | | | | | | | 1995 | | | | | | |
| **Tall Mountain Larkspur** | *Delphinium scaposum* | Native | | | | | | | | 2019 | | | | | 2020 | | | 2020 |
| **Taper Tip Cup Grass** | *Eriochloa acuminata var. acuminata* | Native | | | | | | | | | | 1995 | | | | | | |
| **Teddy Bear Cholla** | *Cylindropuntia bigelovii* | Native | | | | SR | | | | 2022 | 2021 | 2022 | 2022 | 2022 | 2021 | 2022 | 2021 | 2022 |
| **Texas Bindweed** | *Convolvulus equitans* | Native | | | | | | | | | | 1995 | | | 2013 | | | |
| **Texas Stork Bill** | *Erodium texanum* | Native | | | | | | | 1979 | 2022 | 1974 | 1995 | 1970 | 1981 | 2013 | 2019 | 2019 | 2019 |
| **Texas Toadflax** | *Nuttallanthus texanus* | Native | | | | | | | | | | | | 2019 | | | 2011 | 2019 |
| **Texas Virgin Bower** | *Clematis drummondii* | Native | | | | | | | 1979 | | | 2022 | 2019 | 1981 | | | | 2019 |
| **Thorn of Christ** | *Castela emoryi* | Native | | | | SR | G4 | S3 | | | | | | | | 2018 | | |
| **Thread Stem Carpetweed** | *Mollugo cerviana* | Non-native | | | | | | | | | | 1995 | | | | | | 1973 |
| **Thread Stem Sandmat** | *Chamaesyce revoluta* | Native | | | | | | | | | | | | | | | | 2019 |
| **Threadstem Harebell** | *Nemacladus glanduliferus var. glanduliferus* | Native | | | | | | | 1979 | | 1974 | 1995 | 1970 | | 2013 | 2018 | | |
| **Three-awn** | *Aristida purpurea var. parishii* | Native | | | | | GNR | SNR | | | | | | 1981 | 2013 | | | 1973 |

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| Common Name | Plant Species | Nativity | ESA_ FWS | USFS | BLM | NPL Status | GB Nature Serve | ST Nature Serve | BHRP | CCRP | EMRP | HRP | LPRP | MMRP | SCRA | STRP | UMRP | WTRP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Three-awn** | *Aristida purpurea var. wrightii* | Native | | | | | GNR | SNR | 1979 | | 1974 | | | | | | | |
| **Thurber Wild Buckwheat** | *Eriogonum thurberi* | Native | | | | | | | | | | 1995 | | | | | | |
| **Thurbers Sandpaper Plant** | *Petalonyx thurberi subsp. thurberi* | Native | | | | | | | | | 1974 | 1995 | | | | | | |
| **Thyme Leaf Broomspurge** | *Chamaesyce serpyllifolia subsp. serpyllifolia* | Native | | | | | | | | | | | | | | | 2011 | |
| **Timothy Canary Grass** | *Phalaris angusta* | Native | | | | | | | | | 1974 | | | 1981 | | | | |
| **Toad Rush** | *Juncus bufonius* | Native | | | | | | | | | | | | | 2013 | | | 2019 |
| **Tobosa Grass** | *Hilaria mutica* | Native | | | | | | | 1979 | | | 2022 | 1970 | | 2021 | | | 2019 |
| **Tomcat Clover** | *Trifolium willdenovii var. willdenovii* | Native | | | | | | | | | | | | | | | | 2019 |
| **Toothed Dock** | *Rumex dentatus* | Non-native | | | | | | | | | 1974 | 1995 | 1970 | | | | | |
| **Toothed Medick** | *Medicago polymorpha* | Non-native | | | | | | | | | | 1995 | 1970 | | 2013 | | | |
| **Torrey Wolfberry** | *Lycium torreyi* | Native | | | | | | | | | 1974 | | | | | | | |
| **Torreys Rush** | *Juncus torreyi* | Native | | | | | | | | | | 1995 | 1970 | | 2013 | | | 2019 |
| **Tourist Plant** | *Dimorphocarpa wislizeni* | Native | | | | | | | | | 1974 | 1995 | | | | | | 1973 |
| **Trailing Windmills** | *Allionia incarnata var. incarnata* | Native | | | | | GNR | SNR | | | | 2022 | | 1981 | 2021 | | | 2020 |
| **Trans Pecos Amaranth** | *Amaranthus obcordatus* | Native | | | | | G5 | SNR | | | 1974 | 1995 | 1970 | | | | | 2019 |
| **Trans Pecos Ayenia** | *Ayenia filiformis* | Native | | | | | | | | | | | | | 2013 | 2018 | | 2019 |
| **Trans Pecos Thimblehead** | *Hymenothrix wislizeni* | Native | | | | | | | | | | 1995 | | | | | | |
| **Transmontane Gily Flower** | *Gilia transmontana* | Native | | | | | | | | | 1974 | | | | | | | |
| **Trans-pecos Morning-glory** | *Ipomoea cristulata* | Native | | | | | | | | | | 2021 | | | 2013 | | | |
| **Tree of Heaven** | *AILANTHUS ALTISSIMA* | Non-native | | | | | GNR | IS | | | | 2019 | | | | | | |
| **Tree Tobacco** | *Nicotiana glauca* | Non-native | | | | | | | 1979 | | 1974 | 2022 | 1970 | | 2013 | | | |
| **Triangle-leaf Bursage** | *Ambrosia deltoidea* | Native | | | | | G4 | SNR | 1979 | 2022 | 2021 | 2022 | 2021 | 2021 | 2021 | 2021 | 2022 | 2022 |
| **Tubercle Dodder** | *Cuscuta tuberculata* | Native | | | | | | | | | | | | | | | | 2018 |
| **Tucson Prickly Pear** | *Cylindropuntia x tetracantha* | Native | | | | SR | Hyb | HYB | | | | | | 1981 | 2013 | | | |
| **Tufted Evening Primrose** | *Oenothera caespitosa subsp. marginata* | Native | | | | | | | | | | | | | 2013 | | | |
| **Tufted Love Grass** | *Eragrostis pectinacea var. pectinacea* | Native | | | | | | | | | | 1995 | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Tulip Prickly Pear** | *Opuntia phaeacantha* | Native | | | | SR | | | | | | | | | 2013 | | | |
| **Tumbleweed** | *Amaranthus albus* | Non-native | | | | | GNR | SNR | | | 1974 | 1995 | 1970 | | 2013 | | | |
| **Turkeypeas** | *Astragalus nuttallianus var. imperfectus* | Native | | | | | | | 1979 | | 1974 | 1995 | 2020 | 1981 | 2013 | 2018 | | 2020 |
| **Turpentine Bush** | *Ericameria laricifolia* | Native | | | | | | | | 2021 | 1974 | | | 2021 | 2022 | 2022 | | 1973 |
| **Turpentinebroom** | *Thamnosma montana* | Native | | | | | | | | | | 2022 | | | | | | |
| **Twisted Tanglehead** | *Heteropogon contortus* | Native | | | | | | | | | 1974 | | | | 2013 | | | 2019 |
| **Valley Redstem** | *Ammannia coccinea* | Native | | | | | G5 | S2 | | | | | 1970 | | | | | |
| **Variable Flat Sedge** | *Cyperus difformis* | Non-native | | | | | | | | | | | 1970 | | | | | |
| **Velvet Ash** | *Fraxinus velutina* | Native | | | | | | | | | | 2019 | | | 2021 | | | |
| **Velvet Leaf Gaura** | *Oenothera mollissima* | Native | | | | | | | | | | 2017 | | 1981 | | | | |
| **Velvet Mesquite** | *Prosopis velutina* | Native | | | | SA&HR | G5 | S5 | 2021 | 2019 | 2021 | 2022 | 2022 | 2021 | 2022 | 2022 | | 2022 |
| **Violet Toad Mouth** | *Sairocarpus nuttallianus* | Native | | | | | | | | | 1974 | | | | 2013 | | | 2019 |
| **Virgin River Brittlebush** | *Encelia virginensis* | Native | | | | | | | | | | | | 1981 | | | | |
| **Walkingstick Cactus** | *Cylindropuntia spinosior* | Native | | | | SR | | | | | | | | 2021 | 2021 | 2021 | | |
| **Wall Barley** | *Hordeum murinum* | Non-native | | | | | | | | | | 2021 | | 2019 | 2021 | | | 2021 |
| **Wand Fleabane** | *Erigeron oxyphyllus* | Native | | | | | | | | | 1974 | | | 1981 | | | | 2019 |
| **Wand Mullein** | *Verbascum virgatum* | Non-native | | | | | | | | | | 1995 | | | | | | |
| **Warty Caltrop** | *Kallstroemia parviflora* | Native | | | | | | | | | | 2021 | | | | 2018 | | 2019 |
| **Washer Woman** | *Alternanthera caracasana* | Non-native | | | | | G5 | IS | | | | | | | 2013 | | | |
| **Washington Fan Palm** | *Washingtonia robusta* | Non-native | | | | | | | | | | | | | 2020 | | | |
| **Water Jacket** | *Lycium andersonii var. wrightii* | Native | | | | | T4 | SNR | 1979 | | 1974 | 1995 | 1970 | | | | | 2019 |
| **Watercress** | *Nasturtium officinale* | Non-native | | | | | | | | | | 2021 | 1970 | | 2013 | | | |
| **Waterkmelon** | *Citrullus lanatus* | Non-native | | | | | | | | | | | | | | | | 2019 |
| **Wavy Scaly Cloak Fern** | *Astrolepis sinuata subsp. sinuata* | Native | | | | | | | | | | | 1970 | 1981 | 2013 | | | 2021 |
| **Wavyleaf Indain Paintbrush** | *Castilleja applegatei subsp. martinii* | Native | | | | | | | | | | | | | 2013 | | | |
| **Weak Leaf Burr Ragweed** | *Ambrosia confertiflora* | Native | | | | | G5 | SNR | | | 1974 | 2021 | 1970 | 1981 | 2016 | | 2011 | 1973 |
| **Wedgeleaf Draba** | *Draba cuneifolia* | Native | | | | | | | | | | 2019 | | | | | | |

# NATURAL RESOURCE PLAN – TABLE 3. PLANT SPECIES LIST

| Common Name | Plant Species | Nativity | ESA_ FWS | USFS | BLM | NPL Status | GB Nature Serve | ST Nature Serve | BHRP | CCRP | EMRP | HRP | LPRP | MMRP | SCRA | STRP | UMRP | WTRP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Wedgeleaf Draba** | *Draba cuneifolia var. integrifolia* | Native | | | | | | | 1979 | | 1974 | 1995 | 1970 | 1981 | 2013 | 2018 | | 1973 |
| **Western Honey Mesquite** | *Prosopis glandulosa var. torreyana* | Native | | | | SA&HR | | | | | 2021 | 2022 | | | | | | |
| **Western Marsh Cudweed** | *Gnaphalium palustre* | Native | | | | | | | | | | | | 1981 | | | | |
| **Western Myrtle Cotton** | *Bernardia incana* | Native | | | | | | | | | 1974 | | | | | | | 1973 |
| **Western Rock Jasmine** | *Androsace occidentalis* | Native | | | | | G5 | SNR | | | | 1995 | 1970 | | 2013 | | | 1973 |
| **Western Soapberry** | *Sapindus saponaria var. drummondii* | Native | | | | | | | | | | 2021 | | | | | | |
| **Western Tansy Mustard** | *Descurainia pinnata subsp. glabra* | Native | | | | | | | | | | 2019 | | 1981 | 2013 | 2018 | | 2019 |
| **Wheelscale Saltbush** | *Atriplex elegans var. elegans* | Native | | | | | | | | | 1974 | 1995 | 1970 | 1981 | 2013 | | | 2019 |
| **Wheelscale Saltbush** | *Atriplex elegans var. fasciculata* | Native | | | | | | | | | 1974 | | | | | 2018 | | |
| **Whisperingbells** | *Emmenanthe penduliflora var. penduliflora* | Native | | | | | | | | | | 2022 | | | | | | |
| **White Bract Blazingstar** | *Mentzelia involucrata* | Native | | | | | | | | | 1974 | | 1970 | | | 2018 | 2011 | 2019 |
| **White Burrobush** | *Ambrosia dumosa* | Native | | | | | G5 | SNR | 1979 | | 2021 | | 1970 | 1981 | | 2018 | 2011 | 2019 |
| **White Horehound** | *Marrubium vulgare* | Non-native | | | | | | | | | | 2022 | 1970 | 1981 | 2013 | | | |
| **White Mallow** | *Eremalche exilis* | Native | | | | | | | | | 1974 | | 1970 | | | | | 2019 |
| **White Margin Sandmat** | *Euphorbia albomarginata* | Native | | | | | G5 | SNR | | | 1974 | | | 1981 | 2013 | | | |
| **White Mulberry** | *Morus alba* | Non-native | | | | | | | | | | 2021 | | | | | | |
| **White Ragweed** | *Ambrosia salsola* | Native | | | | | G5 | SNR | | | 1974 | 2022 | 1970 | 1981 | 2018 | 2021 | | 2019 |
| **White Ratany** | *Krameria bicolor* | Native | | | | | | | 2021 | 2020 | 2021 | | | 2021 | 2021 | 2021 | 2019 | 2021 |
| **White Sagebrush** | *Artemisia ludoviciana subsp. albula* | Native | | | | | T5 | SNR | | | | | | | 2013 | | | |
| **White Sagebrush** | *Artemisia ludoviciana subsp. ludoviciana* | Native | | | | | T5 | SNR | | | | | | | | | | 2021 |
| **White Sagebrush** | *Artemisia ludoviciana subsp. sulcata* | Native | | | | | T4 | SNR | | | | | | 1981 | | | | |
| **White Stem Blazingstar** | *Mentzelia albicaulis* | Native | | | | | | | | | 1974 | | 1970 | | 2013 | | | |
| **White Stem Paper Flower** | *Psilostrophe cooperi* | Native | | | | | | | | 2017 | 1974 | 1995 | 1970 | 1981 | 2013 | | | 2019 |
| **White Sweetclover** | *Melilotus albus* | Non-native | | | | | | | | | | | | | 2021 | | | |
| **White Tackstem** | *Calycoseris wrightii* | Native | | | | | | | | | 2019 | 2020 | 1970 | 1981 | | 2018 | | 1973 |
| **White Tidytips** | *Layia glandulosa* | Native | | | | | | | | 2019 | | 1995 | 1970 | 2020 | 2013 | | 2011 | |

| Common Name | Plant Species | Nativity | ESA_ FWS | USFS | BLM | NPL Status | GB Nature Serve | ST Nature Serve | BHRP | CCRP | EMRP | HRP | LPRP | MMRP | SCRA | STRP | UMRP | WTRP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **White Woolly Sunflower** | *Eriophyllum lanosum* | Native | | | | | | | 1979 | 2022 | 1974 | 2020 | 1970 | 2020 | 2022 | 2019 | 2022 | 2022 |
| **White Woolly Twintip** | *Stemodia durantifolia* | Native | | | | | | | | | | | | | 2013 | | | 1973 |
| **Whitethorn Acacia** | *Acacia constricta var. constricta* | Native | | | | | GNR | SNR | | | | 2022 | 1970 | 2021 | | | | 2019 |
| **Whitethorn Acacia** | *Acacia constricta var. paucispina* | Native | | | | | T4 | SNR | | | | 1995 | | | | | | |
| **Whorled Marsh Pennywort** | *Hydrocotyle verticillata* | Native | | | | | | | | | | 2021 | | | | | | 2019 |
| **Wild Buckwheat** | *Eriogonum abertianum var. villosum* | Native | | | | | | | | | | | | | 2013 | | | |
| **Wild Buckwheat** | *Eriogonum palmerianum* | Native | | | | | | | | | | 1995 | 1970 | 1981 | 2013 | | 2011 | |
| **Wild Buckwheat** | *Eriogonum thomasii* | Native | | | | | | | 1979 | | 1974 | | 1970 | | | | 2011 | |
| **Wild Dwarf Morning-glory** | *Evolvulus arizonicus* | Native | | | | | | | | | | 2021 | | | | | | |
| **Wild Oat** | *Avena fatua* | Non-native | | | | | | | | | 1974 | 1995 | 1970 | | 2013 | | | 2020 |
| **Winding Mariposa Lily** | *Calochortus flexuosus* | Native | | | | SR | | | | | | | 1970 | | | | | 1973 |
| **Winged Panicgrass** | *Panicum alatum var. minus* | Native | | | | | | | | | | | | | | | | 1973 |
| **Wing-nut Cats Eye** | *Cryptantha pterocarya* | Native | | | | | | | | | | 2019 | | | | | | 2021 |
| **Wingnut Cryptantha** | *Cryptantha pterocarya var. cycloptera* | Native | | | | | | | | | | | | 1981 | 2013 | | | |
| **Wishbone Bush** | *Mirabilis laevis var. retrorsa* | Native | | | | | | | | | | 2022 | | | | | | |
| **Wishbone Bush** | *Mirabilis laevis var. villosa* | Native | | | | | | | 1979 | 2022 | 1974 | 2020 | 1970 | 2020 | 2021 | 2019 | 2022 | 2021 |
| **Witches Butter** | *Tremella mesenterica* | Unknown | | | | | | | | | | 2021 | | | | | | |
| **Woodland Threadstem** | *Pterostegia drymarioides* | Native | | | | | | | 1979 | | 1974 | 2020 | 1970 | 1981 | 2013 | 2018 | 2011 | 2019 |
| **Woodland Whitlow Grass** | *Draba nemorosa* | Non-native | | | | | | | | | | 1995 | | | | | | |
| **Woody Crinklemat** | *Tiquilia canescens var. canescens* | Native | | | | | | | | | | | 1970 | | | | | |
| **Woody Melic Grass** | *Melica frutescens* | Native | | | | | | | | | | | | | | | | 2019 |
| **Woolly Desert Marigold** | *Baileya pleniradiata* | Native | | | | | | | | | 1974 | | | | | 2018 | | 1973 |
| **Woolly Head Neststraw** | *Stylocline micropoides* | Native | | | | | | | 1979 | | 1974 | 2020 | 1970 | 1981 | 2020 | 2018 | 2011 | 2019 |
| **Woolly Honeysweet** | *Tidestromia lanuginosa* | Native | | | | | | | | | 2021 | 2021 | 2021 | | 2021 | 2018 | 2018 | 2021 |
| **Woolly Plantain** | *Plantago patagonica* | Native | | | | | | | | 2022 | 1974 | 2022 | 2020 | 2019 | 2019 | 2018 | 2019 | 2022 |
| **Woolly Sunflower** | *Eriophyllum pringlei* | Native | | | | | | | | | | | | 2019 | | | 2011 | |

# NATURAL RESOURCE PLAN – TABLE 3. PLANT SPECIES LIST

| Common Name | Plant Species | Nativity | ESA_ FWS | USFS | BLM | NPL Status | GB Nature Serve | ST Nature Serve | BHRP | CCRP | EMRP | HRP | LPRP | MMRP | SCRA | STRP | UMRP | WTRP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Woolly-Fruit Bursage** | *Ambrosia eriocentra* | Native | | | | | G5 | SNR | | | | 1995 | | | | | | |
| **Woolwort** | *Laennecia coulteri* | Native | | | | | | | | | 1974 | | 1970 | 1981 | | | | |
| **Wright Beebrush** | *Aloysia wrightii* | Native | | | | | G5 | SNR | | 2018 | 1974 | 2022 | 1970 | 1981 | 2013 | | | 2019 |
| **Wright Saltbush** | *Atriplex wrightii* | Native | | | | | | | | | | 1995 | | | | | | |
| **Wrights Buckwheat** | *Eriogonum wrightii var. nodosum* | Native | | | | | T3 | U | | | 1974 | | | | | | 2021 | 1973 |
| **Wrights Cudweed** | *Pseudognaphalium canescens subsp. canescens* | Native | | | | | | | 1979 | | | | | | | | | 1973 |
| **Wrights Lip Fern** | *Myriopteris wrightii* | Native | | | | | | | | | | | | | | | | 1973 |
| **Wrights Thimblehead** | *Hymenothrix wrightii* | Native | | | | | | | | | | 2021 | | | | | | |
| **Wrinkled Spineflower** | *Chorizanthe corrugata* | Native | | | | | | | 1979 | | | | | | | | | |
| **Yagers Woolstar** | *Eriastrum eremicum subsp. yageri* | Native | | | | | T3 | SNR | | 2018 | | 2022 | | 1981 | 2013 | | | 2019 |
| **Yavapai Hedgehog Cactus** | *Echinocereus yavapaiensis* | Native | | | | SR | G2 | S2 | | | | | | | 2013 | | | |
| **Yellow Bristle Grass** | *Setaria pumila* | Non-native | | | | | | | | | | 1995 | | | | | | |
| **Yellow Indian Mallow** | *Abutilon malacum* | Native | | | | | G4 | SNR | | | | 2022 | 1970 | | | | | |
| **Yellow Nightshade Ground Cherry** | *Physalis crassifolia* | Native | | | | | | | | | | | | | | | | 1973 |
| **Yellow Sweet Clover** | *Melilotus officinalis* | Non-native | | | | | | | | | | 2019 | | | | | | |
| **Yellow Twining Snapdragon** | *Neogaerrhinum filipes* | Native | | | | | | | | | 1974 | | | | | | | |
| **Yellowcomet** | *Mentzelia affinis* | Native | | | | | | | | | 1974 | | 1970 | 1981 | 2013 | 2018 | | 1973 |
| **Yellowdome** | *Trichoptilium incisum* | Native | | | | | | | | | 1974 | | | | | | | 2019 |
| **Yellowflowered Devils Claw** | *Proboscidea althaeifolia* | Native | | | | | | | | | | | | 1981 | | | | 2019 |
| **Yerba Mansa** | *Anemopsis californica* | Native | | | | | G5 | S3 | | | | 2022 | | | 2021 | | | |
| **Yuma Sandmat** | *Euphorbia setiloba* | Native | | | | | | | | | | 2021 | 1970 | 1981 | | 2018 | 2011 | 1973 |
| **Yuma Silverbush** | *Ditaxis serrata var. serrata* | Native | | | | | G5 | SNR | | | | 2022 | | | | | | |

# TABLE 4A: MARICOPA COUNTY PARKS EXOTIC/INVASIVE SPECIES LIST (ANIMALS)

| Common Name | Wildlife Species | BHRP | CCRP | EMRP | HRP | LPRP | Text49 | UMRP | WTRP |
|---|---|---|---|---|---|---|---|---|---|
| **Asiatic Clam** | *Corbicula fluminea* | 2002 | | | | 2020 | | | |
| **Bullfrog** | *Rana catesbeiana* | | | | | 2007 | | | |
| **Common Carp** | *Cyprinus carpio* | | | | | 2012 | | | |
| **Common Slider** | *Trachemys scripta elegans* | | | | 2022 | 2019 | | | |
| **Decollate snail** | *Rumina decollata* | | | | 2022 | | | | |
| **Domestic Cow** | *Bos taurus* | | | | 2020 | | | | |
| **Domestic Muscovy Duck** | *Cairina moschata domestica* | | | | | 2022 | | | |
| **Eurasian Collared-Dove** | *Streptopelia decaocto* | | 2019 | 2021 | 2019 | 2022 | 2008 | | |
| **European Starling** | *Sturnus vulgaris* | | | 2021 | | 2022 | 2008 | | 2020 |
| **Feral/Domestic Cat** | *Felis catus* | | | | 2019 | | | | |
| **House Sparrow** | *Passer domesticus* | | | 2020 | 2021 | 2022 | 2021 | 2022 | |
| **Quagga Mussel** | *Dreissena bugensis* | | | | | 2020 | | | |
| **Rio Grande Leopard Frog** | *Lithobates berlandieri* | | | | 2020 | 2020 | | 2020 | |
| **Rock Pigeon** | *Columba livia* | | 2019 | | 2019 | 2022 | | | |
| **Rosy-faced Lovebird** | *Agapornis roseicollis* | | | | | | | 2021 | |
| **Treehopper** | *Centrodontus atlas* | | | | | 2021 | | | |
| **Virile Crayfish** | *Faxonius virilis* | | | | | 2020 | | | |
| **Western Mosquitofish** | *Gambusia affinis* | | | | 2022 | | | | |
| **Wild Burro/Donkey** | *Equus asinus* | | | | 2022 | 2022 | | | |

# TABLE 4B: MARICOPA COUNTY PARKS INVASIVE SPECIES LIST

| Common Name | Plant Species | BHRP | CCRP | EMRP | HRP | LPRP | MMRP | Text49 | STRP | UMRP | VMRA | WTRP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Bermuda Grass** | *Cynodon dactylon* | | | | 2022 | 2005 | 1981 | 2021 | | | | 2019 |
| **Black Medick** | *Medicago lupulina* | | | | 1995 | | | | | | | |
| **Blue Panicum** | *Panicum antidotale* | | | | 1995 | | | | | | | |
| **Buffelgrass** | *PENNISETUM CILIARE* | 2004 | 2019 | | 2022 | 2022 | 2020 | 2013 | 2019 | 2020 | | 2022 |
| **Burr Medick** | *Medicago minima* | | | | 1995 | | | | | | | |
| **Cape Marigold** | *Dimorphotheca sinuata* | | 2019 | | | | | 2013 | | 2019 | | 2019 |
| **Cheat Grass** | *Bromus tectorum* | | | | 1995 | | | | | | | |
| **Cheeseweed Mallow** | *Malva parviflora* | 1979 | | 2019 | 2022 | 2020 | 1981 | 2022 | 2020 | | | 2020 |
| **Chilean Brome** | *Bromus berterianus* | | | | | | 1981 | 2013 | | | | |
| **Common Reed** | *Phragmites australis* | | | | | | | 2021 | | | | |
| **Corn Mustard** | *SINAPIS ARVENSIS* | | | | | | | | 2018 | | | |
| **Crossflower** | *Chorispora tenella* | | | | 1995 | | | | | | | |
| **Filaree** | *Erodium cicutarium* | 2021 | 2018 | | 2022 | 2020 | 2020 | 2013 | 2019 | 2020 | | 2022 |
| **Five Stamen Tamarisk** | *TAMARIX CHINENSIS* | | | | | | 2015 | | | | | |
| **Fountaingrass** | *PENNISETUM SETACEUM* | | 2019 | | | 2019 | 2020 | 2013 | | 2020 | | 42784 |
| **Giant Reed** | *ARUNDO DONAX* | | | 1974 | | 1970 | | 2013 | | | | |
| **Grannyvine** | *IPOMOEA TRICOLOR* | | | | 1995 | | | | | | | |
| **Great Brome** | *Bromus diandrus* | | | | 2021 | | | 2021 | | | | |
| **Indian Sweetclover** | *Melilotus indicus* | | | 1974 | 1995 | 1970 | 1981 | 2021 | | | | 2019 |
| **Johnson Grass** | *SORGHUM HALEPENSE* | 1979 | | 1974 | 1995 | | | | | | | |
| **Jungle Rice** | *Echinochloa colona* | | | | 1995 | 1970 | 1981 | | 2018 | | | |
| **Large Barnyard Grass** | *Echinochloa crus-galli* | | | 1974 | 2019 | | | 2013 | | 2011 | | |
| **Lehmann Love Grass** | *Eragrostis lehmanniana* | | | | | | | 2013 | | | | |
| **London Rocket** | *Sisymbrium irio* | 1979 | 2019 | 2022 | 2022 | 1970 | 2022 | 2022 | 2022 | 2019 | | 2020 |
| **Malta Star Thistle** | *CENTAUREA MELITENSIS* | | 2022 | 2019 | 2021 | 1970 | 2022 | 2020 | | | | |
| **Mat Amaranth** | *Amaranthus blitoides* | | | | | 1970 | 1981 | 2013 | | | | 1973 |



MARICOPA COUNTY PARKS & RECREATION

# NATURAL RESOURCE PLAN - TABLE 4. INVASIVE SPECIES LIST

| Common Name | Plant Species | BHRP | CCRP | EMRP | HRP | LPRP | MMRP | Text49 | STRP | UMRP | VMRA | WTRP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Nettle Leaf Mock Goosefoot** | *Chenopodium murale* | 1979 | | 1974 | 1995 | 1970 | 1981 | | 2018 | | | 2020 |
| **Onionweed** | *ASPHODELUS FISTULOSUS* | | | | | 2020 | | | | | | |
| **Puncturevine** | *TRIBULUS TERRESTRIS* | | | 1974 | 2021 | 2018 | | 2013 | 2018 | | | 2019 |
| **Red Brome** | *BROMUS RUBENS* | 1979 | 2021 | 1974 | 2022 | 1996 | 2021 | 2021 | 2019 | 2019 | 2021 | 2021 |
| **Rescue Grass** | *Bromus catharticus* | | | 1974 | 1995 | | | 2013 | | | | |
| **Sahara Mustard** | *BRASSICA TOURNEFORTII* | 2002 | 2019 | 2021 | 2022 | 2019 | 2020 | 2022 | 2020 | 2019 | | 2022 |
| **Salt Cedar** | *TAMARIX RAMOSISSIMA* | | | 2019 | 2019 | | 2020 | 2021 | | | | 2021 |
| **Stinknet** | *ONCOSIPHON PILULIFERUM* | | 2022 | 2022 | 2022 | 2022 | 2020 | 2022 | | 2020 | | 2022 |
| **Toothed Medick** | *Medicago polymorpha* | | | | 1995 | 1970 | | 2013 | | | | |
| **Tree of Heaven** | *AILANTHUS ALTISSIMA* | | | | 2019 | | | | | | | |
| **Tree Tobacco** | *Nicotiana glauca* | 1979 | | 1974 | 2022 | 1970 | | 2013 | | | | |
| **Wall Barley** | *Hordeum murinum* | | | | 2021 | | 2019 | 2021 | | | | 2021 |
| **White Horehound** | *Marrubium vulgare* | | | | 2022 | 1970 | 1981 | 2013 | | | | |
| **White Mulberry** | *Morus alba* | | | | 2021 | | | | | | | |
| **Wild Oat** | *Avena fatua* | | | 1974 | 1995 | 1970 | | 2013 | | | | 2020 |
| **Yellow Sweet Clover** | *Melilotus officinalis* | | | | 2019 | | | | | | | |

# DEFINITIONS

- **Allelopathy**: The suppression of growth of one plant species by another due to releasing toxic substances.[99]
- **Anthropogenic:** Of, relating to, or resulting from the influence of human beings on nature are human activities that change the planet and influence climate.[100] The biggest anthropogenic force of current concern is that of carbon dioxide levels rising due to fossil fuel combustion emissions.
- **Biomes:** Also called major life zones, the largest geographic biotic unit, a major community of plants and animals with similar life forms and environmental conditions. It includes various communities and is named for the dominant type of vegetation, such as grassland or coniferous forest. e.g., Forest, Desert, or Tundra.[101]
- **Bimodal precipitation:** Bimodal weather patterns are when there are two (2) extreme seasons – two rainy seasons with dry periods between.[102]
- **Biological diversity:** is all the different kinds of life you'll find in one area—the variety of animals, plants, fungi, and even microorganisms like bacteria that make up our natural world. These species and organisms work together in ecosystems, like an intricate web, to maintain balance and support life. It is often understood at three levels: species **diversity** refers to the variety of different species (plants, animals, fungi, and microorganisms) such as palm trees, elephants, or bacteria; genetic **diversity** corresponds to the variety of genes contained in plants, animals, fungi, and microorganisms.[103]
- **Climate Change:** Is a change in the statistical distribution of weather patterns when that change lasts for an extended period (i.e., decades to millions of years). Thus, climate change may refer to a change in average weather conditions or the time variation of weather around longer-term average conditions (i.e., more or fewer extreme weather events).[104]
- **Climate Drivers** (**Anthropogenic):** Human-caused, or anthropogenic, climate drivers include emissions of heat-trapping gases (also known as greenhouse gases) and changes in land use that make land reflect more or less sunlight energy. Since 1750, human-caused climate drivers have been increasing, and their effect dominates all natural climate drivers.[105]
- **Conservation:** study of the loss of Earth's biological diversity and the ways this loss can be prevented. Biological diversity, or biodiversity, is the variety of life either in a particular

[99] "Allelopathy." Merriam-Webster.com Dictionary, Merriam-Webster, https://www.merriam-webster.com/dictionary/allelopathy. Accessed 27 Mar. 2024.

[100] "Anthropogenic." Merriam-Webster.com Dictionary, Merriam-Webster, https://www.merriam-webster.com/dictionary/anthropogenic. Accessed 27 Mar. 2024.

[101] Augustyn, A. (2024, January 25). *biome*. *Encyclopedia Britannica*. https://www.britannica.com/science/biome

[102] McClaran, M.P., Brady, W.W, (1994, October). Arizona's Diverse Vegetation Contributions to Plant Ecology. Retrieved from: https://journals.uair.arizona.edu/index.php/rangelands/article/viewFile/11222/10495

[103] Biodiversity. National Geographic Encyclopedic Entry. Retrieved from: https://education.nationalgeographic.org/resource/biodiversity/

[104] Climate change is a change in the statistical distribution of weather patterns when that change last - Climate change is a change in the statistical | Course Hero. Retrieved from: https://www.coursehero.com/file/45493348/Climate-change-is-a-change-in-the-statistical-distribution-of-weather-patterns-when-that-change-last/

[105] NOAA Climate.gov Science & Information for climate-Smart Nation. Climate Forcing. Retrieved from: https://www.climate.gov/maps-data/climate-data-primer/predicting-climate/climate-forcing#:~:text=Another%20way%20to%20refer%20to,particles%20into%20the%20upper%20atmosphere.

place or on the entire planet Earth, including its ecosystems, species, populations, and genes. Conservation thus seeks to protect life's variety at all levels of biological organization.

- **Conservation easements:** Are a power invested in a qualified private land conservation organization (often called a "land trust") or government (municipal, county, state, or federal) to constrain, as to a specified land area, the exercise of rights otherwise held by a landowner to achieve specific conservation purposes. It is an interest in real property established by an agreement between a landowner and a land trust or government unit. The conservation easement "runs with the land," meaning it applies to both present and future owners of the land. As with other real property interests, the grant of a conservation easement is recorded in the local land records; the grant becomes a part of the chain of title for the property.[106]
- **Conservation (ecological) threshold:** When a relatively small change or disturbance in external conditions causes a rapid change in an ecosystem. When an ecological threshold has been passed, the ecosystem may no longer return to its state utilizing its inherent resilience. Conversely, crossing an ecological threshold leads to rapid change in ecosystem health. Thus, the ecological threshold represents a non-linearity of the responses in ecological or biological systems to pressures caused by human activities or natural processes. Critical load, regime shift, critical transition, and tipping point are other closely related terms.[107]
- **Ecologically Balanced (Balance of Nature):** A term used to describe how ecosystems are organized in a state of stability where species coexist with other species and their environment. However, even if an ecosystem is balanced, that doesn't mean that no changes ever occur. For example, a windstorm might roll through, wiping out a swath of trees, a predator might be overhunted, or a drought might reduce the availability of food resources. These ecological changes are called disturbances. [108]
- **Ecological Connectivity:** The degree to which similar facets of the landscape, such as habitats or vegetation patches, are interconnected to facilitate movements of plants, animals, and the attendant. Or the relative ease with which dispersive and dynamic ecological processe**s** (such as species. migration, water movement, soil transmission, pollination, etc.) occur across various ecosystem boundaries. [109]
- **Ecological Disturbance:** An event or force, of nonbiological or biological origin, that brings about mortality to organisms and changes in their spatial patterning in the ecosystems they inhabit. Disturbance plays a significant role in shaping the structure of individual populations and the character of whole ecosystems.The change that disrupts the balance of an ecosystem. i.e., development cultivation, fire, grazing, and invasive species invading. [110]
- **Ecological Niche:** describes how a species interacts within an ecosystem. The niche of a species depends on both biotic and abiotic factors, which affect the ability of a

[106] Wikipedia the Free Encyclopedia. Retrieved from: https://en.wikipedia.org/

[107] Wikipedia contributors. (2022, November 7). Ecological threshold. In Wikipedia, The Free Encyclopedia. Retrieved 19:10, March 27, 2024, from https://en.wikipedia.org/w/index.php?title=Ecological_threshold&oldid=1120567878

[108] Study.com. What Is Ecological Balance? - Definition & Importance - Video & Lesson Transcript. Retrieved from: https://study.com/academy/lesson/what-is-ecological-balance-definition-importance-quiz.html

[109] Discovering Ecological Connectivity. Retrieved from: https://ecologicalconnectivity.com/.

[110] Paine, R. T. (2019, February 14). ecological disturbance. Encyclopedia Britannica. https://www.britannica.com/science/ecological-disturbance

species to survive and endure. Refers to a unique functional role and position of a species in its habitat or ecosystem.[111]

- **Ecological Site:** Ecological sites are the basic component of a land-type classification system that describes ecological potential and ecosystem dynamics of land areas. All land/land use types are identified within the ecological site system, including rangeland, pasture, and forest land. Often with specific soil and physical characteristics that differ from other types of land in its ability to produce a distinct kind and amount of vegetation and respond similarly to management actions and natural disturbances. Lands are classified considering discrete physical and biotic factors. Physical factors include soils, climate, hydrology, geology, and physiographic features. Biotic factors include plant species occurrence, plant community compositions, annual biomass production, wildlife-vegetation interactions, and other factors.
- **Ecotones:** A zone where two communities meet and integrate.[112]
- **Edge Effect:** Edge effects refer to the changes in population or community structures that occur at the boundary of two habitats. Generally, more species are found in these regions (ecotones), which is called the edge effect.[113]
- **Fragmentation (Habitat):** The process during which a large expanse of habitat is transformed into several smaller patches of smaller total area isolated by a matrix of habitats unlike the original.[114]
- **Genetic Diversity:** Is the total number of genetic characteristics in the genetic makeup of a species. It is distinguished from genetic variability, which describes the tendency of genetic factors varying.[115]
- **Geology:** The science that deals with the Earth's physical structure and substance, its history, and the processes that act on it.[116]
- **Habitat Blocks:** Habitat blocks are areas of contiguous forests and other natural habitats un-fragmented by roads, development, or agriculture (per the MCPRD Natural Resource Specialist).
- **Habitat Loss:** Is the process by which a natural habitat becomes incapable of supporting its native species. In this process, the organisms that previously used the site are displaced or destroyed, reducing biodiversity. **Habitat loss and fragmentation** are considered two of the major factors driving the loss of biological diversity and degradation of ecosystem services (such as air quality and climate regulation), both in the United States and globally.[117]

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[111] Dotson, J.D. (2019, June 21). Ecological Niche: Definition, Types, Importance & Examples. Retrieved from: https://sciencing.com/ecological-niche-definition-types-importance-examples-13719219.html

[112] USDA-ARS Jornada Experimental Range, USDA Natural Resources Conservation Service, and New Mexico State University Ecosystem Dynamics Interpretive Tool. Ecological site descriptions (nmsu.edu).

[113] Ecotones - Definition, Characteristics of ecotones, Importance of ecotones (byjus.com). Retrieved from: https://byjus.com/free-ias-prep/ecotone/#:~:text=Edge%20effects%20refer%20to%20the%20changes%20in%20population,The%20species%20found%20here%20are%20called%20edge%20species.

[114] Urban Fragmentation and Human Movement Patterns | BioBuild Program (vt.edu). Retrieved from: https://www.sciencedirect.com/science/article/abs/pii/B9780128038352000140

[115] Wikipedia contributors. (2024, March 9). Genetic diversity. In Wikipedia, The Free Encyclopedia. Retrieved 19:34, March 27, 2024, from https://en.wikipedia.org/w/index.php?title=Genetic_diversity&oldid=1212815447

[116] King PhD, RPG, H.M. What is Geology? What Does a Geologist Do? Geology.com. https://geology.com/articles/what-is-geology.shtml#:~:text=Geology%20is%20the%20study%20of%20the%20Earth%2C%20the,structures%2C%20processes%20and%20organisms%20have%20changed%20over%20time.

[117] Wikipedia contributors. (2024, February 26). Habitat destruction. In Wikipedia, The Free Encyclopedia. Retrieved 19:36, March 27, 2024, from https://en.wikipedia.org/w/index.php?title=Habitat_destruction&oldid=1210474590

- **Habitat Connectivity:** Structural connectivity refers to the physical relationship between landscape elements.[118] In contrast, functional connectivity describes the degree to which landscapes facilitate or impede the movement of organisms between areas of habitat. Functional connectivity is a function of both landscape structure and the behavioral response of organisms to this structure. Thus, functional connectivity is both species and landscape-specific.
- **Habitat (Ecological) Enhancement:** Habitat Enhancement is a management objective describing the manipulation of the natural landscape to improve its ecological function. Improvements to relic habitat that has undergone some form of disturbance but has retained ecological function.
- **Hyporheic Zone:** A subsurface volume of sediment and porous space adjacent to a stream through which the stream water readily exchanges. Although these zones are physically defined by the hydrology of a stream and its surrounding environment, they strongly influence stream ecology, stream biochemical cycling, and stream water temperatures.[119]
- **Igneous Rock** (Derived from the Latin word *ignis*, meaning fire)**:** is one of the three main rock types, the others being sedimentary and metamorphic. Igneous rock is formed through the cooling and solidification of magma or lava. Igneous rock may form with or without crystallization, either below the surface as intrusive (plutonic) rocks or on the surface as extrusive (volcanic) rocks.[120]
- **Inbreeding Depression:** Is the reduced biological fitness in a given population due to **inbreeding** or breeding of related individuals. Population biological fitness refers to an organism's ability to survive and perpetuate its genetic material. Inbreeding depression is often the result of a population bottleneck.[121]
- **Invasive Species:** A plant, fungus, or animal species that is not native to a specific location (an introduced species) and tends to spread to a degree believed to cause damage to the environment, human economy, or human health.[122]
- **Island Biogeography** (Also called *insular biogeography*)**:** Provides some of the best evidence supporting natural selection and the theory of evolution. The term describes an ecosystem that is isolated by being surrounded by different ecosystems. For this theory, an island is defined as more than just a piece of land surrounded by water. It includes mountain peaks, a lake surrounded by a desert, a patch of woodland, or even a national park. The theory provides a model to explain the richness and uniqueness of species, both plants and animals, found in an isolated area. The **theory** of **island biogeography** states that the number of species found on a particular, undisturbed **island** is determined solely by the number of species immigrating to the **island** and extinction rates.[123]

[118] NOAA Office of Ocean Exploration and Research. What is habitat connectivity, and why is it important? Retrieved from: https://oceanexplorer.noaa.gov/facts/habitat-connectivity.html

[119] Source and Issues Water Encyclopedia. Stream, Hyporheic Zone of a - river, effects, temperature, important, system, oxygen, Pacific. Retrieved from: http://www.waterencyclopedia.com/St-Ts/Stream-Hyporheic-Zone-of-a.html.

[120] Wikipedia contributors. (2024, March 24). Igneous rock. In *Wikipedia, The Free Encyclopedia*. Retrieved 19:53, March 27, 2024, from https://en.wikipedia.org/w/index.php?title=Igneous_rock&oldid=1215281514

[121] Wikipedia contributors. (2024, March 18). APA style. In *Wikipedia, The Free Encyclopedia*. Retrieved 19:54, March 27, 2024, from https://en.wikipedia.org/w/index.php?title=APA_style&oldid=1214404177

[122] Wikipedia contributors. (2024, March 21). Invasive species. In *Wikipedia, The Free Encyclopedia*. Retrieved 19:54, March 27, 2024, from https://en.wikipedia.org/w/index.php?title=Invasive_species&oldid=1214890101

[123] BD Editors (2018, May 6). Theory of Island Biogeography. https://biologydictionary.net/island-biogeography/

- **Keystone Species:** In ecology, a species has a disproportionately large effect on the communities in which it occurs. Such species help maintain local biodiversity within a community either by controlling populations of other species that would otherwise dominate the community or by providing critical resources for a wide range of species. Every ecosystem has certain species that are critical to the survival of the other species in the system. The keystone species could be a colossal predator or an unassuming plant, but without them, the ecosystem may not survive.[124]
- **Metamorphic rocks:** These rocks arise from the transformation of existing rock types in a process called metamorphism, which means "change in form." The original rock (protolith) is subjected to heat (temperatures greater than 150 to 200 °C) and pressure (1500 bars), causing profound physical and/or chemical change. The protolith may be sedimentary rock, igneous rock or another older metamorphic rock.[125]
- **Non-native Species Or Adventive:** An introduced, alien, exotic, non-indigenous, or non-native species, or simply an introduction, is a species living outside its native distributional range, which has arrived there by human activity, either deliberate or accidental. Non-native species can have various effects on the local ecosystem.[126]
- **Noxious Weed:** A weed considered harmful to the environment or animals, especially one that may be the subject of regulations governing attempts to control it.[127]
- **Orographic:** Relating to mountains, especially concerning tier position and form.
- **Physiography:** Often called surficial geology; it is the physical features of the Earth's surface.[128]
- **Plate tectonics:** A theory explaining the structure of the Earth's crust and many associated phenomena resulting from the interaction of rigid lithospheric plates, which move slowly over the underlying mantle.[129]
- **Recreational and Public Purpose (RP&P):** Land leased or patented under the R&PP Act Title 43 of the code of federal regulations (43 CFR). This particular act authorizes the sale or lease of public lands for recreational or public purposes to state and local governments and qualified nonprofit organizations. Under this act, examples of land leased and patented are historical monument sites, campgrounds, schools, firehouses, law enforcement facilities, municipal facilities, hospitals, parks, and fairgrounds.[130]
- **RP&P Lease:** Leases have an expiration date of 25 years; at that time, the managing agency can request a lease extension or a patent. The lease is an agreement entered by the BLM and the MCPRD agreeing that the MCPRD will manage the land, allows for the initial development as stated in the agreements is required to be no more than 10% or

[124] Thompson, J. N. (2023, October 9). *keystone species*. *Encyclopedia Britannica*. https://www.britannica.com/science/keystone-species

[125] Wikipedia contributors. (2024, March 11). Metamorphic rock. In *Wikipedia, The Free Encyclopedia*. Retrieved 20:00, March 27, 2024, from https://en.wikipedia.org/w/index.php?title=Metamorphic_rock&oldid=1213142170

[126] Wikipedia contributors. (2024, March 10). Introduced species. In *Wikipedia, The Free Encyclopedia*. Retrieved 20:00, March 27, 2024, from https://en.wikipedia.org/w/index.php?title=Introduced_species&oldid=1212961122

[127] Arizona Department of Agriculture. Noxious Weeds. Retrieved from: https://agriculture.az.gov/pestspest-control/agriculture-pests/noxious-weeds#:~:text=%C2%A7%203%2D201%2C%20A.A.C.,are%20listed%20in%20Table%204.

[128] Radford University. (2014). Physiographic Provinces v. Geologic Provinces. Retrieved from: https://sites.radford.edu/~jtso/GeologyofVirginia/Physiography/PhysioIntro-4.html

[129] LibreTexts Geosciences. 3.15: Plate Tectonics Theory. Retrieved from: https://geo.libretexts.org/Bookshelves/Oceanography/Oceanography_101_(Miracosta)/03%3A_Structure_of_the_Earth/3.15%3A_Plate_Tectonics_Theory

[130] U.S. Department of Interior Bureau of Land Management. (2011, August 8). Third Party Uses on Recreation and Public Purposes Act Patents and Leases | Bureau of Land Management (blm.gov). Retrieved from: https://www.blm.gov/policy/im-2011-162.

lease area or total area being leased and will manage the other 90% for conservation areas.[131]

- **RP&P Patents:** Considered MCPRD lands and follows many of the same requirements as the lease and is based on the original agreement; however, the land is permanently patented to MCPRD.[131]
- **Restoration (Ecological):** The process of repairing sites in nature whose biological communities (that is, interacting groups of various species in a common location) and ecosystems have been degraded or destroyed.[131]
- **Remnant habitat:** Also known as **remnant natural area** - is an ecological community containing native flora and fauna that has not been significantly disturbed by destructive activities such as agriculture, logging, pollution, development, non-native species invasion.[132]
- **Sink habitats:** Habitats in which populations cannot survive when they are isolated from other populations.[133]
- **Source:** Habitats where not only is the populations sustainable but from which migration can occur to populate other habitats.[134]
- **Sedimentary Rock:** Formed at or near Earth's surface by the accumulation and lithification of sediment (detrital rock) or by the precipitation from solution at normal surface temperatures (chemical rock). Sedimentary rocks are produced by the weathering of preexisting rocks and the subsequent transportation and deposition of the weathering products.[134]
- **Sonoran Desert:** Is a North American desert that covers large parts of the Southwestern United States in Arizona and California and Northwestern Mexico in Sonora, Baja California, and Baja California Sur. It is the hottest desert in Mexico. It has an area of 260,000 square kilometers. The western portion of the United States–Mexico border passes through the Sonoran Desert.[135]
- **Uplifting in geology:** Vertical elevation of the Earth's surface in response to natural causes. Broad, relatively slow and gentle uplift is termed warping, or epeirogeny, in contrast to the more concentrated and severe orogeny, the uplift associated with earthquakes and mountain building.[136]
- **Urban Sprawl:** Rapid expansion of the geographic extent of cities and towns, often characterized by low-density residential housing, single-use zoning, and increased reliance on the private automobile for transportation. Urban sprawl is caused in part by the need to accommodate a rising urban population; however, in many metropolitan areas it results from a desire for increased living space and other residential amenities.
- **Visitor Capacity:** A component of visitor use management. The maximum amounts and types of visitors use that an area can accommodate while achieving and maintaining the

[131] Veblen, K. E. , Porensky, . Lauren and Young. Truman (2023, August 10). ecological restoration. Encyclopedia Britannica. https://www.britannica.com/science/ecological-restoration.

[132] Wikipedia contributors. (2023, February 20). Remnant natural area. In Wikipedia, The Free Encyclopedia. Retrieved 20:27, March 27, 2024, from https://en.wikipedia.org/w/index.php?title=Remnant_natural_area&oldid=1140461888

[133] Jansen VA, Yoshimura J. Populations can persist in an environment consisting of sink habitats only. Proc Natl Acad Sci U S A. 1998 Mar 31;95(7):3696-8. doi: 10.1073/pnas.95.7.3696. PMID: 9520428; PMCID: PMC19898.

[134] Folk, R. Louis , Schwab, . Frederick L. , Crook, . Keith A.W. , Bissell, . Harold J. , Haaf, . Ernst ten and Beck, . Kevin Charles (2024, March 8). sedimentary rock. Encyclopedia Britannica. https://www.britannica.com/science/sedimentary-rock.

[135] Wikipedia contributors. (2024, March 14). Sonoran Desert. In Wikipedia, The Free Encyclopedia. Retrieved 20:38, March 27, 2024, from https://en.wikipedia.org/w/index.php?title=Sonoran_Desert&oldid=1213729490

[136] Britannica, T. Editors of Encyclopaedia (2023, May 10). *uplift*. *Encyclopedia Britannica*. https://www.britannica.com/science/uplift.

desired resource conditions and visitor experiences consistent with the purposes for which the area was established.[137]

- **Wildlife Corridor/Linkage:** An area of habitat connecting wildlife populations separated by human activities or structures (such as roads, development, or logging). This allows an exchange of individuals between populations, which may help prevent the negative effects of inbreeding and reduced genetic diversity (via genetic drift) that often occur within isolated populations. Corridors may also help facilitate the re-establishment of populations that have been reduced or eliminated due to random events (such as fires or disease).[138]

[137] Marion, J.L. (2019, March) Impacts to Wildlife: Managing Visitors and Resources to Protect Wildlife. Interagency Visitor Use Management Council. Retrieved from: https://visitorusemanagement.nps.gov/Content/documents/Contributing%20Paper_Impacts%20to%20Wildlife_Visitor%20Capacity_Edition%201.pdf or https://pubs.usgs.gov/publication/70210073#:~:text=Visitor%20capacity%2C%20a%20component%20of%20visitor%20use%20management%2C,the%20purposes%20for%20which%20the%20area%20was%20established.

[138] Wikipedia contributors. (2024, March 1). Wildlife corridor. In Wikipedia, The Free Encyclopedia. Retrieved 20:42, March 27, 2024, from https://en.wikipedia.org/w/index.php?title=Wildlife_corridor&oldid=1211125838

## Maricopa County's regional parks provide beautiful open spaces to connect with nature:

Adobe Dam Regional Park
23280 N. 43rd Avenue
Glendale, AZ 85310
(602) 506-2930 ext. 8

Buckeye Hills Regional Park
26700 W. Buckeye Hills Drive
Buckeye, AZ 85326
(602) 506-2930 ext. 6

Cave Creek Regional Park
37019 N. Lava Lane
Cave Creek, AZ 85331
(602) 506-2930 ext 8

Desert Outdoor Center at Lake Pleasant
41402 N. 87th Avenue
Peoria, AZ 85383
(602) 372-7470

Estrella Mountain Regional Park
14805 W. Vineyard Ave.
Goodyear, AZ 85338
(602) 506-2930 ext. 6

Hassayampa River Preserve
49614 U.S. Hwy. 60 89
Wickenburg, AZ 85390
(602) 506-2930 ext. 9

Lake Pleasant Regional Park
41835 N. Castle Hot Springs Rd.
Morristown, AZ 85342
(602) 506-2930 ext. 1

McDowell Mountain Regional Park
16300 McDowell Mtn. Park Dr.
Fountain Hills, AZ 85268
(602) 506-2930 ext 3

San Tan Mountain Regional Park
6533 W. Phillips Road
Queen Creek, AZ 85142
(602) 506-2930 ext 7

Spur Cross Ranch Conservation Area
44000 N. Spur Cross Road
Cave Creek, AZ 85331
(602) 506-2930 ext 8

Usery Mountain Regional Park
3939 N. Usery Pass Rd.
Mesa, AZ 85207
(602) 506-2930 ext 4

Vulture Mountains Recreation Area
Located South of Us60
Wickenburg, AZ 85390
(602) 506-2930

White Tank Mtn. Regional Park
20304 W. White Tank Mountain Road
Waddell, AZ 85355
(602) 506-2930 ext. 5