NATIONAL PARK SERVICE • U.S. DEPARTMENT OF THE INTERIOR

RESOURCE STEWARDSHIP STRATEGY SUMMARY

JOSHUA TREE NATIONAL PARK

CALIFORNIA

JANUARY 2021

CONTENTS

Introduction 1
Purpose of a Resource Stewardship Strategy 1
Intent of this Summary Document 2
Brief Description of Joshua Tree National Park 3
Development of the Resource Stewardship Strategy for Joshua Tree National Park 5
Operating Principles of Joshua Tree National Park 7
Key Park Issues, Stressors, and Threats 9
Anthropogenic Climate Change in Joshua Tree National Park 17
Priority Resources and Components 19
Priority Resource Summaries 21
Archeological Resources 21
Ethnography 21
History 22
Historic Structures 22
Cultural Landscapes 23
Museum Collections and Archives 23
Native Flora 24
Native Fauna 26
Oases and Other Riparian Areas 27
Wilderness Character 28
Geological Resources 28
Paleontological Resources 28
Water Resources 29
Night Sky 29
Air Quality 30
Soundscape 31
Scenic Views 31
Landscape-Scale and Cross Boundary Resources and Collaboration 32
Stewardship Goals 33
High-Priority Stewardship Activities 45
Ongoing Implementation of the Resource Stewardship Strategy 63
References 64
Appendix A: Joshua Tree National Park Comprehensive List of Stewardship Strategies and Respective Priorities 66
Contributors 113

TABLES

Table 1. Key Issues, Stressors, and Threats; Potential Implications; and Affected Resources 9

Table 2. Priority Resources and Their Components 19

Table 3a. Long-Term and Short-Term Stewardship Goals for Priority Resource—Archeological Resources 34

Table 3b. Long-Term and Short-Term Stewardship Goals for Priority Resource—Ethnography 35

Table 3c. Long-Term and Short-Term Stewardship Goals for Priority Resource—History 35

Table 3d. Long-Term and Short-Term Stewardship Goals for Priority Resource—Historic Structures 36

Table 3e. Long-Term and Short-Term Stewardship Goals for Priority Resource—Cultural Landscapes 37

Table 3f. Long-Term and Short-Term Stewardship Goals for Priority Resource—Museum Collections and Archives 37

Table 3g. Long-Term and Short-Term Stewardship Goals for Priority Resource—Native Flora 38

Table 3h. Long-Term and Short-Term Stewardship Goals for Priority Resource—Native Fauna 39

Table 3i. Long-Term and Short-Term Stewardship Goals for Priority Resource—Oases, Springs, and Other Riparian Areas 41

Table 3j. Long-Term and Short-Term Stewardship Goals for Priority Resource—Geologic Resources 41

Table 3k. Long-Term and Short-Term Stewardship Goals for Priority Resource—Paleontological Resources 42

Table 3l. Long-Term and Short-Term Stewardship Goals for Priority Resource—Water Resources (sans oases / springs) 42

Table 3m. Long-Term and Short-Term Stewardship Goals for Priority Resource—Night Sky 42

Table 3n. Long-Term and Short-Term Stewardship Goals for Priority Resource—Air Quality 43

Table 3o. Long-Term and Short-Term Stewardship Goals for Priority Resource—Soundscape 43

Table 3p. Long-Term and Short-Term Stewardship Goals for Priority Resource—Scenic Views 43

Table 3q. Long-Term and Short-Term Stewardship Goals for Priority Resource—Wilderness Character 43

Table 3r. Long-Term and Short-Term Stewardship Goals for Priority Resource—Landscape-scale and Cross-boundary Resources and Collaboration 44

Table 4a. High-Priority Stewardship Activities for Priority Resource—Archeological Resources 47

Table 4b. High-Priority Stewardship Activities for Priority Resource—Ethnography 47

Table 4c. High-Priority Stewardship Activities for Priority Resource—History 48

Table 4d. High-Priority Stewardship Activities for Priority Resource—Historic Structures 49

Table 4e. High-Priority Stewardship Activities for Priority Resource—Cultural Landscapes 50

Table 4f. High-Priority Stewardship Activities for Priority Resource—Museum Collections and Archives 50

Table 4g. High-Priority Stewardship Activities for Priority Resource—Native Flora 51

Table 4h. High-Priority Stewardship Activities for Priority Resource—Native Fauna 53

Table 4i. High-Priority Stewardship Activities for Priority Resource—Oases, Springs, and Other Riparian Areas 54

Table 4j. High-Priority Stewardship Activities for Priority Resource—Geologic Resources 55

Table 4k. High-Priority Stewardship Activities for Priority Resource—Paleontological Resources 55

Table 4l. High-Priority Stewardship Activities for Priority Resource—Water Resources 56

Table 4m. High-Priority Stewardship Activities for Priority Resource—Night Sky 56

Table 4n. High-Priority Stewardship Activities for Priority Resource—Air Quality 57

Table 4o. High-Priority Stewardship Activities for Priority Resource—Soundscape 58

Table 4p. High-Priority Stewardship Activities for Priority Resource—Scenic Views 58

Table 4q. High-Priority Stewardship Activities for Priority Resource—Wilderness Character 59

Table 4r. High-Priority Stewardship Activities for Priority Resource—Landscape-scale and Cross-boundary Resources and Collaboration 59

FIGURES

Figure 1. Map of Joshua Tree National Park 4

Figure 2. Annual average temperature for the area within park boundaries, 1895–2017 18

Figure 3. Modeled suitable habitat (green) of Joshua trees for historical (1951–1980) and projected (2070–2099) climate 18

Figure 4. RSS Implementation Process 63

INTRODUCTION

PURPOSE OF A RESOURCE STEWARDSHIP STRATEGY

A resource stewardship strategy (RSS) is a strategic plan, intended to help park managers achieve and maintain desired resource conditions over time (see NPS *Management Policies 2006* [§2.3.2]). As part of a park's planning portfolio, a resource stewardship strategy serves as a bridge between the park's foundation document, other plans, and everyday management of its natural and cultural resources.

More specifically, a resource stewardship strategy is a dynamic planning tool used to set stewardship goals and track progress in achieving and maintaining desired natural and cultural resource conditions. All resource stewardship goals and activities should be based on science, law, NPS management policies, and the long-term public interest.

Essentially, a resource stewardship strategy establishes a framework and a coordinated process for

1. evaluating and summarizing existing information about priority park resources (including key issues, stressors, and threats),
2. using science and scholarship to establish stewardship goals for priority resources,
3. integrating natural and cultural resource management to achieve stewardship goals, and
4. determining what stewardship activities are needed to get us "from where we are to where we want to be."

This information provides a basis for making informed resource management decisions for specific project proposals and for developing and revising annual work plans over time.

A resource stewardship strategy is not a static document or one-time effort. Rather, it is a dynamic framework that should be routinely updated as conditions change; new issues, stressors, or threats are identified; and activities are accomplished. A resource stewardship strategy is reviewed by NPS subject-matter experts and decision makers; however, it is not a publicly reviewed decision document.

The RSS process also provides an opportunity for a park to take an integrated approach to resource management by capitalizing on overlapping opportunities among and within disciplines, identifying stewardship activities that benefit multiple resources, or addressing larger parkwide issues. Taking an integrated approach can result in more effective stewardship for resources through the use of science, scholarship, research, policy, interpretation, and direct management.

INTENT OF THIS SUMMARY DOCUMENT

This summary document is intended to provide readers with a snapshot of the resource stewardship strategy for Joshua Tree National Park. For the sake of simplification and abbreviation, this unit of the national park system will also be referred to as "the park" or JOTR in this document. The document serves as a communication tool that complements the dynamic and evolving RSS desktop application that is actively used for resource management. This summary is not intended to describe all of the elements in the resource stewardship strategy, but instead focuses on those components of the strategy that are essential for communicating information about the park's plan to address key management issues and seize opportunities for those resources identified as priority natural and cultural resources.

This document includes a summary of key issues, stressors, and threats affecting park resources; brief descriptions of the park's priority resources and their components; stewardship goals for priority resources and stewardship activities determined to be high priorities for the next 3 to 5 years. The document concludes with a brief description of future RSS implementation.

It is important to remember that implementation of the resource stewardship strategy is an ongoing process, with necessary updates and revisions occurring as resource and management conditions change and stewardship activities are carried out.

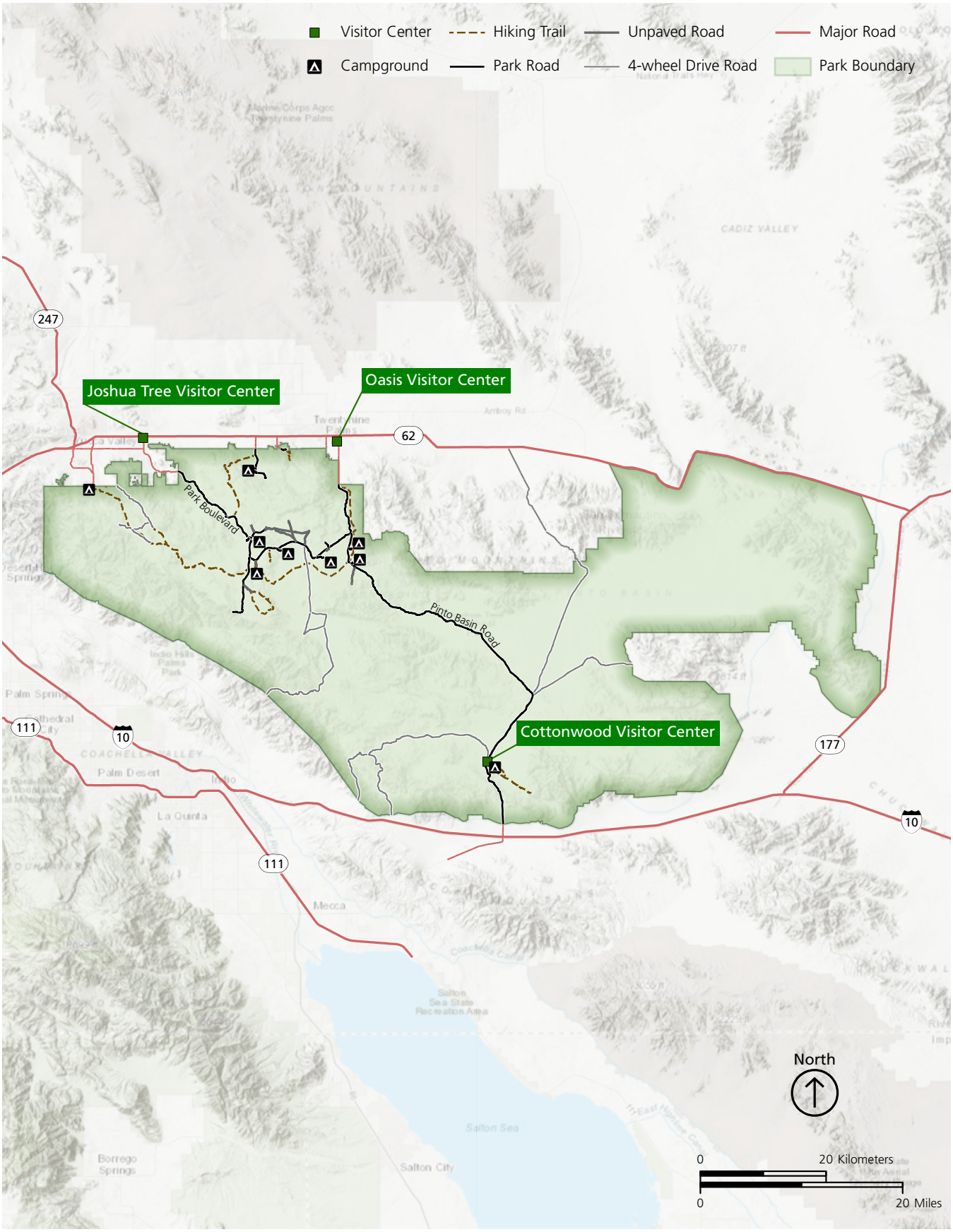
BRIEF DESCRIPTION OF JOSHUA TREE NATIONAL PARK

Joshua Tree National Park lies at the eastern extent of the east-west transverse ranges of southern California. The southern boundary of the park follows the base of the Little San Bernardino Mountains along the northern edge of the Coachella Valley; the northern boundary is defined by the Morongo Basin. Ecologically, Joshua Tree National Park lies at the convergence of two deserts—two large bioregions whose characteristics are driven by differences in precipitation and temperature. The Colorado Desert encompasses the hotter and drier eastern part of the park and features expansive basins dominated by creosote bush, with scattered gardens of ocotillo, and cholla cactus. The special habitat of the Joshua tree is found in the higher, more moist, and slightly cooler Mojave Desert. In addition to Joshua tree forests, the western part of the park also includes some of the most interesting geologic displays found in California's deserts. The park includes five native desert fan palm oases, which are the few areas where surface water occurs naturally. The park lands include a rich and diverse cultural history. Human occupation dates to the Late Pleistocene period with a small number of Clovis and Folsom materials found within the park and in the immediate area. The most substantial early occupation identified within the park dates to the early Holocene, with what is known as Pinto culture; human occupation continues throughout the historical era with tribes known today as Cahuilla, Chemehuevi, Mojave, and Serrano. In the last quarter of the 19th century, European American surveyors, cattlemen, miners, and homesteaders began to arrive and, alongside native peoples, created a set of enduring social and cultural legacies for these lands.

On August 10, 1936, President Franklin D. Roosevelt established Joshua Tree National Monument as a unit of the national park system through a Presidential Proclamation. After two boundary changes in 1950 and 1961, Congress designated 429,690 acres of the monument as wilderness and 37,550 acres as potential wilderness in 1976. Then, in 1984, the monument was designated as part of a biosphere reserve system that included Joshua Tree and Death Valley National Monuments, Anza Borrego Desert State Park, Santa Rosa Mountains Wildlife Management Area, and Deep Canyon Research Center. In 1994, the California Desert Protection Act added 234,000 acres (including 163,000 acres of new wilderness) to the park, and redesignated the area as Joshua Tree National Park. The park boundary currently contains 772,676 acres in federal ownership and 19,834 acres of nonfederal lands. Of these lands, 595,370 acres are designated as wilderness and 70,557 acres of potential wilderness. The park lies within both San Bernardino and Riverside counties approximately 100 miles from the Los Angeles metropolitan area—more than 18 million people live within a three-hour drive of the park. The natural desert expanse of the park provides ideal conditions for campers, photographers, star gazers, naturalists, as well as anyone seeking space for quiet introspection, exploration, or outdoor learning. In addition, the extensive granite rock outcrops, boulder piles, desert mountain ranges, and canyons create a world-class destination for rock climbers, as well as hundreds of miles of scenic trails for hikers and equestrians.

Given its location along a transition zone between two desert regions, the park is home to a fascinating diversity of desert plants and animals. Nearly 750 species of flowering plants have been identified, with the most distinctive being the ocotillo, the teddy bear cholla, and the Joshua tree. The park is the only unit in the national park system that preserves native desert fan palm oases. These oases support a rich diversity of vegetation and wildlife species not found elsewhere in the park. The park contains highly diverse fauna. More than 250 species of birds have been recorded at Joshua Tree National Park, as have many unique species of reptiles, amphibians, mammals, and invertebrates. Some examples include the Agassiz's desert tortoise, the California treefrog, the desert bighorn sheep, and a species of tarantula that is found only in the Joshua tree plant community. Joshua Tree National Park protects numerous archeological sites associated with the Pinto Culture, one of the earliest prehistoric cultures found in the California desert (7,000–10,000 years old). The park preserves sites and materials associated with at least four overlapping ethnographic native cultures—the Cahuilla, Serrano, Chemehuevi, and Mojave Indians. Other historic sites preserve information on the history of the processing of gold ore, cattle ranching, rustling, and homesteading of the southwestern deserts.

Figure 1. Map of Joshua Tree National Park



DEVELOPMENT OF THE RESOURCE STEWARDSHIP STRATEGY FOR JOSHUA TREE NATIONAL PARK

This resource stewardship strategy represents the collaborative efforts of National Park Service (NPS) personnel from the park; the NPS Region Office for Interior Regions 8, 9, 10, and 12 (RO), the NPS Cultural Resources, Partnerships and Science Directorate (CRPS); the NPS Natural Resource Stewardship and Science Directorate (NRSS); and the NPS Denver Service Center, Planning Division (DSC-P). It is based on information about park resources that was available at the time of RSS development and on the experience and professional judgment of resource specialists.

In developing the resource stewardship strategy, the project team followed a five-step process established by a national NPS working group that formed to provide direction and oversight for RSS efforts nationwide. First, the team gathered and evaluated existing information about park resources to determine the current condition of resources and status of information. Next, they identified and assessed key issues, stressors, and threats that are impacting park resources or could do so in the future. The team then identified priority resources and their components for this resource stewardship strategy. They subsequently set stewardship goals for each priority resource. Finally, the team identified stewardship activities aimed at achieving those goals and prioritized activities to implement within the next 3 to 7 years. The organization of this summary document parallels this RSS development process, which is described in more detail in internal NPS documents, including the RSS Development Guide prepared in 2019. Some key terms that are used throughout this summary document are defined below.

DEFINITIONS OF KEY TERMS

Priority Resource: A cultural or natural resource or value that the National Park Service manages or monitors to maintain a park unit's purpose and significance, to address policy/law mandates, or to address scholarly and scientific research needs or findings.

Priority Resource Component: An aspect or attributing resource that is integral to the functionality, importance, or condition of a priority resource and can be managed or monitored practically over the next 5-year horizon. A priority resource component is included, or nested, under the associated priority resources.

Stewardship Activity: One or more initiatives that lead to the achievement of a short-term stewardship goal. On its own, a stewardship activity should produce a specific deliverable or outcome. Activities may include assessments, documentation, identification, maintenance, operations, resource protection, thematic studies, cataloging, evaluation, interpretation, planning, training, data recovery, education, inventory, monitoring, research, survey, treatment, restoration, or other types of management.

Stewardship Goal: A description of what resource condition or information that managers are working to achieve for a particular priority resource or component. Stewardship goals guide the National Park Service in its aim to enhance information; improve or maintain resource conditions; address issues, stressors, or threats; or achieve other park stewardship needs related to the priority resource such as increasing collaboration with partners or expanding education, interpretation, and other programming.

Strategy: A tactical path forward defined through achievable actions that maintain or improve aspects of a priority resource / component. Strategies start with a stewardship goal and include a comprehensive set of activities to achieve that goal. Strategies are logically organized, science/scholarship-based, well documented, and reviewed by subject-matter experts. The typical timeframe for executing a strategy is short term, typically 3 to 5 years depending on a park's needs.

OPERATING PRINCIPLES OF JOSHUA TREE NATIONAL PARK

Joshua Tree National Park applies the following operating principles to guide their actions in the management of resource protection at the park:

- Adaptive Management Approach – Identify the issue, sequence actions that build upon knowledge from previous situations, try it, adjust, apply, or abandon.
- Iterative and Collaborative Approach – Continuously integrate management with the long-range interpretive plan. Use the long-range interpretive plan matrix to inform the nexus between science/stewardship and interpretation to mitigate anthropogenic changes to resources by using education/outreach tools to influence visitor behaviors. Collaborate with facilities to maximize resource protection and foster the innovation required to solve today and tomorrows problems.
- Problem solve using the "Three E's" – Education, Engineering, and Enforcement. Managers begin with scoping education and engineering solutions and rely on enforcement when those two efforts fail.
- Utilize all data collection, analysis, and reporting to inform decision making and guide park management. Reporting in the park must consider the target audience; all reports with the potential to change park management are presented to the park leadership team and in many cases park partners and stakeholders.
- Inclusive and diverse staffing and funding portfolio. Given the park's complex landscape and fabric, an interdisciplinary approach to science and stewardship is critical to successful problem solving. Additionally, partnerships and a wide array of fund sources are central to the long-term sustainability of RSS goals.
- Focus on essential tasks. The park makes deliberate, calculated choices on which stewardship and science projects to pursue. To make best use of limited time and funds, the park only engages in the most important tasks to achieve the agency mission. The park realizes that it cannot pursue every possible beneficial action and that in choosing to perform a certain task comes with the trade-off of not pursuing another task. The park engages in work planning efforts to determine which tasks are essential.
- Prioritize based on the following; 1) intersection of threats across multiple resources, 2) probability of success, and 3) long term sustainability of the actions; encourage risk-taking when necessary.

These operating principles of Joshua Tree National Park and the goals and activities established during this resource stewardship strategy process help to support the four pillars to guide natural resource specific activities and investments as established by the National Park Service Natural Resource Stewardship and Science Framework (2016). The four pillars include: 1) Holding the line, 2) Managing amid continuous change, 3) Leveraging for conservation at scale, and 4) Enhancing stewardship and science access and engagement. The pillars emphasize collaboration, cross-discipline learning, and synthesis; elevate scientific integrity; encourage a strong role for science in informing park management; and emphasize the value and need of law and development of policy guidance.

KEY PARK ISSUES, STRESSORS, AND THREATS

Joshua Tree National Park faces a variety of issues, stressors, and threats that affect park resources or may potentially affect park resources in the future. These include factors that are related to climate change and those that are unrelated. Key issues are management concerns that directly relate to park resources and their conditions. Stressors are factors that exacerbate change in resource conditions, while threats are immediate or potential factors that may negatively impact park resources in the future but do not currently affect park resources. The identification of key issues, stressors, and threats helped drive the selection of priority resources for this resource stewardship strategy. Furthermore, the National Park Service considered key issues, stressors, and threats when setting stewardship goals for priority resources and when developing and prioritizing stewardship activities that respond to those goals.

Table 1 summarizes key issues, stressors, and threats; their potential implications; and resource types affected. This table is the driver for identifying priority resources to manage, goal setting, and stewardship activity planning. Given the significance of climate change stressors on resources at the park, a brief narrative that elaborates on climate change effects and responses is provided after the table.

Table 1. Key Issues, Stressors, and Threats; Potential Implications; and Affected Resources[1]

ISSUES, STRESSORS, OR THREATS	POTENTIAL IMPLICATIONS	RESOURCE TYPES AFFECTED
VISITOR USE—Social trails, unauthorized pullouts, etc.	- The development of social trails (leading from neighboring residential developments, parking lots, and official trails), unauthorized car pullouts, and OHV activities lead to soil erosion and compaction and damage to biological soil crusts, which can alter localized native plant community health and patterns, and disturb archeological sites and historic structures. Mortality to desert tortoises also occurs at unauthorized pullouts. - Vegetation trampling and invasive plant introduction along these social trails and pullouts also occurs, along with increases in human disturbance to wildlife behavior and fragmentation of wildlife habitat. Erosion from social trails also results in the loss of habitat.	Archeology; historic structures; geologic resources; soils and soil biota; vegetation; creek riparian areas; springs/seeps; wildlife; wilderness character; scenic views

1. The ordering of the key issues, stressors, and threats listed in this table is arbitrary and does not indicate level of concern or severity.

Table 1. Key Issues, Stressors, and Threats; Potential Implications; and Affected Resources (continued)

ISSUES, STRESSORS, OR THREATS	POTENTIAL IMPLICATIONS	RESOURCE TYPES AFFECTED
VISITOR USE— Vandalism, looting, refuse, and poaching	- Vandalism, such as graffiti and looting, causes damage to and deterioration of historic structures and archeological resources. - Poaching of plants and animals is a known threat. - Refuse/trash being left behind along park borders is also an issue. - Future increases in visitation volumes, concentration of visitors in a small percent of the park/attraction sites and shifts in visitation periods due to climate change (daily or seasonally) would likely exacerbate several of the above effects. - Illegal camping/fires (large and small groups) cause degradation of native vegetation and cultural resources (this use often occurs in culturally sensitive areas.	Historic structures; archeological sites; cultural landscapes; rock art; vegetation; wildlife; fossils / paleo resources; wilderness character
VISITOR USE— Rock recreation, wilderness camping, frontcountry camping, etc.	- Increased noise disturbance from increased (high density use) volume of people in backcountry locations - Increased impacts to geology, rock features from increased volume of rock-oriented recreational use. - Authorized rock recreation can cause direct impacts to cultural resources, such as archeology, rock art, etc., as well as result in vegetation trampling, noise disturbances to soundscape, etc. - Allowance of open backcountry camping (without designated/hardened campsites) could result in impacts to resources that weren't previously affected due to the increase in volume of people in concentrated areas. Also, unauthorized activities associated with these authorized uses (illegal campfires, wood gathering, etc. also affects vegetation, wildlife, cultural resources, etc.). - Increasing need for preventative management actions (installing signs, more formal trails done in response to these uses) also have their own small impacts to natural resources that have a cumulative effect. - Unauthorized activities in formal campgrounds can degrade cultural and natural resources (e.g., noise after hours, collecting vegetation for fires, cultural resource disturbances, etc.)	Wildlife (especially raptor nesting); cultural resources; rock art; vegetation; soundscape; wilderness character

Table 1. Key Issues, Stressors, and Threats; Potential Implications; and Affected Resources (continued)

ISSUES, STRESSORS, OR THREATS	POTENTIAL IMPLICATIONS	RESOURCE TYPES AFFECTED
CLIMATE CHANGE— Scenario 1: Hot and dry	- Reduced surface and groundwater for plants and animals. - Increased mortality and reduced recruitment of Joshua trees and other sensitive perennial plant species. - Increased mortality of piñon pine. - Increased mortality of desert tortoise and contraction of range. - Increased mortality of birds and shifts of ranges. - Decrease in abundance of native annual plants. - Lower frequency of "superblooms" - Increased risk of drying of oases. - Increased probability of wildfire if herbaceous vegetation is present, which may occur with increased frequency of extreme storms. - Possible northward shift of Sonoran ecosystem. - Naturalization of species native to the Sonoran Desert but not native to the Mojave. - Increased mortality of tree frogs and lizards. - Upslope contraction of desert bighorn sheep range. - Possible increase in non-vegetated areas. - Topsoil (biological soil crust) loss from increased wind erosion from decrease in vegetation and drought. - Severe heat exposure of staff and visitors. - Exposure and erosion of cultural artifacts. - Alteration of character of cultural landscapes.	Geologic resources and processes; vegetation; wildlife; fan palm oases (five within the park); small reservoirs (four within the park); springs/seeps (109 within the park); air quality; scenic views; cultural landscapes; archeological sites; historic structures; museum collections; prehistoric trails
CLIMATE CHANGE— Scenario 2: Hot and moist	- Increased extent and density of invasive plant species and associated loss of native annual species. - Degradation of "superblooms" by invasive plant species. - Increased fire frequency and extent if ignitions occur. - Increased fire-induced mortality of Joshua trees. - Possible increase of precipitation-driven grass-fire cycle leading to fire induced tree and shrub mortality and increase in dominance of invasive grasses and more frequent fire. - Mixed species-specific effects on wildlife. - Exposure and erosion of cultural artifacts, particularly in extreme storms, flash floods, and wildfire. - Alteration of character of cultural landscapes. - Increases in pest and pathogens.	Geologic resources and processes; vegetation; wildlife; fan palm oases (five within the park); small reservoirs (four within the park); springs/seeps (109 within the park); air quality; scenic views; cultural landscapes; archeological sites; historic structures; museum collections; prehistoric trails

Table 1. Key Issues, Stressors, and Threats; Potential Implications; and Affected Resources (continued)

ISSUES, STRESSORS, OR THREATS	POTENTIAL IMPLICATIONS	RESOURCE TYPES AFFECTED
URBAN ENCROACHMENT, REGIONAL DEVELOPMENT AND LAND CONVERSION—External disrupted landscape, ecological connectivity	- Regional urban development, military land use, and energy development around the park perimeter (and beyond) continue to result in habitat fragmentation and loss of regional habitat connectivity. Could potentially isolate the park's plant and animal populations, reducing their numbers, increasing their susceptibility to environmental change, and exposing them to potential genetic deterioration. Could also increase the spread of invasive plants and animals. - Park links three distinct ecoregions but also serves as a vital link for the mosaic of protected lands spread across the California Desert, including Bureau of Land Management (BLM) land, US Fish and Wildlife Service (USFWS) lands, Department of Defense lands, and other National Park Service lands.	Wilderness character; wildlife corridors and genetic connectivity; vegetation; hydrology and water quality; soils; cultural landscapes/ traditional cultural landscapes
URBAN ENCROACHMENT, REGIONAL DEVELOPMENT AND LAND CONVERSION—Boundary encroachment	- Encroachment of park boundaries, especially along the Southern Boundary, for unpermitted uses, such as wildlife poaching, off-highway vehicle (OHV) use, and trespassing in general, affect park resources. The park boundary and internal areas of the park are affected by OHV encroachment, having an adverse impact on the park's fundamental resources and values. - Illegal dumping occurs along park perimeter, resulting in multiple environmental quality stressors. - Recreational prospecting - Graffiti—defacement taking place along the boundary - Illegal target practice occurring outside and inside of the park boundaries - Increase of social/entrance trails into the park from adjacent increased residential development along the park boundary - Spread of invasive or nonnative plants across boundary	Wilderness character; wildlife corridors and genetic connectivity; vegetation; wildlife and vegetation poaching; hydrology and water quality; cultural landscapes; archeological sites; prehistoric trails; soils and soil biota; geology
URBAN ENCROACHMENT, REGIONAL DEVELOPMENT AND LAND CONVERSION—Views impacts	- Views beyond the park boundaries continue to be threatened and affected by urban development and landscape conversion, communication facilities, solar farm and energy development (e.g., the 50-mile long Riverside East Solar and Wind Development Focus Area on BLM land). - External land uses and industrial operations contribute to regional haze and other air quality issues that diminish scenic views and impact human health and natural communities (see air pollution item below).	Wilderness character; scenic views; air quality; cultural landscapes
URBAN ENCROACHMENT, REGIONAL DEVELOPMENT AND LAND CONVERSION—Artificial light	- Light pollution from nearby metropolitan areas and military facilities degrades visitor experience of dusk scenery and night sky viewing including astronomy, degrades wilderness character, and can adversely affect nocturnal wildlife species that rely on natural patterns of light and dark for navigation to cue behaviors or to hide from predators.	Dark night skies; wilderness character; nocturnal wildlife; scenic views; cultural landscapes

Table 1. Key Issues, Stressors, and Threats; Potential Implications; and Affected Resources (continued)

ISSUES, STRESSORS, OR THREATS	POTENTIAL IMPLICATIONS	RESOURCE TYPES AFFECTED
URBAN ENCROACHMENT, REGIONAL DEVELOPMENT AND LAND CONVERSION—Anthropogenic noise	- Airplane overflight noise affects the natural soundscape in the park (commercial and military, primarily). - Military training operations at nearby bases often involve noise that disturb park resources. - Potential for increased construction noise from development outside, but nearby, the park's boundary (for example, solar energy development) - Noise from shooting/target practice occurring along the park boundary	Natural soundscape; wilderness character; cultural landscapes; wildlife habitat use
URBAN ENCROACHMENT, REGIONAL DEVELOPMENT AND LAND CONVERSION—Surface and groundwater withdrawals	- Oases and springs are affected by groundwater drawdown to meet external water demands from local/regional communities. - Proposed large-scale groundwater development projects in the region pose threat to the park's groundwater aquifers. (e.g., pumped storage projects and utility-scale solar developments.)	Oases, springs and associated vegetation and habitat; wildlife dependent on surface water sources; ethnographic resources at springs
AIR POLLUTION—Regional haze	- Without the effects of pollution, visual range is between 120 to 205 miles. However, scenic views are diminished by pollution-caused haze, reducing visibility to between 55 and 155 miles depending on pollution levels. At night, particulates also scatter artificial light, increasing the impact of light pollution to the night skies.	Air quality; wilderness character; scenic views; dark night skies; cultural landscapes
AIR POLLUTION—Ozone	- Ground-level ozone reaches levels that can affect breathing for sensitive user groups and cause injury to ozone-sensitive plants, including willow, dogbane, and skunkbush sumac. The park is within US Environmental Protection Agency (USEPA) nonattainment areas where ozone exceedances of the National Ambient Air Quality Standard (NAAQS) often occur.	Air quality; wilderness character; biodiversity; native vegetation; ozone sensitive plant species; wildlife; human health; recreation
AIR POLLUTION—Particulate matter	- Coarse particulate matter (PM10) such as dust can irritate eyes, nose, and throat. The park is within EPA nonattainment areas for PM10 where current levels are moderate but may increase depending on surrounding land use changes including drying of the Salton Sea.	Air quality; wilderness character; scenic views; dark night skies; wildlife; human health; recreation; rock art; cultural landscapes; surface water resources; aquatic ecosystems
AIR POLLUTION—Pollutant deposition	- Natural communities are being affected by nutrient enrichment from excess nitrogen deposition, which is above critical loads for lichen and herbaceous vegetation in the highly sensitive arid ecosystem. Elevated soil nitrogen is increasing exotic annual grasses at the expense of native vegetation. Increased cover of grasses can increase fire risk and frequency, which can affect many shrub species that are not fire adapted. - Airborne toxics, including mercury, can deposit and accumulate in organisms including insect, fish, bird, bat, amphibian, and reptile species, leading to reduced foraging efficiency, survival, and reproductive success.	Air quality; wilderness character; scenic views; biodiversity; native vegetation; wildlife; human health; cultural landscapes; rock art; surface water resources; aquatic ecosystems

Table 1. Key Issues, Stressors, and Threats; Potential Implications; and Affected Resources (continued)

ISSUES, STRESSORS, OR THREATS	POTENTIAL IMPLICATIONS	RESOURCE TYPES AFFECTED
SALTON SEA EVAPORATION	- Evaporation of the Salton Sea and prevailing winds in the area have brought unpleasant odors into the park (incl. dead fish odor). - The overwhelming odors overwhelm the natural smells in the desert, particularly after rain (creosote, etc.). - The drying of Salton Sea may have air quality effects (blown particulate matter, etc.)	Air quality
PESTS, PATHOGENS, AND DISEASE	- Disease has severely affected neighboring herds of bighorn sheep from *Mycoplasma ovipneumoniae* and other pathogens. Research is needed to understand the role of connectivity between herds and disease movement. - Upper respiratory tract disease threatens desert tortoise populations. - Rabbit Hemorrhagic Disease RHDV2 has lead to black-tailed jackrabbit and desert cottontail rabbit mortality with possible population level effects. - White-nose syndrome emerging in the area and has the potential to put bat populations in the park at further risk of decline. - Increasing numbers of honeybees are displacing other native bees and insect pollinators and have become a nuisance to visitors at a number of locations throughout the park. - There are pests, pathogens and disease affecting plants in the park and these stressors may increase with a changing climate. Examples include juniper pathogens, native Ips beetles that affect pinyon, confounding effects of drought, and polyphagous shot hole borer and gold spotted oak borer regionally known to spread via commercially purchased firewood.	Wildlife (bighorn sheep, desert tortoise, bats); vegetation (juniper); native bees / insect pollinators (displaced)
INVASIVE, NONNATIVE PLANTS AND ANIMALS	- Nonnative invasive plants degrade or displace native plant communities, alter ecological food webs of plant forage for wildlife, and collectively threaten biodiversity. - The increased abundance of nonnative invasive annual grasses (compounded further by climate change and nitrogen deposition), are increasing fuel loads and introducing fire risk into park plant communities. Mustard species, including Sahara mustard, tumble mustard, and London rocket, also contribute to increased fuel loads. - Increase in nonnative invasive plants have been associated with a decrease in water availability. - The threat of invasive plants will likely increase from the synergistic effect of several other resource stressors (i.e., with increased boundary encroachment, regional development, climate change, social trailing vectors, etc.) - Invasive animals have the potential to affect native animals as a result of displacement, resource competition, and disease spread.	Cultural landscapes; native vegetation; native wildlife; scenic views; rare, threatened, and endangered species habitat - at risk species; archeological sites; wilderness character

Table 1. Key Issues, Stressors, and Threats; Potential Implications; and Affected Resources (continued)

ISSUES, STRESSORS, OR THREATS	POTENTIAL IMPLICATIONS	RESOURCE TYPES AFFECTED
WILDFIRE SUPPRESSION / MANAGEMENT	- All fires in the park are suppressed regardless of size (NRCA). Impacts to vegetation, wildlife (e.g., tortoise), and archeological sites can occur from suppression efforts (vehicle access, retardant).	Scenic views; wilderness character; vegetation; wildlife (e.g., desert tortoise affected from off-road suppression activities); water resources; soils and soil biota; archeological sites
PARK ROADS, TRAILS, AND OTHER PARK INFRASTRUCTURE	- These built structures on the park landscape (and their use by humans) contribute to fragmentation of native wildlife habitat and plant communities and alter natural processes that contribute to ecosystem health. - Wildlife movement corridors (daily or seasonal) are often altered and wildlife road mortality occurs. - Natural sheetflow patterns of surface hydrology are also substantially disrupted and converted to channelized or point flows, which increases the potential for soil erosion. - Import of quarry materials for road/trails projects can introduce invasive plants. - Roadkill of native wildlife on park roads. - Artificial wildlife water source devices ("guzzlers") are located in wilderness areas. - 4WD roads are often associated with OHV impacts. - Roads and trails are vectors for invasive plant infestations. - Increased visitation and visitor concentration in particular areas over time is triggering an increasing need for preventative management actions (installing signs, more formal trails, other infrastructure) also have impacts to natural resources that have a cumulative effect.	Wildlife; vegetation; surface hydrology; groundwater (from park water use); cultural landscapes; wilderness character; scenic views; dark night skies; Natural soundscapes; archeological sites; historic guzzler infrastructure
ABANDONED MINE SHAFTS AND RELATED ENVIRONMENTAL IMPACTS	- Threat of white-nose syndrome spreading to bat species in the park. As of 2013, more than 720 mine openings have been identified within the park, a number of which provide suitable habitat for bats and other wildlife. Many of these have been modified/ closed with the installation of bat gates. Threat of humans spreading disease in mines that are still accessible. - Wilderness character and scenic views can be affected by management of abandoned mines (e.g., closures with bat gates).	Wildlife (particularly bats); wilderness character; scenic views

In addition to the issues, stressors, and threats noted in the above table, the park faces additional operational and organizational challenges that ultimately affect the stewardship of several park resources and thus could affect stewardship goals and identified stewardship activities. These issues are described below:

- The park has limited staffing and funding, often making it challenging to fulfill resource management goals. Project funding is driven by funding source guidelines and funding calls, which results in a lack of knowledge in certain areas since prioritization of resource inventories and research is inconsistent across the park. For example, archeological surveys are ongoing to increase the knowledge base in the park, but there are limited funds for park staff to perform resource surveys. As a result, external researchers have completed surveys and have sometimes affected sites without providing research results to the park. There has often been a lack of accountability and deliverables with their research. Similarly, the park lacks the ability to adequately inventory and monitor all priority plant and animal populations in the park. This hinders its ability to identify appropriate stewardship needs for the ecological systems.
- Insufficient staffing levels have led to challenges maintaining recorded cultural resource sites, recording new sites, conducting area surveys, accessioning and processing artifacts, and completing compliance documentation.
- The park has a storage facility for artifacts that provides a stable and climate-controlled environment for artifacts; however, it is nearing capacity.
- Despite impacts to priority resources, the magnitude of widespread nonnative invasive plant infestations that cover hundreds of thousands of acres limits the staff's ability to control them.
- Resource damage in the park from off-highway vehicle use, graffiti, social trails, and burned areas is too extensive and frequent for the limited park staff to be able to fully prevent or restore.
- The park continues to experience increased visitation and popularity; this not only affects nonrenewable resources but also local communities, cost of living, employee retention, and sustainable park management.

ANTHROPOGENIC CLIMATE CHANGE IN JOSHUA TREE NATIONAL PARK

Greenhouse gas emissions from cars, power plants, deforestation, and other human sources have caused anthropogenic climate change globally (IPCC 2013, 2014) and in Joshua Tree National Park (Gonzalez et al. 2018). Annual average temperature of the area within park boundaries increased at a statistically significant rate of 1.5 ± 0.1 ºC (2.7 ± 0.2 ºF.) per century from 1895 to 2017 (Gonzalez et al. 2018) (figure 2). Temperature increases were highest in the eastern parts of the park, including the Pinto Basin and the Coxcomb Mountains. From 1895 to 2017, total annual precipitation decreased at a statistically significant rate of -32 ± 12% per century. The most severe rainfall declines occurred in central and western parts of the park, including Wilson Canyon, Fortynine Palms Oasis, Indian Cove, and along Park Boulevard.

These hotter and drier conditions have caused at least two ecological changes in the park that published analyses have attributed more to anthropogenic climate change than other factors. At sites across the Mojave Desert, including Joshua Tree National Park, bird species richness declined 43%, an average net loss of 18 bird species, between 1908 and 2016, due more to the decline in precipitation than fire or grazing (Iknayan and Beissinger 2018). The lack of water caused birds to overheat (Riddell et al. 2019). In addition, at Audubon Christmas Bird Count circles across the United States, including in Joshua Tree National Park, climate change shifted the average winter range of 254 bird species northward 30 ± 17 km (19 ± 11 mi.) from 1975 to 2004 (La Sorte and Thompson 2007). One of the species shifting north, away from the park, is the canyon wren (*Catherpes mexicanus*).

Continued climate change could increase annual average temperature of the area within park boundaries 4.6 ± 0.9 ºC (8.3 ± 1.6 ºF.), under the highest emissions scenario of the Intergovernmental Panel on Climate Change (IPCC) (RCP8.5), from 2000 to 2100 (Gonzalez et al. 2018). Substantial cuts to emissions from human activities, under the IPCC reduced emissions scenario (RCP2.6), could limit projected heating to 1.5 ± 0.6 ºC (2.7 ± 1.1 ºF.) Climate models do not agree on future projections of precipitation, although higher temperatures would tend to increase aridity in the region (Byrne and O'Gorman 2015).

The increased heat and aridity of climate change under the highest emissions scenario could nearly eliminate suitable habitat for Joshua trees (*Yucca brevifolia*) from Joshua Tree National Park (Sweet et al. 2019) and reduce habitat across the southwestern United States 90% by 2100 (Cole et al. 2011). With less extreme emissions, Joshua trees could persist in some refugia of limited spatial extent (Barrows and Murphy-Mariscal 2012, Sweet et al. 2019) (figure 3).

Continued climate change could increase mortality of single leaf pinyon (*Pinus monophylla*) and other trees (Barrows et al. 2014). With increased atmospheric carbon dioxide, heat, and extreme storms under climate change, red brome (*Bromus rubens*) and other invasive nonnative grasses could increase (Huxman et al. 1999, Curtis and Bradley 2015). This could provide more fuel for wildfires (Brooks and Matchett 2006, Abatzoglou and Kolden 2011). On the other hand, increased aridity would tend to reduce herbaceous growth. Increased aridity under climate change could substantially reduce habitat for the desert tortoise (*Gopherus agassizii*) (Barrows 2011, Barrows et al. 2014) and desert bighorn sheep (*Ovis canadensis nelsoni*) (Epps et al. 2006, 2007). In addition, climate projections for the park suggest exposure of cultural resources to potential damage. Increased wildfire could damage wooden artifacts or components of historic structures. Increased aridity could increase risks of palm oases drying up or burning in wildfire. Those and other changes could alter traditional cultural properties, ethnographic resources, and cultural landscapes.

Vegetation in the park helps prevent climate change by storing 140 000 ± 200 000 tons of carbon (Gonzalez et al. 2015). Motor vehicles of staff and visitors generate nearly 90% of the 1,800 tons per year of park emissions (NPS 2010). In response, the *Joshua Tree National Park Climate Action Plan* (NPS 2010) identified public transit, energy conservation, renewable energy, and other park actions to help reduce the cause of climate change and protect the park for the future.

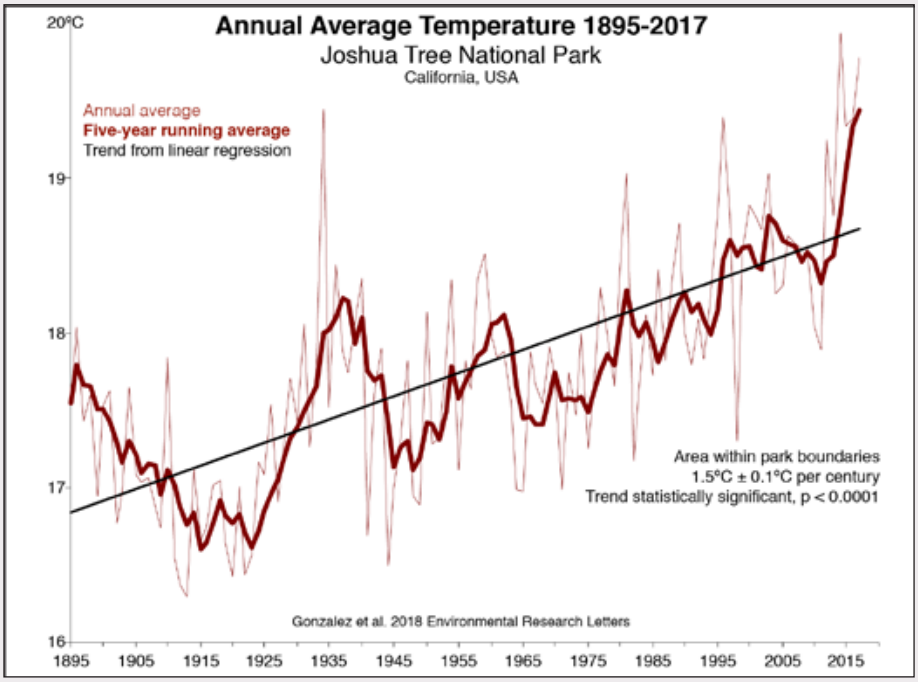


Figure 2. Annual average temperature for the area within park boundaries, 1895–2017 (Gonzalez et al. 2018).

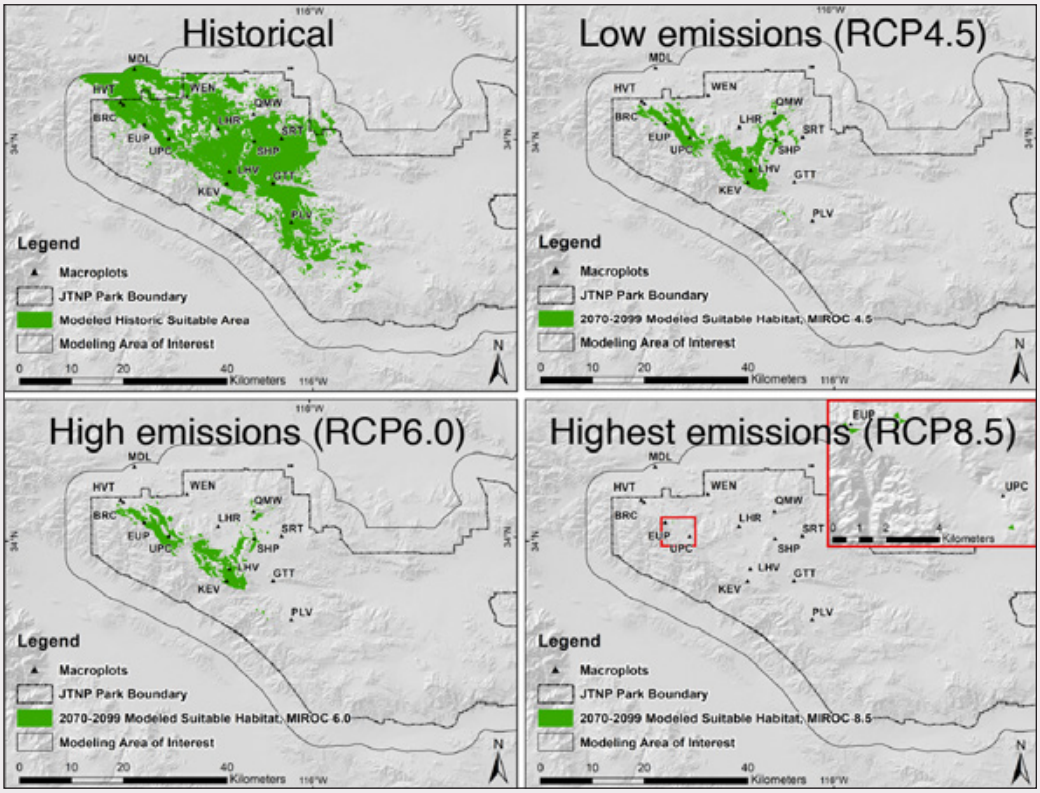


Figure 3. Modeled suitable habitat (green) of Joshua trees for historical (1951–1980) and projected (2070–2099) climate (Sweet et al. 2019).

PRIORITY RESOURCES AND COMPONENTS

Priority resources drive the entire RSS process by focusing attention on those park resources that are critical and could most benefit from management direction within the next 3 to 5 years. Typically, the priority resources for a resource stewardship strategy may include those that are defined in a foundation document as fundamental or other important resources, as well as additional resources that park staff believes are necessary to maintain the park's purpose and significance, address policy or legal mandates, or address scholarly and scientific research needs. Certain priority resources are standalone, while others may be subdivided into one or more components. The identification of priority resources and components guides the development of stewardship goals and activities in subsequent steps of RSS development. Parsing out the components of each priority resource helps resource managers tailor these goals and activities to more directly target the resource condition or understanding of its constituent parts. Collectively, this component-level stewardship works to improve the condition or understanding of the broader, "umbrella" priority resource.

Table 2 includes a list of priority resources and their components for the JOTR resource stewardship strategy. Each priority resource is described in greater detail in a summary narrative that follows the table.

Table 2. Priority Resources and Their Components

PRIORITY RESOURCE	COMPONENT(S)
ARCHEOLOGICAL RESOURCES	- N/A
ETHNOGRAPHY	- Ethnography of traditionally associated American Indian communities - Historic ethnography
HISTORY	- Mining - Homesteading - Military - Climbing
HISTORIC STRUCTURES	- Active administrative / in use historic facilities (Mission 66, Jellystone, and Homesteading) - Visitor destinations National Register listed structures - All other historic structures

PRIORITY RESOURCE	COMPONENT(S)
CULTURAL LANDSCAPES	- Recreation and administrative landscapes - Keys Ranch Historic District (Front-country/high visitor use) - Historic mining districts (Hexie Mountain, N. Pinyon, S. Pinyon, Lost Horse Wilderness, backcountry) - To be identified cultural landscapes - Traditional cultural landscape/ ethnographic landscapes
MUSEUM COLLECTIONS AND ARCHIVES	- N/A
NATIVE FLORA	- Mojave Desert and high-elevation plant communities (sans Joshua trees) - Colorado Desert and transition zone plant communities - Joshua trees - Parkwide native plants
NATIVE FAUNA	- Desert tortoise - Bighorn sheep - Mammals - Birds - Herpetofauna - Invertebrates
OASES, SPRINGS, AND OTHER RIPARIAN AREAS	- N/A
WILDERNESS CHARACTER	- N/A
GEOLOGICAL RESOURCES	- N/A
PALEONTOLOGICAL RESOURCES	- N/A
WATER RESOURCES	- Groundwater - Water impoundments
NIGHT SKY	- N/A
AIR QUALITY	- N/A
SOUNDSCAPE	- N/A
SCENIC VIEWS	- N/A
LANDSCAPE-SCALE AND CROSS BOUNDARY RESOURCES AND COLLABORATION	- N/A

PRIORITY RESOURCE SUMMARIES

ARCHEOLOGICAL RESOURCES

The park contains a diverse range of archeological resources that include prehistoric, ethnographic, and historic era sites and cover three main archeologically significant time periods: Lake Mojave-Pinto, Saratoga Springs, and Protohistoric. The prehistoric era includes numerous archeological sites associated with the Pinto Culture. Dating between 7,000 and 10,000 years old, this is one of the earliest prehistoric cultures found in the California desert. The presence of springs and other water sources in what is now the park boundaries attracted prehistoric populations and led to the establishment of travel routes in the area. Prehistoric resources include seasonal camps, rock-shelters, milling sites, lithic and ceramic scatters, lithic quarries, and rock art sites. The park preserves and protects sites and artifacts that are associated with four overlapping ethnographic cultures; the Cahuilla, Serrano, Chemehuevi, and Mojave Indians.

Historic archeology sites consist of those that represent activities in the southwestern desert including processing gold ore, cattle ranching, rustling, and homesteading. Historic site types include roads, trails, artifact scatters, dams, homesteads, temporary camps, mines, and mills. The park has seven historic sites that are actively interpreted and represent important ranching, mining, milling, and homesteading sites of late 1800s through early 1900s California: Lost Horse Mine and Mill, Ryan Ranch, Keys Ranch, Wall Street Mill, Desert Queen Mine, Mastodon Mine, and Barker Dam.

Archeological resources are primarily threatened by increased visitor use. Sites are often vandalized and/or looted, recreational activities, social trails, and illegal camping and camp fires disturb archeological features and degrade the archeological integrity of sites. Climate change also continues to threaten archeological sites by causing increased erosion, which exposes/displaces artifacts and features.

ETHNOGRAPHY

Ethnography is the study of the origins, history, and development of human culture, especially its social forms and institutions. Ethnographic resources are those that have a significant association with cultural practices or beliefs and are important to maintaining a sense of identity. There are several sites and resources at Joshua Tree National Park that remain traditionally significant to American Indian tribes associated with the park. These associations are links to living traditions and cultures. For example, some of the park's oases were cultivated; leaves of palm trees were used for baskets and canes were used to make arrows. Conducting oral histories and collaborative projects with the park's associated tribal groups documents cultural and historical memory, fills gaps in the historical record, and incorporates the perspectives of diverse people into park management and interpretation. Ethnography also applies to more modern uses of the park. For instance, interviews have been conducted with local homesteaders and their descendants as well as with tribal elders to document significant American Indian cultural perspectives.

Ethnographic resources include landscapes, geographic features, and flora and fauna. All of these resources continue to be threatened by effects from climate change, urban encroachment, increased visitor use, and invasive species.

HISTORY

A rich history preserved through time demonstrates the integral connection between deserts, changing land use, and human cultures. Historic uses of what would later become park lands included cattle ranching, homesteading, prospecting, mining and processing of gold ore, and construction of roads and trails. Historic inhabitants dug wells, constructed windmills and dams, and built cabins and outbuildings. Many mine shafts, adits, camps, roads, trails, cairns, and mills remain on the landscape. When the land became a National Monument in 1936, the National Park Service began to develop park infrastructure. Mission 66 construction (1945–1972) was the largest single organized effort to develop park units, adding a great deal of infrastructure to the park including campgrounds, various roads and trails, entrance signs, and two visitor centers. While two of General Patton's World War II training camps are just outside of the park, there are many visible remains of training in the park, such as tank tracks, exploded ordinance, target ranges, and ammunition cans. Remains of the Colorado River Aqueduct construction include a large concrete water catchment pond, small camps and dumps, and large earth debris piles. The park's contributions to history continue to unfold in themes related to environmental history, the desert conservation movement, recreation, and anthropogenic climate change.

HISTORIC STRUCTURES

The National Park Service manages 140 structures at Joshua Tree National Park that are listed on the national List of Classified Structures (LCS). These historical features have been evaluated and determined to contain historical and architectural significance. Most park structures on the LCS have also been either listed or determined eligible for listing on the National Register of Historic Places (NRHP). The following examples represent structures common to Joshua Tree National Park: habitation, storage sheds, walls, fences, wells, dams, roads, trails, cairns, tanks, stamp mills, and arrastras. Many mining and ranching structures associated with Joshua Tree National Park remain on the landscape. Historic structures have been categorized into three types for the purpose of the RSS: active administrative historic facilities that are currently in use (Mission 66 structures, Jellystone, and homesteading structures), visitor destinations that are listed on the National Register of Historic Places, and all other historic structures that do not fall into the other two categories.

The most significant ongoing threats to historic structures are from climate change and increased visitor use. Climate change impacts such as increased occurrence of wildfires and flooding may destroy or severely damage historic structures. Increased visitor use is resulting in vandalism, such as looting and graffiti to buildings and their associated features.

CULTURAL LANDSCAPES

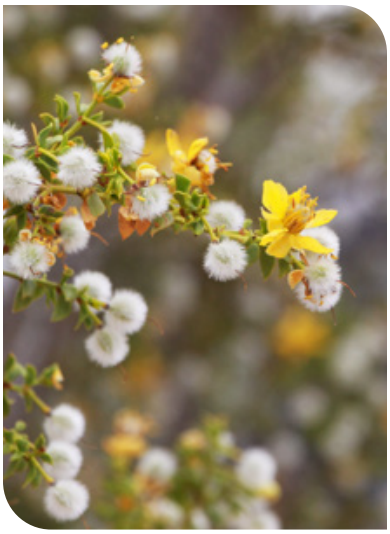
A cultural landscape is: "a geographic area, including both natural and cultural resources and the wildlife and/or domestic animals therein, associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values." (NPS 1998a) Cultural landscapes also examine circulation networks, including roads and trails that connect different areas together. Joshua Tree National Park contains the following cultural landscapes: Keys Ranch Historic District, a front-country area that receives high visitor use; the Hexie Mountains Mining Historic District; the Southern and Northern Piñon Mining Districts; the Lost Horse Mining Historic District; backcountry mining districts; and Traditional Cultural/ Ethnographic landscapes. Other cultural landscapes include recreation and administrative, ethnographic, and traditional cultural landscapes. Still other cultural landscapes are yet to be identified.

Cultural landscapes are threatened by proposed and current uses near the park boundary, including urban development, military land use, and energy development. Such uses have the potential to diminish the integrity of cultural landscapes by altering and/or fragmenting historic features and views from artificial light, noise, and development. Other threats to cultural landscapes include air pollution-caused haze that obscures views; invasive plants and animals that change landscape characteristics; vandalism; and a need for more signage, formal trails, and infrastructure to support increased visitor use. Climate change continues to affect cultural landscapes by altering plants and animals that define cultural landscapes and increasing erosion that damages historic features.

MUSEUM COLLECTIONS AND ARCHIVES

The museum and archival collection at Joshua Tree National Park provides on-site examples or documentation of park resources. The museum collection houses scientific specimens and associated records (reports, images, correspondence, and other information) as well as artifacts and records related to historic, archeological, and traditional sites. The collection is mostly accessed by employees and researchers and serves as documentation for resource inventories, environmental monitoring and impact studies, interpretation, and research. The collections illustrate the story of the park, its environment, and the people who have inhabited its lands.

Impacts from climate change threaten museum collections. The current storage facility lacks the appropriate climate control features necessary to ensure proper museum object, and archive conservation and fluctuating temperatures and humidity levels will exacerbate that problem.



NATIVE FLORA

Joshua Tree National Park is renowned for the diversity of its native flora with nearly 800 plant species present in the park. Vegetation communities in the park are broadly divided into the Colorado Desert, the Mojave Desert, and a large transition zone in between. The Colorado Desert, a western extension of the vast Sonoran Desert, occupies the southern and eastern parts of the park. It is characterized by stands of spike-like ocotillo plants, ironwood and palo verde trees, and dense gardens of teddy bear cholla cactus. The southern boundary of the Mojave Desert passes through the park. It is the habitat of the park's namesake: the Joshua tree (*Yucca brevifolia*). Extensive stands of this peculiar looking plant are found in the western half of the park (NPS 2017). Joshua trees are found only in North America in the states of California, Arizona, Utah, and Nevada. They have shallow root systems with top-heavy branches that make them susceptible to wind throw and root damage (NPS 2012). The park's third primary ecosystem is located in the westernmost part of the park above 4,000 feet. The Little San Bernardino Mountains provide habitat for a community of California juniper, Muller's oak, and pinyon pine.

The 2013 *A Summary of the Joshua Tree National Park Vegetation Mapping Project* identified 51 vegetation alliances in the park and 78 associations. An 'alliance' is a vegetation classification that describes repeating patterns of plants across a landscape and an 'association' is the basic vegetation unit, with a distinctive species. The largest amount of land cover was classified under the *Larrea tridentata – Ambrosia dumosa* Shrubland Alliance, which is classified into seven associations. Dominant species include creosote bush (*Larrea tridentata*) and white bursage (*Ambrosia dumosa*), jojoba (*Simmondsia chinensis*), spiny senna (*Senna armata*), and Mojave yucca (*Yucca schidigera*)(NPS 2013).

The park harbors populations of two federally listed plant species and 44 additional plant taxa that are considered rare in California. Both the endangered triple-ribbed milkvetch (*Astragalus tricarinatus*) and the threatened Parish's daisy (*Erigeron parishii*) are known to occur in the Little San Bernardino Mountains. Rare plant species of concern regularly monitored by park staff include Little San Bernardino Mountains Linanthus (*Linanthus maculatus*), Alkali mariposa lily (*Calochortus striatus*), Robison's monardella (*Monardella robisonii*), Jack-ass clover (*Wislizenia refracta ssp. refracta*), spiny menodora (*Menodora spinescens var. mohavensis*), matted cholla (*Grusonia parishii*), and the hybrid Munz's oak (*Quercus x munzii*).

The native vegetation communities at JOTR are threatened by a variety of stressors. Urban encroachment around the park adds to habitat fragmentation and increased threat of invasive plants. Elevated soil nitrogen is also increasing non-native annual grasses at the expense of native vegetation. Nonnative plants not only alter plant community composition and diversity but also decrease water availability and can increase fuel loads and elevate fire risk beyond what is natural. Increased cover of grasses can increase fire size, frequency, and intensity. Many native plant species are not adapted to fire and recovery is slow to nonexistent. Park staff estimate that invasive plants are found throughout most of the park. There are also invasive insect pests outside of the park such as the polyphagous shot hole borer and gold spotted oak borer that could enter into the park from transport of firewood into the park. The threat of invasive plants will likely increase from the synergistic effect of several other resource stressors (i.e., with increased boundary encroachment, regional development, climate change, social trailing vectors, etc.). Climate change compounds, or multiplies, the effects of most stressors on native vegetation. Increased mortality of Joshua trees and other sensitive vegetation in the park is anticipated with a changing climate, in addition to increased mortality of pinon pine. Degradation of the park's occasional "superblooms" during abnormally wet years is also anticipated as a result of increased dominance of invasive plant and climate change.

Continued visitor use in the park has resulted in some disturbances to native vegetation through social trailing that results in vegetation trampling, unauthorized wood collection for use in campfires, and even poaching of sensitive vegetation.

NATIVE FAUNA

The diverse vegetation communities within Joshua Tree National Park support a variety of wildlife species. NPS-managed lands provide havens for wildlife because they are more protected and generally less developed than other surrounding lands. The park is in a transition zone between two major biotic communities—the Mojave Desert and Colorado Desert regions.

Approximately 350 vertebrate species inhabit Joshua Tree National Park. The park is home to approximately 270 bird species that either nest or migrate through the park. Commonly observed species include turkey vultures, common ravens, Gambel's quail, black throated sparrow, greater roadrunner, California scrub-jay, and various wrens. A great horned owl is known to nest in a Joshua tree in a campground. The park is also home to 52 species of mammals. The most common species consist of small mammals such as woodrat, white-tailed antelope squirrel, kangaroo rat, chipmunks, and pocket mice. Other common mammal species include black-tailed jackrabbit and predators such as coyote, fox, and desert bobcat. There are two species of amphibians in the park and 45 species of reptiles. Common species parkwide include red spotted toad, side-blotched lizard, desert iguana, desert banded gecko, leopard lizard, shovel-nosed snake, leaf-nosed snake, speckled rattlesnake, and sidewinder. The Agassiz's desert tortoise, a federally threatened species, also inhabits the park. Several invertebrates such as the venomous black widow and brown recluse spiders occur in the region. Other invertebrates such as scorpions, tarantulas, centipedes, ants, beetles, bees, and wasps occur throughout the park and the region (NPS 2012).

The park is also home for numerous sensitive species including the endangered Agassiz's desert tortoise (*Gopherus agassizii*) and the Yellow-billed Cuckoo (*Coccyzus americanus*), a candidate for listing as threatened. Additional species of concern tagged as management priorities in JOTR include big brown bat (*Eptesicus fuscus*), Californian myotis, fringed myotis, long-legged myotis (*Myotis volans*), pallid bat, spotted bat (*Euderma maculatum*), western pipistrelle, coyote (*Canis latrans*), American white pelican (*Pelecanus erythrorhynchos*), golden eagle (*Aquila chrysaetos*), Le Conte's thrasher (*Toxostoma lecontei*), willow flycatcher, elf owl (*Micrathene whitneyi*), and mountain quail (*Oreortyx pictus*). Forty-three additional species of concern were listed as occurring in the park (NPS 2016b).

Wildlife communities at JOTR are threatened by a variety of stressors. Wildlife habitat in the park has been disturbed by past vegetation clearing and high visitor use. Noise and disturbance from visitor use and camping, poaching, and the creation of social trails can also disturb wildlife behavior. Urban encroachment around the park adds to habitat fragmentation and increases the threat of invasive vegetation species, which affects wildlife habitat. Encroachment and development also affect wildlife corridors (daily or seasonal) and increases wildlife road mortality. Air pollution in the area leads to pollutant deposition in insects, birds, bats, amphibians, and reptiles.

Climate change continues to affect the fauna of the park in several direct and indirect ways. Shifts and contractions of habitat range affect desert tortoise, numerous bird species, and amphibians. Increasing numbers of honeybees are displacing other native bees and insect pollinators. Invasive animals have the potential to affect native animals as a result of displacement, resource competition, and spread disease. Disease has severely affected neighboring herds of bighorn sheep. White-nose syndrome has been emerging in regional bat populations and has the potential to put bat populations in the park at further risk of decline. In addition, desert tortoise populations are threatened by upper respiratory tract disease.

OASES AND OTHER RIPARIAN AREAS

The park contains five fan palm (*Washingtonia filifera*) oases. The oases sit atop geological faults that crisscross the park. The oases occur in areas where groundwater hits a fault plane and rises to the surface providing conditions that can support an oasis. The desert fan palm, *Washingtonia filifera*, is native to the low, hot deserts of southern California where it can live up to 150 years (Vogl and McHargue 1966). Towering up to 75 feet, the desert fan palm is among the tallest of North American palms. The fan palm's dead leaves remain attached to its trunk until removed by fire, wind, or flood. Fire does kill young palms, but it also removes competitors and opens up space for palm seeds to germinate (NPS 2015).

The oases are well-known destinations for bighorn sheep, coyotes, mountain lions, and many other species of wildlife, as they are the only year-round dependable water source in the park. The cool shade of an oasis provides habitat for animals that live nowhere else. The dime-sized holes seen in the trunks of palms are exit holes of the two-inch, blue-black, giant palm-boring beetle, *Dinapate wrightii*, that lives exclusively in palm oases. The larvae of the palm-boring beetle spend about five years chewing tunnels within the trunks of desert fan palms. Eventually these beetles can kill a palm, but they only inhabit older trees. Giant palm-boring beetles keep the palm population young and vibrant, and the presence of these beetles is actually a sign of a healthy oasis (Cornett 2008)).

In addition, the oases have great cultural resource significance because of their long history of human use. People have been attracted to palm oases since prehistoric times. American Indians ate palm fruit and used the fronds to build waterproof dwellings.

Some of the park's oases are well-protected and unspoiled; others such as Cottonwood Spring and 49 Palms receive high visitor use and associated impacts. Oasis of Mara is affected by both natural and unnatural factors. Unnatural effects include a lowered groundwater table from adjacent water uses/drawdown and supplemental watering to sustain the oasis (by the National Park Service and adjacent landowners) (NPS 2016a). Natural effects could include hydrogeologic changes associated with the shifting fault line that could block and/or reduce spring flows. In addition, there is an increased risk for drying of the oases and springs as a result of projected climate change.

Joshua Tree National Park has no perennial streams, ponds, or lakes. However, the park has four small reservoirs and 109 springs and seeps that provide unique riparian habitat within the park (NPS 2016b).

WILDERNESS CHARACTER

Approximately 595,000 acres of designated wilderness (75% of the park) make Joshua Tree National Park one of the largest wilderness areas in southern California. Another 70,577 acres of park lands have been identified as potential wilderness areas and 402 acres are proposed; in sum, 84% of the park is managed as wilderness (NPS 2014b). Given the large amount of wilderness area in the park, ample opportunities exist for visitors to enjoy the solitude and untrammeled landscape that are characteristic of a high-quality wilderness experience (NPS 2015).

However, along park boundaries and in areas radiating from popular wilderness access points, some wilderness values are diminished from visitor use within and without the park (e.g., certain recreational uses, social trail development, encounters with other visitors). Wilderness character values such as solitude are also affected by external threats. For example, large development projects affect views from wilderness, while airplane overflight noise affects natural quiet. In some areas, illegal dumping occurs along the wilderness perimeters.

GEOLOGICAL RESOURCES

Joshua Tree National Park lies along one of the world's most active earthquake faults, the San Andreas Fault. Geologic processes, including tectonic activity, have played and continue to play a major role in shaping the mountains, valleys, and basins of the park (NPS 2015). The unique rock pile features in the park began underground eons ago as a result of volcanic activity. Magma (monzogranite) rose from deep within the Earth. As it rose, it intruded the overlying rock, the Pinto gneiss formation. As the granite cooled and crystalized underground, cracks formed horizontally and vertically. The granite continued to uplift, where it came in contact with groundwater. Chemical weathering caused by groundwater worked on the angular granite blocks, widening cracks and rounding edges. Eventually the surface soil eroded, leaving heaps of monzogranite scattered across the land. The present landscape is essentially a collection of relict features inherited from earlier times of higher rainfall and lower temperatures.

Geological resources are dynamic and continuously evolving with time. The rate of change may be imperceivable on human time scales, but change is inevitable. Episodic events are anticipated (e.g., large-scale earthquakes) and will probably alter the landscape considerably (NPS 2015).

PALEONTOLOGICAL RESOURCES

Pleistocene vertebrate fossils are known to occur in the park. The Pleistocene Epoch, 11,500 years ago to 2.6 million years ago, represents a time largely before humans were in North America. Scientists have uncovered a variety of animal fossils in the park, including horse, camel, llama, deer, wolf, badger, tortoise, and a Columbian mammoth. Joshua Tree National Park was created partially to protect these fossils.

Paleontological resources in the park are threatened by impacts from off-road vehicles ,visitors, and climate change. Increased severity of monsoonal events and resulting erosion threaten irreparable damage to non-renewable paleontological resources. Data limitations make resource protection challenging. The park has an extremely limited amount of survey data; much of what is understood has come from park research partners and the national park service senior paleontologist.

WATER RESOURCES

Located within the Colorado River basin, Joshua Tree National Park is a desert region of southern California with limited surface water resources and has no perennial streams, ponds, or lakes. Freshwater sources occur at springs (109 occur in the park), wells, oases, and seeps. These water flows originate in shallow or perched aquifers, as well as deep aquifers where water makes it way to the surface via fractures and joints in the underlying bedrock. In addition, there are several artificial impoundments in the park, including Barker Dam, Cow Camp, and Keys Lake. The artificial impoundments are historic structures associated with early ranching activities. The presence of water in a desert landscape allows life to flourish and attracts high levels of natural and human use (NPS 2015, NPS 2016b).

Water resources are primarily threatened by alterations to precipitation from climate change and the extraction of aquifer water for municipal and industrial use in the surrounding communities. The lack of accurate baseline data and understanding of local and regional surface water and groundwater limits the park's ability to manage for surface and groundwater. Climate change and variability could have significant impacts on the protection of water resources.

NIGHT SKY

Joshua Tree National Park was recently certified as an International Dark Sky Park at the Silver Tier level by the International Dark-Sky Association. This certification requires the park to demonstrate community support for the dark sky protection and continued adherence to the park's lighting plan.

The park's setting is between dense metropolitan areas along its western boundary and some of the only remaining natural darkness in Southern California along its eastern boundary. The western half of the park is affected by light from Los Angeles to Palm Springs and other nearby cities, but the eastern wilderness area of the park boasts some of the darkest night skies in the region. At night, air pollution particulates scatter artificial light, increasing the impact of light pollution to the night sky.

The park strives to be a refuge for those who want to experience a naturally dark night sky and has taken an increasingly active role in preserving what darkness remains.

AIR QUALITY

Joshua Tree National Park is a Clean Air Act Class I area. This designation provides special protection for air quality, sensitive ecosystems, and clean, clear views, with the goal to eliminate all human-caused visibility impairment in Class I areas by 2064. Clean air enhances the color and contrast of the park's landscape features; allows visitors to see great distances; enhances views of the wide-open expanses and night skies; and contributes directly to ecosystem, visitor, and staff health. Overall park air quality is in fair condition and improved from 2008-2017, the most recent 10-year period analyzed by the NPS Air Resources Division. The overall condition and trend is a combination of air quality indicators for visibility, particulate matter, ozone human health, ozone vegetation health, and pollutant deposition including nitrogen, sulfur, and mercury (NPS 2017).

Without the effects of pollution, visual range is between 120 and 205 miles. However, scenic views are diminished by pollution-caused haze, reducing visibility to between 55 and 155 miles depending on pollution levels. For 2008-2017, visibility remained relatively unchanged. At night, particulates also scatter artificial light, increasing the impact of light pollution to the night skies. Ground-level ozone often reaches levels that can cause injury to ozone-sensitive plants and is a respiratory irritant that can affect breathing for sensitive user groups. Joshua Tree National Park is within EPA nonattainment areas where ozone exceedances of the National Ambient Air Quality Standards (NAAQS) often occur, but ozone conditions improved for 2008-2017. On October 1, 2015, the EPA strengthened the NAAQS for ozone by setting the new level at 70 parts per billion (ppb), daily maximum 8-hour average. Park ozone monitors at Black Rock, Cottonwood Canyon, and Pinto Wells recorded regular ozone exceedances during 2016(38), 2017(52), 2018(65), and 2019(39). More frequent exceedances occur at Black Rock due to the closer proximity to pollution source areas to the west. The park is also within nonattainment areas for course particulate matter (PM10), where condition deteriorated between 2008–2017, and particulate levels are expected to increase as the result of anticipated Salton Sea water loss and industrial energy construction projects.

Natural communities are at risk for the harmful effects of nutrient enrichment from excess nitrogen deposition, which is above critical loads for some arid vegetation types that are particularly vulnerable. Increases in nitrogen have been found to promote invasions of nonnative invasive annual grasses at the expense of native vegetation. Increased cover of grasses can increase fire risk, which can have profound implications for trees and shrub species that are not fire adapted. Airborne toxics, including mercury, can deposit and accumulate in organisms including insect, bird, bat, amphibian, and reptile species, leading to reduced foraging efficiency, survival, and reproductive success.

Anthropogenic air pollution that is generated within the Mojave Desert, of which Joshua Tree National Park is a part, tends to be local, concentrated around population centers, or trapped in isolated basins. The primary urban and industrial air pollution sources that affect the park are the two nearby major population centers, the Las Vegas area and the southwestern boundary of the Mojave, where groups of small cities and unincorporated communities are clustered. These clusters include Antelope Valley, Victor Valley, and the cluster of communities northeast of San Gorgonio Pass and just west of Joshua Tree. Air pollution also flows over mountain passes into the park from the Los Angeles metropolitan area and from urban and agricultural areas in the San Joaquin Valley. (NPS 2016b).

According to the EPA 2014 National Emissions Inventory, regional emission sources that contribute to air pollution in the park include vehicle exhaust, agriculture, road and construction dust, solvent use, oil and gas development, and smoke from fires. California air pollution emissions have declined since 2000, with overall emissions from stationary, mobile, and area-wide sources projected to decline by 40 percent between 2000 and 2020. These emission reductions reflect the maturity of California's emission control program and should improve air quality conditions in the park.

SOUNDSCAPE

Natural quiet is a fundamental resource and value of Joshua Tree National Park and something visitors intentionally come to experience. The natural soundscape of the park also complements several other park resources and values, from wildlife habitat to wilderness character (e.g., desert solitude).

Major sources of anthropogenic sound in the park include transportation networks; construction, maintenance, and operation of solar and wind energy (Lovich and Ennen 2011); motorized recreation; and military operations. Air traffic accounts for a considerable proportion of anthropogenic sounds in the park (Lynch et al. 2011). Transportation networks in the greater Las Vegas area and southern California can elevate ambient sound levels late at night in parts of Joshua Tree National Park (Lynch et al 2011). Edwards and Nellis Air Force Bases, March Air Reserve Base, Camp Pendleton, the China Lake Naval Air Weapons Station, and the Marine Corps Yuma Air Station frequently fly missions over the Mojave Desert, and the new Marine Corps Air Ground Combat Center in Twentynine Palms, California. External threats to the natural soundscape include additional military activities, commercial aircraft, and construction activities for proposed energy developments near the eastern boundary of the park. Internal threats come from generators in campgrounds, loud motorcycles, and visitor activities.

SCENIC VIEWS

Scenic views in the park were identified as a fundamental resource and value for the park during their foundation planning (NPS 2015). Views within the park offer a contrast to the urban areas outside of the park boundaries. In addition, panoramic views of the Coachella Valley, the San Andreas Fault, and the high peaks of San Jacinto and San Gorgonio, all located outside of the park boundaries, are visible from the peaks within the park.

While scenic views within the park boundaries are generally exceptional, some views experienced from within the park, including wilderness, have been affected by external development including communication facilities, solar farm and energy development, and urban development. For example, the Riverside East Solar Energy Zone on BLM-administered lands includes nearly 150,000 acres of land along the southeast boundary of the park. Approximately 80% of this land is proposed for solar renewable energy projects. In addition, the Federal Aviation Administration use and access to airspace within the park is protected via the California Desert Protection Act. A new antenna is being constructed for aircraft communication purposes that will also affect scenic views from within the park. Additionally, scenic views are diminished by air pollution-caused haze, reducing visual range from the park considerably.

LANDSCAPE-SCALE AND CROSS BOUNDARY RESOURCES AND COLLABORATION

In the JOTR resource stewardship strategy, this priority resource is intended to include stewardship goals and activities that address multiple resources concurrently and/or require cross-boundary collaboration because of larger, landscape-scale nature of the resources and their stressors. In addition to the more acute, in-park, or resource-specific management needs that are inherent to resource management, JOTR staff also strive for a stewardship approach that is more holistic, regional or cross-boundary, and proactive. The wide-ranging and complex effects of climate change on the park's natural and cultural resources is one prime example of an issue that demands such an approach. However, addressing several other threats to park resources would also be best served by this regional, landscape-scale approach (e.g., invasive plant infestations and migrations; local and regional water use; cross-boundary wildlife movement and migration; regional degradation of scenic views, soundscape, air quality, and dark night skies; and various other issues). For example, the major long-term threats to many park resources posed by large infrastructure projects, such as solar farms proposed along the eastern boundary of the park, can only be addressed through collaborative efforts with regional partners. Addressing all of these issues would employ elements of interagency information sharing, stewardship collaboration with partners, public education/awareness of issues, and using Joshua Tree National Park as a living laboratory to improve the collective understanding of the resources and the threats.

STEWARDSHIP GOALS

Stewardship goals are essential to the RSS process because they articulate what managers are working to achieve for a park's natural and cultural resources and provide both the framework to structure activities later in the RSS process and the time frame needed to reach them. Long-term goals are defined as those that park staff wish to accomplish in a 10- to 20-year time frame. Short-term goals are those that are attainable in a 3- to 5-year time frame.

Stewardship goals focus on

1. improving quality and/or completeness of current resource information and documentation of one or multiple priority resources;
2. improving or maintaining the conditions of one or multiple priority resources;
3. reducing issues, stressors, or threats that are adversely affecting priority resources; or
4. addressing other management needs for resource stewardship, such as increasing collaboration with partners or expanding education and interpretation related to the park's priority resources.

An important consideration in establishing goals is to determine the appropriate level of knowledge and information and the desired condition for each priority resource and component. Long-term stewardship goals typically bear a strong relationship to broad, qualitative direction for resource management that are set forth in legal mandates, NPS mandates, or established park management documents. Short-term goals tier off long-term goals and set more specific targets for resource management. Short-term goals help drive the development of stewardship activities.

The RSS project team identified a wide array of stewardship goals, based upon the current and desired status of information and resource conditions, as well as key issues, stressors, and threats, and other management considerations. Long-term and short-term goals are also included in the RSS desktop application, in addition to this summary document (tables 3a-3r).

Table 3a. Long-Term and Short-Term Stewardship Goals for Priority Resource—Archeological Resources

COMPONENT	LONG-TERM GOAL	SHORT-TERM GOAL
ARCHEOLOGICAL RESOURCES	Increased knowledge of the human past at Joshua Tree National Park through adequate research, field work, and documentation.	- Archeological sites have current and complete baseline documentation to assist with management planning. - The Archeological Overview and Assessment (AOA) is complete and updated to include research and preservation strategies for all archeological site types. - Prioritize research needs in the AOA and other park management documents. - Encourage universities to conduct research (through field schools?) into park cultural resources, with a specific focus on landscape-scale contexts and Pleistocene/early Holocene (Archaic) time periods.
ARCHEOLOGICAL RESOURCES	Prehistoric and historic archeological sites are professionally inventoried, recorded, and evaluated for the National Register of Historic Places (NRHP).	- A reliable and accurate inventory of archeological sites is created. Identified high-priority archeological sites have complete, accurate, and reliable data recorded in Cultural Resources Inventory System (CRIS) and GIS and are entered into Facility Management Software System (FMSS) as appropriate. - Reliable temporal data is collected and analyzed at archeological sites. - Determinations of Eligibility (DOE) are complete and accurate for historic properties.
ARCHEOLOGICAL RESOURCES	Prehistoric and historic archeological sites are preserved, protected, and monitored for future research (and possibly limited interpretation of these sites).	- Implement a strategy to complete archeological resource condition assessments. - Continue (establish) archeological site monitoring and implement treatment strategies. - Establish a sustainable, consistent message from the park to the public to enhance stewardship goals. - Recommendations for site treatments and activities are recorded in cultural resource plans. - Determine impacts to archeological sites affected by recreational activities. - An archaeological management plan (AMP) is completed to address managing sites in various use areas.

Table 3b. Long-Term and Short-Term Stewardship Goals for Priority Resource—Ethnography

COMPONENT	LONG-TERM GOAL	SHORT-TERM GOAL
ETHNOGRAPHY	Improve the understanding and relationship with traditionally associated peoples in the region and respect their traditional practices.	- Establish active relationships with associated tribes to both renew their ties with still vital ancestral homelands and to expand knowledge of ethnographically important components that the park could prioritize for both natural and cultural resource management. - Ethnographic resources are identified and documented in consultation with associated tribes and other traditionally associated people. - Complete, accurate and reliable information is retained in appropriate databases (CRIS-ER) with appropriate protection of confidential information and is used in all park management activities. - Expand/establish a tribal youth program to encourage participation from a broader array of associated tribes and support the program in the future. - Encourage and facilitate the use of the park by associated communities. - Ensure that tribes have access to traditional plants under the traditional plant gathering rule.
ETHNOGRAPHY	Improve inventory of ethnographic resources in the park.	- Complete ethnographic resource and/or traditional use studies for prioritized list. - Identify ethnographic collections and other connections with traditionally associated people.

Table 3c. Long-Term and Short-Term Stewardship Goals for Priority Resource—History

COMPONENT	LONG-TERM GOAL	SHORT-TERM GOAL
HISTORY	Improve the comprehensive knowledge of the history of the region and the park.	- Complete historic resource studies (HRS) of significant historical themes (mining, climbing, homesteading, military) through inventory, research, compiling existing information, identifying sensitive resources, and assessing future research needs. - Identify other potential historic themes and contexts. - Establish a sustainable, consistent message from the park to the public to enhance stewardship goals. - Update and complete NRHP nominations for sites and structures.
HISTORY	Inventory and evaluation information is shared with park managers and staff and incorporated into appropriate park planning documents to help properly manage cultural resources.	- Improve the communication of historic themes (what they are) to park staff and understanding of potential implications to management activities/options/directions.
HISTORY	NPS relations with historians, historical organizations, academic, other governmental agencies, and descendants of homesteaders are maintained.	- Continue outreach to partners, stakeholders, descendants, agencies, educational institutions, etc. to gain a better understanding of park history and ties to the community.
HISTORY	Complete and update NRHP Documentation and nominations.	- Develop a priority list by cross referencing the history of parkwide development. - Properties with concurred upon DOEs are submitted to the Keeper for listing on the NRHP.

Table 3d. Long-Term and Short-Term Stewardship Goals for Priority Resource—Historic Structures

COMPONENT	LONG-TERM GOAL	SHORT-TERM GOAL
HISTORIC STRUCTURES	Protect historic structures and their character defining elements that may contribute to the listing or eligibility for listing on the NRHP and provide for public enjoyment.	- Maintain the LCS so that records are updated and recertified. - Complete DOE priority order for structures more than 50 years old. - Appropriate chronology, assessment, and treatment guidance is developed in an Historic Structure Report (HSR) and treatment recommendations are entered into FMSS as work orders. - All historic structure locations and associated assets are accurately and consistently entered into FMSS and quality control is regularly conducted. - Treatment plans are developed and implemented to preserve historic structures where full HSRs are not applicable. - Improve the condition of historic structures and increase the percentage of structures with upgraded condition.
HISTORIC STRUCTURES	Information regarding the proper management and protection of historic structures are shared with park managers and staff and incorporated into appropriate park planning documents.	- Develop a cultural resources handbook that outlines the professional standards for properly managing historic structures to inform park staff. - Establish a sustainable, consistent message from the park to the public to enhance stewardship goals. - Update the existing "Keys Ranch Management Plan" to include routine and cyclic maintenance issues and long-term management.
HISTORIC STRUCTURES	Develop a historic structures stewardship operation.	- Work with facilities, utilities, and trails program to explore the possibility of sharing positions that could support preservation activities. - Explore the possibility of creating a career seasonal program lead position.
HISTORIC STRUCTURES	Information regarding historic structures is regularly conveyed to the public.	- Partner with qualified organizations that can help complete historic preservation activities. - Use volunteers to help meet management and preservation goals. - Internal files are updated regularly, and information is organized in a standardized structure and files are made readily available.

Table 3e. Long-Term and Short-Term Stewardship Goals for Priority Resource—Cultural Landscapes

COMPONENT	LONG-TERM GOAL	SHORT-TERM GOAL
CULTURAL LANDSCAPES	Improve the understanding of historic integrity, significance, landscape characteristics, and features associated with ranching, homesteading, mining, and traditional cultural landscapes.	- Complete CLRs following the prioritized list. - Complete CLIs following the prioritized list. - Maintain and update CLI database in CRIS. - Work with tribal communities to identify potential traditional cultural landscapes. - Complete and update NRHP documentation.
CULTURAL LANDSCAPES	Integrity of character and interrelationships between the structures and their historic setting maintained as landscapes change under climate change.	- Maintain cultural landscapes in good condition and improve the historic character according to CLR treatment recommendations, while also being consistent with vegetation community stewardship goals. - Utilize Climate Change Impact Assessment tool to manage and document cultural landscapes, characteristics, and interrelationships that are under threat from climate change.

Table 3f. Long-Term and Short-Term Stewardship Goals for Priority Resource—Museum Collections and Archives

COMPONENT	LONG-TERM GOAL	SHORT-TERM GOAL
MUSEUM COLLECTIONS AND ARCHIVES	Museum collection is maintained and readily accessible and researchable while maintaining NPS standards for preservation and use.	- Improve the data quality of accession and catalog records. - Increase the percentage of processed and digitized archives. - In collaboration with other California desert parks, develop a museum management approach for the subregion. - Protocols are developed and reviewed for research collections and relevancy to the park. - The percentage of catalogued objects is increased and assemblages that require updating in Interior Collections Management System (ICMS) are identified.
MUSEUM COLLECTIONS AND ARCHIVES	Museum collection storage and exhibit facilities are maintained to full NPS standards.	- Conservation assessments are in place for the archeological and cultural collections, with condition surveys for paper and photographs and archeological objects and natural history collections.
MUSEUM COLLECTIONS AND ARCHIVES	Park collection is searchable via finding aids and significant collection materials are digitized for access.	- Archival records, including electronic records, are updated. A strategy for cataloging legacy archives is developed.

Table 3g. Long-Term and Short-Term Stewardship Goals for Priority Resource—Native Flora

COMPONENT	LONG-TERM GOAL	SHORT-TERM GOAL
MOJAVE DESERT AND HIGH-ELEVATION PLANT COMMUNITIES	Improve knowledge of changes to the distribution of Mojave and high-elevation plant communities and resilience to environmental change.	- Improve scientific understanding of the effects of climate change, vegetation pathogens, and other stressors on Mojave Desert and high-elevation native plant communities in park. - Refine and update mapping of blackbrush dominated plant communities. - Improved understanding of natural fire regimes in high-elevation Mojave plant communities. - Better knowledge of changes to climate, especially freezing temperatures, in pinyon pine habitat.
MOJAVE DESERT AND HIGH-ELEVATION PLANT COMMUNITIES	Conserve biodiversity of native Mojave and high-elevation flora within potential ranges under climate change, and minimize invasive annual grass-driven fires.	- Improved understanding of spatial distribution, abundance, and interannual changes of invasive annual grass infestations in fire-prone areas of the Mojave. - Remove invasive annual grasses in the Mojave to reduce unnatural fire occurrence. - Protect blackbrush dominated plant communities from wildfire and invasive plants.
COLORADO DESERT AND TRANSITION ZONE PLANT COMMUNITIES	Increased knowledge of community structure, distribution and trends of Colorado Desert flora.	- Improve understanding of changes to the distribution and condition of target Colorado Desert Plant species (e.g., Ocotillo, Ironwood) and native plant communities.
COLORADO DESERT AND TRANSITION ZONE PLANT COMMUNITIES	Conserve biodiversity of native Colorado Desert and transition zone flora within potential ranges under climate change, and minimize impacts to biodiversity from invasive plant infestations.	- Improved understanding of spatial distribution and abundance of fountaingrass. - Limit the spread and control infestations of fountaingrass.
JOSHUA TREES	Sustain Joshua tree populations within their potential range under climate change.	- Control wildfires within Joshua tree climate change refugia. - Remove invasive exotic plant species within Joshua tree climate change refugia. - Direct visitor activity to areas outside of climate change refugia to minimize trampling of young trees. - Restoration of degraded refugia for Joshua trees, especially burned areas.
JOSHUA TREES	Improved understanding of the trends in Joshua tree distribution, resilience to environmental change, and the effects of other stressors on Joshua trees.	- Improved understanding long-term demographic changes to Joshua tree populations parkwide. - Improved knowledge of the spatial distribution of Joshua trees in the park and potential range contraction. - Improved understanding of Joshua tree resiliency to climate change through research. - Improved scientific understanding of the effects of climate change, invasive species, and other stressors on Joshua trees in the park.

Table 3g. Long-Term and Short-Term Stewardship Goals for Priority Resource—Native Flora (continued)

COMPONENT	LONG-TERM GOAL	SHORT-TERM GOAL
PARKWIDE NATIVE PLANTS	The abundance and diversity of spring and summer annual plant blooms follow natural cycles tied to precipitation events and are not impacted by invasive plants across the entire park.	- Improved understanding of distribution of species, composition, and abundance spring and summer flower blooms (i.e., monitoring goal). - Improve scientific understanding of the effects of climate change, invasive species, and other stressors on wildflower species in the park. - Minimization of impacts from stressors on native annual plants to help maintain abundance and diversity.
PARKWIDE NATIVE PLANTS	Most populations of rare, threatened and endangered plants are stable or increasing, with high quality habitat and minimized human impacts.	- Preservation of the two rare hybrid oak trees with no visitor-caused damage (carving, graffiti). - Improved understanding of targeted rare plant populations. - Vulnerable rare plant populations are protected from impacts of invasive plants, fire, and visitor caused damage (OHV incursions, social trailing, rock climbing).
PARKWIDE NATIVE PLANTS	Invasive plants become a lesser component of the ecosystem that does not substantially affect ecosystem function and biodiversity.	- Improved understanding of spatial distribution, abundance, and interannual changes of invasive annual grasses and mustard infestations in park. - Remove invasive annual grasses and mustard species to reduce adverse effects on ecosystem function. - Conduct Early Detection and Rapid Response for new invaders and satellite infestations, and implement measures to prevent spread of invasive plants.

Table 3h. Long-Term and Short-Term Stewardship Goals for Priority Resource—Native Fauna

COMPONENT	LONG-TERM GOAL	SHORT-TERM GOAL
DESERT TORTOISE	Improved knowledge of abundance and distribution of desert tortoise in the park.	- Maintain partnerships and promote research to improve desert tortoise understanding. - Continue to track desert tortoise sightings in the park using a variety of methods (e.g., observation cards, iNaturalist).
DESERT TORTOISE	Minimization of negative effects to tortoises from human activities.	- Improved understanding of human impacts on desert tortoises and their habitat. - Improve visitor and park staff awareness of desert tortoises to support tortoise conservation. - Implementation of mitigation measures to reduce tortoise threats that result from indirect human interactions.
DESERT TORTOISE	Sustain desert tortoise populations within their potential range under climate change.	- Identify potential climate refugia in the park for desert tortoise and reduce potential conflicts with conserving tortoise in these habitats. - Maintain research partnerships as it relates to climate change projections for desert tortoise.

Table 3h. Long-Term and Short-Term Stewardship Goals for Priority Resource—Native Fauna (continued)

COMPONENT	LONG-TERM GOAL	SHORT-TERM GOAL
BIGHORN SHEEP	Improved understanding of range and metapopulation structure of desert bighorn sheep.	- Identify habitat use patterns and population dynamics in the park. Identify and address potential conflicts from visitation and disease spread to and from nearby populations outside the park. - Maintain partnerships to accomplish conservation goals.
BIGHORN SHEEP	Sustain bighorn sheep populations within their current/potential range to the extent possible under climate change.	- Identify and model potential effects to the current range and distribution of bighorn sheep from climate change, especially as it relates to water availability.
BIGHORN SHEEP	Minimize disturbance to bighorn sheep from park visitors and adjacent communities at locations where interactions occur.	- Identify sensitive locations and times of the year for bighorn sheep to explore actions that reduce stress to the animal. - Research and identify threats to sheep from visitation and neighboring communities.
MAMMALS	Identify and preserve bat habitats and monitor bat diversity and abundance.	- Develop greater understanding of current bat species in the park and their status, current habitat locations, and protection needs. - Establish protocol for protecting bat species from visitor activity. - Monitor for white-nose syndrome and other threats to bats.
MAMMALS	Respond to threats and concerns for mammal species of concern or where new threats are identified and may affect park populations.	- Remain vigilant to species of mammals that are of concern for the park (e.g., mountain lion, American badgers, kit fox, ringtail, bobcat, etc.).
BIRDS	Improve understanding of trends in bird species richness and distribution in the park.	- Inventory, map, and monitor eagle and raptor nesting locations near external development activities that may affect nesting and foraging. - Encourage citizen science-based activities to report bird sightings.
BIRDS	Identify effects to native bird populations within their range under climate change.	- Describe bird occupancy shifts and changes in the park.
BIRDS	Minimize disturbances to raptor nesting from recreation activities.	- Protect raptor nesting through seasonal closures and visitor education. - Encourage raptor nesting reporting by visitors, especially user groups like climbers and bird watchers.
HERPETOFAUNA	Improved understanding of reptile and amphibian species richness in park.	- Develop greater understanding of trends in herpetofauna populations with focus on species of conservation concern. - Contribute to knowledge of herpetofauna through collaborative research and citizen science.
HERPETOFAUNA	Maintain, where possible, California treefrog populations in historically occupied habitats in the park.	- Determine habitat needs of California treefrogs at current and historic locations to inform future goals for conservation.
INVERTEBRATES	Respond to threats and concerns for invertebrate species of concern or where new threats are identified.	- Remain vigilant to species of invertebrates that may arise to a level of conservation concern for the Park (e.g., yucca moths, Casey's June beetle, monarch butterflies, etc.)

Table 3i. Long-Term and Short-Term Stewardship Goals for Priority Resource—Oases, Springs, and Other Riparian Areas

COMPONENT	LONG-TERM GOAL	SHORT-TERM GOAL
OASES, SPRINGS, AND OTHER RIPARIAN AREAS	Ecological integrity and cultural authenticity of oases and riparian areas are maintained or improved to support all native species and natural processes under climate change.	- Improve and enhance visitor education, interpretation, and visitor management to protect natural and cultural resources at oases and riparian areas (incl. maintaining water quality at attraction sites, interpreting the Oasis of Mara, etc.). - Understand and address the effect of groundwater withdrawals in the Twentynine Palms area on the Oasis of Mara. - Manage and maintain the Oasis of Mara to be consistent with cultural landscapes, ethnographic values, and native natural communities under climate change. - Limit the impact of invasive species on native species dependent on oasis/riparian conditions.
OASES, SPRINGS, AND OTHER RIPARIAN AREAS	Improved understanding of the natural resources and traditional human interactions associated with the oases, springs, and riparian areas within the park.	- Improve understanding of locations and water quantity/quality trends in springs, oases, and seeps based on hydrological conditions, including interannual variability and reduction of water flows due to climate change. - Increase knowledge and monitoring of species that are dependent on desert aquatic and riparian habitat. - Improve understanding of human connections and traditional associations with spring, oasis, and riparian areas and transportation routes between these water sources.

Table 3j. Long-Term and Short-Term Stewardship Goals for Priority Resource—Geologic Resources

COMPONENT	LONG-TERM GOAL	SHORT-TERM GOAL
GEOLOGIC RESOURCES	Improved understanding of tectonic processes and the processes that create desert landforms within the park to integrate knowledge into operations, planning, and interpretation for park visitors.	- Encourage geologic research by universities and other geologic science institutions. - Expand geologic science expertise, knowledge, and/or representation in park staffing.
GEOLOGIC RESOURCES	Preserve biological soil crust (BSC) and increase knowledge of the role it plays with soil stabilization and other ecological services.	- Increase knowledge of biological soil crust within the park, its condition, and ecological role. - Improve preservation of biological crust through increased education, outreach, and restoration.

Table 3k. Long-Term and Short-Term Stewardship Goals for Priority Resource—Paleontological Resources

COMPONENT	LONG-TERM GOAL	SHORT-TERM GOAL
PALEONTOLOGICAL RESOURCES	Improved understanding of paleontological deposits in the context of climate change.	- Encourage paleontological research by universities and other geologic science institutions. - Gather information on presence and condition of paleontological resources from existing NPS sources, partners, and tribes.
PALEONTOLOGICAL RESOURCES	Protect, preserve and manage paleontological resource for education, scientific value, and interpretive goals.	- Protect paleontological discoveries, particularly in relation to exposure to climate change-enhanced fire, flood erosion, etc. - Minimize visitor use impacts to in situ paleontological sites via education and interpretation.

Table 3l. Long-Term and Short-Term Stewardship Goals for Priority Resource—Water Resources (sans oases / springs)

COMPONENT	LONG-TERM GOAL	SHORT-TERM GOAL
GROUNDWATER	Increased knowledge of local and regional groundwater hydrology and potential reduction of recharge under climate change.	- Encourage/procure groundwater aquifer research.
GROUNDWATER	Minimize human use of groundwater resources in the park and improve/ increase visitor understanding of water use in the park (and its effects).	- Only high-efficiency water use appliances or facilities are used in all new and upgraded facilities within the park. - Improve education and outreach related to efficient human water use.
WATER IMPOUNDMENTS	Water impoundments are managed for wildlife use, wildlife viewing, cultural resources management, and safety to minimize negative impacts to other park values and resources.	- Conduct necessary research to understand the integrity of existing dams/impoundments for the future management of park infrastructure.

Table 3m. Long-Term and Short-Term Stewardship Goals for Priority Resource—Night Sky

COMPONENT	LONG-TERM GOAL	SHORT-TERM GOAL
NIGHT SKY	Continue to assess night sky quality in the park, especially in wilderness areas, and work within boundaries and with neighboring communities to raise awareness and improve conditions of the nocturnal environment.	- Identify and monitor the condition of the park's night sky resource. - Identify sensitive species that are likely to be affected by impaired night sky quality. - Improve health and safety of visitors and wildlife by improving the nocturnal environment through reducing artificial light impacts from NPS facilities and park operations, and from visitor-based activities. - Partner with neighboring communities, landowners, and other entities to reduce artificial light impacts in the region. - Improve public understanding of the value of the nocturnal environment on park resources and experiences.

Table 3n. Long-Term and Short-Term Stewardship Goals for Priority Resource—Air Quality

COMPONENT	LONG-TERM GOAL	SHORT-TERM GOAL
AIR QUALITY	Improve understanding of air quality condition, trends, and pollution impacts; and maintain the long-term air quality data record, through continued monitoring of visibility, particulate matter, ozone, and pollutant deposition.	- Improve understanding of air quality through continued monitoring, compiling existing information, identifying sensitive resources, assessing future research needs, and educating park staff about impacts to resources. - Provide information about air pollution impacts to NPS management, air regulatory agencies, the public, the scientific community and other stakeholders.
AIR QUALITY	Seek to perpetuate the best possible air quality condition for the protection of resources affected by air pollution, eliminating human caused visibility impairment by the year 2064 (where the average visibility is < 2 deciviews above natural conditions), and achieving attainment for the EPA NAAQS.	- Be an environmental leader by reducing park air pollutant emissions, improving park sustainability and environmental management, (demonstrating the park's commitment to do its part for air quality, water quality, night sky and climate change). - Collaborate with other federal, state, regional and local planning organizations, and stakeholders to reduce air quality impacts in the park from sources of air pollution.

Table 3o. Long-Term and Short-Term Stewardship Goals for Priority Resource—Soundscape

COMPONENT	LONG-TERM GOAL	SHORT-TERM GOAL
SOUNDSCAPE	Continue to assess soundscape quality in the park, especially wilderness areas, and reduce nonnatural and inappropriate noise in and around the park to protect and enhance the condition of the natural soundscape.	- Identify and monitor the condition of the acoustic resource. - Partner with neighboring communities, landowners, and other entities to reduce external noise impacts. - Improve public understanding of the effects of nonnatural sounds on park resources and experiences.

Table 3p. Long-Term and Short-Term Stewardship Goals for Priority Resource—Scenic Views

COMPONENT	LONG-TERM GOAL	SHORT-TERM GOAL
SCENIC VIEWS	Protect, improve, and monitor the condition of views important for natural scenery and cultural resources both within and across park boundaries to maintain or improve visual character.	- Inventory and assess park views over time to monitor changes in condition. - Minimize changes, visual contrast, and intrusions to views to the extent possible within the park. - Collaborate with adjacent landowners, municipalities, developers, and other stakeholders to promote cooperative conservation of views across park boundaries. - Provide enhanced opportunities for visitors to access and understand the importance of park views.

Table 3q. Long-Term and Short-Term Stewardship Goals for Priority Resource—Wilderness Character

COMPONENT	LONG-TERM GOAL	SHORT-TERM GOAL
WILDERNESS CHARACTER	Joshua Tree National Park Wilderness – including physical resources, intangible values, and wilderness character qualities – are protected, preserved, and access is maintained.	- Understand the baseline wilderness character condition and changes over time. - Maintain and restore wilderness character.

Table 3r. Long-Term and Short-Term Stewardship Goals for Priority Resource—Landscape-scale and Cross-boundary Resources and Collaboration

COMPONENT	LONG-TERM GOAL	SHORT-TERM GOAL
LANDSCAPE-SCALE AND CROSS-BOUNDARY RESOURCES AND COLLABORATION	Improved storage and accessibility to resource information.	- NA
LANDSCAPE-SCALE AND CROSS-BOUNDARY RESOURCES AND COLLABORATION	Park resources are managed with a more holistic, regional perspective that explicitly considers cross-boundary resource needs and proactively addresses cross-boundary resource threats.	- Improve scientific understanding of landscape-scale and cross-boundary resource issues to inform park management. - Appropriately manage visitor use to minimize impacts to natural and cultural resources. - Protect park resources via cross-boundary stewardship by partnering with neighboring communities, landowners, and other entities to protect natural resources within the park. - Expanded outreach with partners, regional communities, and the public to increase awareness of landscape-scale resource issues and leverage collaboration on cross-boundary resource management.
LANDSCAPE-SCALE AND CROSS-BOUNDARY RESOURCES AND COLLABORATION	Reduce adverse effects of cross-boundary and landscape-scale human-induced stressors on park resources.	- Minimize impacts of fire suppression activities on park resources. - Minimize off-highway vehicle (OHV) incursions originating from the parks southern and eastern boundaries. - Minimize impacts from external land development and land uses adjacent to the park (urbanization, commercial/industrial, energy development, water development, etc.).
LANDSCAPE-SCALE AND CROSS-BOUNDARY RESOURCES AND COLLABORATION	Complete reconnaissance of newly acquired lands.	- Understand and manage resources on newly acquired Dingell Act properties.
LANDSCAPE-SCALE AND CROSS-BOUNDARY RESOURCES AND COLLABORATION	Foster ecological integrity and cultural authenticity as climate change alters park resources.	- Integrate climate change science into resource management actions. - Maintain and extend leadership in the park serving as an example for addressing climate change. - Reducing greenhouse gas emissions that cause climate change.

HIGH-PRIORITY STEWARDSHIP ACTIVITIES

Stewardship activities represent the primary product of the RSS development process, providing the park with a roadmap for investing both human and financial resources in the stewardship of natural and cultural resources. They are logically organized, based on science and/or scholarship, well documented and reviewed by subject-matter experts. Activities are aimed at achieving short-term goals and may also strive to reduce stressors on priority resources and components.

The RSS project team identified a wide array of management activities to consider over the next 3- to 5-year horizon. Whenever possible, activities were designed with integrated resource stewardship in mind, both in terms of their potential to improve the condition or understanding of multiple resources, address multiple issues or stressors concurrently, and/or increase the efficiency and effectiveness of their deployment via the integrated efforts of interdisciplinary staff. One prime example of integrated resource stewardship at Joshua Tree National Park relates to the management of the park's many palm oases and associated springs, which are interspersed across the desert landscape. Given the harshness of the desert conditions, the wet, lush oases in the park have been convergence points of many living things over the millennia, including a diversity of plants, wildlife, and people. So, from a resource stewardship perspective, oases management can involve water resource management (springs, seeps), flora and fauna management, as well as archeological resource management and ethnography. Stewardship activities and goals that are directly intended to affect one resource type within an oasis can also directly affect the other resources, and vice versa. Therefore, in managing all resources associated with the park's oases, it is important and more efficient to consider how stewardship activities can be integrated to improve the condition and knowledge base of multiple resources concurrently. It is also important that the management activities related to these resources involve multiple disciplines of subject-matter expertise across the cultural and natural resource management spectrum.

Another notable illustration of integrated resource stewardship at Joshua Tree National Park involves the park's collaborative management of several cross-boundary or landscape-scale resource issues in the region, including the adaptation to the effects of climate change. Many of the park's identified priority resources transcend park boundaries (e.g., wildlife habitat, vegetation communities, night skies, soundscape, etc.). Thus, aside from internal park stressors, these resources are also collectively affected by external land use, climate change, and many other external stressors beyond park boundaries. However, the condition and understanding of these same resources can benefit greatly by an integrated and cooperative approach to stewardship by the National Park Service and the many partners, municipalities, and land and water management agencies in the region. Collaborating across the park's boundaries is a core ideal of the JOTR resource stewardship strategy. Other examples of integrated resource stewardship can be found throughout the RSS goals and activities.

In addition, many of the activities developed include components that involve partnerships or coordination with regional NPS staff, the Natural Resource Stewardship and Science directorate, and other offices of the National Park Service. The park made an effort to consider and document integrated resource management efforts within these activities and will seek to carry them out as described.

While the RSS desktop application includes all of the activities identified for each priority resource component, the following table presents only those activities that park staff determined to be high priority in the next 3 to 5 years, along with associated short-term goals. The team considered a variety of factors when determining priorities, including feasibility and impact of the management activity, urgency, potential funding opportunities, and sequencing in relation to other activities (see list below). Medium and low priority activities are still valuable approaches for achieving resource objectives, but they are generally less urgent or represent secondary approaches. Many of the medium and low priority activities may rise to the level of high priority in the coming years, as stewardship activities are implemented, stewardship goals are achieved, and resource conditions change over time.

During the activity prioritization step of the resource stewardship strategy process, a list of general criteria for what can contribute to a "high priority" rating was used to inform the prioritization process. The list of criteria is included below:

- Activity has a high likelihood of success and/or is very feasible.
- Integrated activity will benefit multiple priority resources or address parkwide issues (i.e., big opportunity for integrated stewardship).
- Activity will benefit a great extent of park lands.
- Activity will benefit park areas with a concentration of biodiversity.
- Activity is urgent or time-sensitive (i.e., needs to be addressed right away).
- Activity is necessary to prevent extirpations or other irreparable
- damage to resources.
- Results of activity are resilient to climate change.
- Activity reduces the need for additional management actions.
- Activity promotes self-sustainable systems.
- Activity offers partnership opportunities and/or strengthens existing partnerships.
- Activity will benefit species for which the park provides primary habitat.
- Activity will result in a contribution to essential information and fills data gaps toward stewardship of park resources.
- Activity aligns well with servicewide policies and priorities.
- Activity is a "low-hanging fruit" action (e.g., with leverage opportunities for getting the activity done via partnerships, grants, etc.).
- Activity addresses a fundamental park resource (per the foundation document)
- Activity is the necessary first step of a sequence of activities.

A table including all of the low, medium, and high-priority activities identified to reach each goal established for the park's priority resources can be found in appendix A.

In tables 4a-4r below, all high-priority activities the park identified as "integrated stewardship activities" are highlighted in yellow. Also, activities that have been noted as "Mission Critical" in the table identify high-priority activities that have an even higher level of urgency and importance given how they tie directly to maintaining the park's purpose and significance.

Table 4a. High-Priority Stewardship Activities for Priority Resource—Archeological Resources

COMPONENT	SHORT-TERM STEWARDSHIP GOAL	HIGH-PRIORITY STEWARDSHIP ACTIVITIES
ARCHEOLOGICAL RESOURCES	Archaeological sites have current and complete baseline documentation to assist with management planning.	- Ensure that all newly recorded archeological sites are being documented according to NPS standards with sufficiently detailed information to guide management strategies.
ARCHEOLOGICAL RESOURCES	Prioritize research needs in the AOA and other park management documents.	- Develop a list of research needs and other research topics of interest to the academic community for archeological sites.
ARCHEOLOGICAL RESOURCES	A reliable, and accurate inventory of archeological sites is created. Identified high-priority archeological sites have complete, accurate and reliable data recorded in CRIS and GIS and are entered into FMSS as appropriate.	- Ensure that records in CRIS are updated and reliable.
ARCHEOLOGICAL RESOURCES	DOE are complete and accurate for historic properties.	- Ensure NRHP evaluations are completed for all archeological sites by a SOI qualified archeologist.
ARCHEOLOGICAL RESOURCES	Implement a strategy to complete archeological resource condition assessments.	- Annually export from CRIS sites due for completing condition assessments.
ARCHEOLOGICAL RESOURCES	Continue (establish?) archeological site monitoring and implement treatment strategies.	- Support Visitor and Resource Protection (VRP) "Ranger Routes" for archeological site monitoring.
ARCHEOLOGICAL RESOURCES	Establish a sustainable, consistent message from the park to the public to enhance stewardship goals.	- (Mission Critical) Collaborate with tribal partners to develop appropriate messaging regarding archeological resources.
ARCHEOLOGICAL RESOURCES	An archeological plan (AMP) is completed to address managing sites in various use areas.	- Identify the contents of what is needed in the AMP and its fundamental purpose for the protection of archeological resources at JOTR.

Table 4b. High-Priority Stewardship Activities for Priority Resource—Ethnography

COMPONENT	SHORT-TERM STEWARDSHIP GOAL	HIGH-PRIORITY STEWARDSHIP ACTIVITIES
ETHNOGRAPHY	Establish active relationships with associated tribes to both renew their ties with still vital ancestral homelands and to expand knowledge of ethnographically important components that the park could prioritize for both natural and cultural resource management.	- Continue to build and improve relationships with tribal communities. - Work with tribes to develop a prioritized list of ethnographically important components of integrated resources for both Sec. 110 baseline documentation and Sec. 106 considerations.
ETHNOGRAPHY	Ethnographic resources are identified and documented in consultation with associated tribes and other traditionally associated people. Complete, accurate and reliable information is retained in appropriate databases (CRIS-ER) with appropriate protection of confidential information and is used in all park management activities.	- Complete an ethnobotany study.
ETHNOGRAPHY	Expand/establish a tribal youth program to encourage participation from a broader array of associated tribes and support the program in the future.	- Continue partnerships and agreements with Conservation Legacy and their Ancestral Lands Program. - Establish a local Southern California-based Ancestral Lands Program led and directed by tribal communities.

Table 4b. High-Priority Stewardship Activities for Priority Resource—Ethnography (continued)

COMPONENT	SHORT-TERM STEWARDSHIP GOAL	HIGH-PRIORITY STEWARDSHIP ACTIVITIES
ETHNOGRAPHY	Encourage and facilitate the use of the park by associated communities.	- Facilitate tribal access to the park's educational programs and staff by ensuring annual updates of contact information for both park and tribal contacts. - Encourage and facilitate tribal participation in service projects, science and research, and other park activities.
ETHNOGRAPHY	Ensure that tribes have access to traditional plants under the traditional plant gathering rule.	- Identify plants of interest to tribes that they wish to collect. - Strategize compliance needs such as minimum requirement analysis for traditional plant gathering in wilderness areas.

Table 4c. High-Priority Stewardship Activities for Priority Resource—History

COMPONENT	SHORT-TERM STEWARDSHIP GOAL	HIGH-PRIORITY STEWARDSHIP ACTIVITIES
HISTORY	Complete HRSs of significant historical themes (mining, climbing, homesteading, military) through inventory, research, compiling existing information, identifying sensitive resources, and assessing future research needs.	- Create a list of outstanding HRS needs.
HISTORY	Establish a sustainable, consistent message from the park to the public to enhance stewardship goals.	- Make all HRSs available to the public via the park website and Integrated Resource Management Applications (IRMA). - Annually coordinate with social media to promote relevant historic themes during emphasis months (ex: black history month, women's history month, etc.).
HISTORY	Continue outreach to partners, stakeholders, descendants, agencies, educational institutions, etc. to gain a better understanding of park history and ties to the community.	- Continue partnerships and collaborations with UCR school of public history.
HISTORY	Develop a priority list by cross referencing the history of parkwide development.	- Identify all locally, regionally and nationally significant historic contexts and themes represented in the park and regularly update the administrative record with this information.
HISTORY	Properties with concurred upon DOEs are submitted the Keeper for listing on the NRHP.	- Develop a prioritized list of previously concurred upon properties for listing to the NRHP.

Table 4d. High-Priority Stewardship Activities for Priority Resource—Historic Structures

COMPONENT	SHORT-TERM STEWARDSHIP GOAL	HIGH-PRIORITY STEWARDSHIP ACTIVITIES
HISTORIC STRUCTURES	Maintain the LCS so that records are updated and recertified.	- (Mission Critical) Complete annual condition assessment according to the LCS schedule for historic structures.
HISTORIC STRUCTURES	Appropriate chronology, assessment, and treatment guidance is developed in an HSR and treatment recommendations are entered into FMSS as work orders.	- Prioritize the list of historic structures for completing HSRs.
HISTORIC STRUCTURES	All historic structure locations and associated assets are accurately and consistently entered into FMSS and quality control is regularly conducted.	- (Mission Critical) Create assets records associated with historic structures. - (Mission Critical) Identify Location records that need to be created for historic structures.
HISTORIC STRUCTURES	Improve the condition of historic structures and increase the percentage of structures with upgraded condition.	- Identify historic structures in poor or fair condition and assess the feasibility of improving condition.
HISTORIC STRUCTURES	Establish a sustainable, consistent message from the park to the public to enhance stewardship goals.	- Annually coordinate with the social media team to disseminate a preservation message during national historic preservation month (consider annually identifying a message to promote each year, e.g., vandalism).
HISTORIC STRUCTURES	Update the existing "Keys Ranch Management Plan" to include routine and cyclic maintenance issues and long-term management.	- Develop routine and cyclic maintenance schedules for each structure and the landscape/grounds.
HISTORIC STRUCTURES	Explore the possibility of creating a career seasonal program lead position.	- Complete the announcement of recruitment hiring package for a career seasonal position for cultural resources.
HISTORIC STRUCTURES	Use volunteers to help meet management and preservation goals.	- Continue to identify appropriate tasks for diverse volunteer groups to help meet historic preservation needs, goals, and specific projects. - Continue Keys Ranch caretaker program.
HISTORIC STRUCTURES	Internal files are updated regularly, and information is organized in a standardized structure and files are made readily available.	- Update GIS information for historic structures.

Table 4e. High-Priority Stewardship Activities for Priority Resource—Cultural Landscapes

COMPONENT	SHORT-TERM STEWARDSHIP GOAL	HIGH-PRIORITY STEWARDSHIP ACTIVITIES
CULTURAL LANDSCAPES	Complete CLRs following the prioritized list.	- Prepare and submit PMIS project requests for Key Ranch CLR.
CULTURAL LANDSCAPES	Complete CLIs following the prioritized list.	- Complete CLI for Ironwood Mining District. - Complete CLI for the Golden Eagle Mining District. - Prepare and submit PMIS statements to complete the CLI for 29 Palms Mining District.
CULTURAL LANDSCAPES	Maintain and update CLI database in CRIS.	- Complete annual update with information from condition assessments for cultural landscapes.
CULTURAL LANDSCAPES	Complete and update NRHP documentation.	- Create a prioritized list for districts to be listed to the NRHP for cultural landscapes.
CULTURAL LANDSCAPES	Maintain cultural landscapes in good condition and improve the historic character according to CLR treatment recommendations, while also being consistent with vegetation community stewardship goals.	- Prioritize the cultural landscapes for treatment.
CULTURAL LANDSCAPES	Utilize Climate Change Impact Assessment tool to manage and document cultural landscapes, characteristics and interrelationships that are under threat from climate change.	- Prioritize cultural landscapes for climate change impact assessments. - Prepare climate change impact assessments for prioritized cultural landscapes.

Table 4f. High-Priority Stewardship Activities for Priority Resource—Museum Collections and Archives

COMPONENT	SHORT-TERM STEWARDSHIP GOAL	HIGH-PRIORITY STEWARDSHIP ACTIVITIES
MUSEUM COLLECTION AND ARCHIVES	Improve the data quality of accession and catalog records.	- Ensure that hard copy museum records are put into ICMS. - Complete processing of herbarium collection records to reduce backlog.
MUSEUM COLLECTION AND ARCHIVES	Increase the percentage of processed and digitized archives.	- Complete processing of backlog archive collection. - Digitize historic photos and other photo collections and post to NP Gallery.
MUSEUM COLLECTION AND ARCHIVES	In collaboration with other CA desert parks, develop a museum management approach for the subregion.	- Complete a repository agreement with the Western Science Center for paleontological collections.
MUSEUM COLLECTION AND ARCHIVES	Protocols are developed and reviewed for research collections and relevancy to the park.	- Continue interactions between the research coordinator and museum curator to hold permittees accountable to park to ensure research products are entered into park archives.
MUSEUM COLLECTION AND ARCHIVES	The percentage of catalogued objects is increased and assemblages that require updating in ICMs are identified.	- Continue to process backlog archival collections.
MUSEUM COLLECTION AND ARCHIVES	Conservation assessments are in place for the archeological and cultural collections, with condition surveys for paper and photographs and archeological objects and natural history collections.	- Create PMIS statements and implement strategies to conduct cyclical conservation assessments and treatments for museum collections.
MUSEUM COLLECTION AND ARCHIVES	Archival records, including electronic records, are updated. A strategy for cataloging legacy archives is developed.	- Identify resources (intern, volunteer) to improve findings aids.

Table 4g. High-Priority Stewardship Activities for Priority Resource—Native Flora

COMPONENT	SHORT-TERM STEWARDSHIP GOAL	HIGH-PRIORITY STEWARDSHIP ACTIVITIES
MOJAVE DESERT AND HIGH-ELEVATION PLANT COMMUNITIES	Improve scientific understanding of the effects of climate change, vegetation pathogens, and other stressors on Mojave Desert and high-elevation native plant communities in park.	- Analyze Mojave vegetation monitoring data for trends/changes in plant species composition and abundance possibly related to climate change.
MOJAVE DESERT AND HIGH-ELEVATION PLANT COMMUNITIES	Improved understanding of spatial distribution, abundance, and interannual changes of invasive annual grass infestations in fire prone areas of the Mojave.	- Develop prioritization system for treating invasive annual grasses that alter Mojave fire regime. System should include prioritization of blackbrush dominated plant communities. - Locate areas in the Mojave with these characteristics: healthy mature Joshua trees, Joshua tree recruitment, shrub component, and high coverage of invasive annual grasses. - Determine configuration, location, and most effective techniques for invasive annual grass treatments in the Mojave according to fire behavior and ecological principles in collaboration with BLM fire and fuels specialists.
MOJAVE DESERT AND HIGH-ELEVATION PLANT COMMUNITIES	Remove invasive annual grasses in the Mojave to reduce unnatural fire occurrence.	- Systematically and cyclically treat invasive annual grass fuels in high-priority treatment areas of the Mojave. - Coordinate fuels management, campfire restrictions, and fire readiness with fire management.
COLORADO DESERT AND TRANSITION ZONE PLANT COMMUNITIES	Improve understanding of changes to the distribution and condition of target Colorado Desert Plant species (e.g., Ocotillo, Ironwood) and native plant communities.	- Refine protocols to understand the distribution and abundance of target Colorado Desert plant species based upon climate change vulnerability assessments. - Redefine spatial information on the current desert transition zone through an analysis of the distribution of indicator plant species.
COLORADO DESERT AND TRANSITION ZONE PLANT COMMUNITIES	Improved understanding of spatial distribution and abundance of fountaingrass.	- Continue to conduct ground surveys of fountaingrass infestations, with assistance from volunteers and IPMT.
COLORADO DESERT AND TRANSITION ZONE PLANT COMMUNITIES	Limit the spread and control infestations of fountaingrass.	- Conduct outreach to expand public awareness of fountaingrass. - Partner with IPMT to control fountaingrass throughout this zone so that infestations are easily controlled on an annual basis.
JOSHUA TREES	Control wildfires within Joshua tree climate change refugia.	- Annually maintain Covington Flats road network fire break to protect Joshua tree refugia. - Develop a strategy to utilize fuel breaks on a landscape level to protect Joshua tree refugia. - Use Resource Advisor Guide to inform and promote rapid fire suppression in Joshua tree refugia.

Table 4g. High-Priority Stewardship Activities for Priority Resource—Native Flora (continued)

COMPONENT	SHORT-TERM STEWARDSHIP GOAL	HIGH-PRIORITY STEWARDSHIP ACTIVITIES
JOSHUA TREES	Remove invasive exotic plant species within Joshua tree climate change refugia.	- Explore a variety of methods to control invasive annual grasses including mechanical removal, various herbicides, and the promotion of biological control agents. - Systematically and cyclically treat invasive annual grass fuels in climate change refugia for Joshua trees using the most effective methods. Adjust methods following adaptive management principles.
JOSHUA TREES	Restoration of degraded refugia for Joshua trees, especially burned areas.	- Utilize native plant materials, including nursery grown Joshua tree seedlings, to restore burned Joshua tree climate change refugia.
JOSHUA TREES	Improved understanding long-term demographic changes to Joshua tree populations parkwide.	- Establish a network of long-term monitoring plots to assess changes to Joshua tree populations. Plots should be sampled on a five-year rotation, and individual trees should be resampled. - Conduct demographic analysis to understand the health of Joshua tree populations using long-term monitoring data. Produce a five-year report on the condition of Joshua trees parkwide.
JOSHUA TREES	Improved understanding of Joshua tree resiliency to climate change through research.	- Promote research to better understand Joshua tree reproduction, including relationships with pollinators, masting, seed dispersal mechanisms, nurse plants, and asexual reproduction (sprouting).
PARKWIDE NATIVE PLANTS	Improved understanding of distribution of species, composition, and abundance spring and summer flower blooms (i.e., monitoring goal).	- Identify areas in the park where native annual plant diversity and abundance are highest.
PARKWIDE NATIVE PLANTS	Improved understanding of targeted rare plant populations.	- Complete a genetic analysis of endangered plant *Astragalus tricarinatus*. - Continue long-term monitoring of federally listed plants *Astragalus tricarinatus* and *Erigeron parishii* on an annual basis. - Produce a report every 5 years analyzing monitoring data to assess trends in the condition of these species. Provide information to USFWS.
PARKWIDE NATIVE PLANTS	Improved understanding of spatial distribution, abundance, and interannual changes of invasive annual grasses and mustard infestations in park.	- Inventory and map the extent of mustard infestations in park. - Define a control grid for mustard infestations and identify priority grid cells to implement control treatments.
PARKWIDE NATIVE PLANTS	Remove invasive annual grasses and mustard species to reduce adverse effects on ecosystem function.	- Systemically and cyclically remove mustard infestations by targeting priority grid cells of mapped mustard infestations. Evaluate the effectiveness of control treatments in treated grid cells, and over time add more grid cells into the treatment scheme.
PARKWIDE NATIVE PLANTS	Conduct Early Detection and Rapid Response for new invaders and satellite infestations, and implement measures to prevent spread of invasive plants.	- Maintain a prioritized treatment list of exotic invasive plant species; review list periodically to focus efforts on species with highest impacts to ecosystems and highest probability to control. Add new species that pose threats to park resources as a result of new introductions within the region. - Use volunteers to survey and treat satellite infestations through an iNaturalist project.

Table 4h. High-Priority Stewardship Activities for Priority Resource—Native Fauna

COMPONENT	SHORT-TERM STEWARDSHIP GOAL	HIGH-PRIORITY STEWARDSHIP ACTIVITIES
DESERT TORTOISE	Maintain partnerships and promote research to improve desert tortoise understanding.	- Support Line Distance Sampling effort coordinated by the USFWS. - Encourage research in the Park by UC-Riverside, USGS, and others to address tortoise data gaps.
DESERT TORTOISE	Continue to track desert tortoise sightings in the park using a variety of methods (e.g., observation cards, iNaturalist).	- Analyze tortoise sighting data to identify "hot spots," develop population models, and assess other trends.
DESERT TORTOISE	Improved understanding of human impacts on desert tortoises and their habitat.	- Track tortoise mortalities on park roads, and develop actions to reduce this threat.
DESERT TORTOISE	Improve visitor and park staff awareness of desert tortoises to support tortoise conservation.	- Work with interpretation staff to incorporate high-level protection messages for tortoise and other resources in the park map. - Provide training to all park staff on desert tortoise conservation and awareness.
DESERT TORTOISE	Implementation of mitigation measures to reduce tortoise threats that result from indirect human interactions.	- Continue monitoring park construction projects and activities that pose a threat to desert tortoise. - Work with USFWS to develop management actions to reduce tortoise mortality.
DESERT TORTOISE	Identify potential climate refugia in the park for desert tortoise and reduce potential conflicts with conserving tortoise in these habitats.	- Work with park vegetation staff to explore ways to protect and restore potential tortoise refugia from other factors that may degrade the habitat (e.g., fire, invasive species, etc.).
DESERT TORTOISE	Maintain research partnerships as it relates to climate change projections for desert tortoise.	- Support climate change research on desert tortoise (funding, researcher housing and field expertise).
BIGHORN SHEEP	Identify habitat use patterns and population dynamics in the park. Identify and address potential conflicts from visitation and disease spread to and from nearby populations outside the park.	- Work collaboratively with California Dept. Fish & Wildlife on gathering bighorn sheep data through survey and collaring projects. - Continue to foster research on bighorn sheep abundance, behavior, health and genetics to identify and respond to problems (e.g., disease outbreak). - Continue to solicit reports from visitors and staff relating to sick bighorn sheep seen at popular water sources. - Continue game camera data collection and analysis; continue use of cameras to gauge visitor compliance with closures and overall use.
BIGHORN SHEEP	Maintain partnerships to accomplish conservation goals.	- Support survey and collaring effort coordinated by the California Department of Fish and Wildlife with funds, housing and field expertise. - Encourage research in the park by universities and conservation groups (Oregon State University, Society for the Conservation of Bighorn Sheep, Wild Sheep Society, Desert Bighorn Council, and California Department of Fish & Wildlife) through networking.
BIGHORN SHEEP	Identify and model potential effects to the current range and distribution of bighorn sheep from climate change, especially as it relates to water availability.	- Utilize I&M spring data to identify status and trends in water availability, both in terms of distribution on the landscape and changes in seasonality of discharge. These data can then be used to assess and prioritize spring conservation and identify management tools to achieve conservation goals.

Table 4h. High-Priority Stewardship Activities for Priority Resource—Native Fauna (continued)

COMPONENT	SHORT-TERM STEWARDSHIP GOAL	HIGH-PRIORITY STEWARDSHIP ACTIVITIES
BIGHORN SHEEP	Identify sensitive locations and times of the year for bighorn sheep to explore actions that reduce stress to the animal.	- Maintain sensitive area closures at Cow Camp and Keys Ranch. Implement measures to protect sheep populations from visitor impacts at 49 Palms Oasis, Barker Dam, and other water sources.
MAMMALS	Establish protocol for protecting bat species from visitor activity.	- Design abandoned mine closures to minimize impacts to bat habitat; limit physical closures to high and medium health and safety risks.
MAMMALS	Monitor for white-nose syndrome and other threats to bats.	- Continue to work with I&M to swab bats annually at NABat priority cells and other targeted cells to detect the presence or absence of white-nose syndrome.
BIRDS	Describe bird occupancy shifts and changes in the park.	- Continue to monitor bird assemblages on long-term established plots to identify changes in occupancy over time from climate change and other stressors such as light pollution.
BIRDS	Protect raptor nesting through seasonal closures and visitor education.	- Survey habitats for raptor nesting annually that are located in areas where visitor activities may affect nesting. Enact seasonal closures or other actions to reduce interactions.

Table 4i. High-Priority Stewardship Activities for Priority Resource—Oases, Springs, and Other Riparian Areas

COMPONENT	SHORT-TERM STEWARDSHIP GOAL	HIGH-PRIORITY STEWARDSHIP ACTIVITIES
OASES, SPRINGS, AND OTHER RIPARIAN AREAS	Improve and enhance visitor education, interpretation, and visitor management to protect natural and cultural resources at oases and riparian areas (incl. maintaining water quality at attraction sites, interpreting the Oasis of Mara, etc.).	- Identify and prioritize strategies and locations to better manage visitors at oases and riparian areas to help reduce trampling oases and riparian resources; seek tribal input regarding ethnographically important oases components to inform prioritization. - Continue swimming prohibitions and trail closures to oases during times of drought to provide wildlife access, primarily bighorn sheep.
OASES, SPRINGS, AND OTHER RIPARIAN AREAS	Understand and address the effect of groundwater withdrawals in the Twentynine Palms area on the Oasis of Mara.	- Continue groundwater monitoring at the Oasis of Mara. - Develop comprehensive water budget model of the Oasis of Mara that incorporates climate change and assess water movement to the west of the Oasis of Mara comprehensive water budget.
OASES, SPRINGS, AND OTHER RIPARIAN AREAS	Manage and maintain the Oasis of Mara to be consistent with cultural landscapes, ethnographic values, and native natural communities under climate change.	- Continue irrigating Oasis of Mara manually to maintain vegetation until the irrigation system is upgraded/replaced. - Develop a management strategy for cultural and natural resources at the Oasis of Mara that incorporates tribal values, climate change (species viability), and groundwater extraction. - Replace and upgrade the irrigation system at Oasis of Mara.
OASES, SPRINGS, AND OTHER RIPARIAN AREAS	Limit the impact of invasive species on native species dependent on oasis/ riparian conditions.	- Remove invasive, exotic plant species from oases and riparian areas (e.g., tamarisk, fountain grass) to protect native vegetation.

Table 4i. High-Priority Stewardship Activities for Priority Resource—Oases, Springs, and Other Riparian Areas (continued)

COMPONENT	SHORT-TERM STEWARDSHIP GOAL	HIGH-PRIORITY STEWARDSHIP ACTIVITIES
OASES, SPRINGS, AND OTHER RIPARIAN AREAS	Increase knowledge and monitoring of species that are dependent on desert aquatic and riparian habitat.	- Continue monitoring palm and mesquite health at the Oasis of Mara. - Continue to work with I&M to monitor spring vegetation at 49 Palms, Smithwater, and Cottonwood (percent cover and composition). - Continue to work with I&M to monitor benthic macroinvertebrates at 49 Palms Oasis and Smithwater Canyon.
OASES, SPRINGS, AND OTHER RIPARIAN AREAS	Improve understanding of human connections and traditional associations with spring, oasis, and riparian areas and transportation routes between these water sources.	- Conduct assessment of historic water uses and modifications at oases, riparian areas, and seeps/springs.

Table 4j. High-Priority Stewardship Activities for Priority Resource—Geologic Resources

COMPONENT	SHORT-TERM STEWARDSHIP GOAL	HIGH-PRIORITY STEWARDSHIP ACTIVITIES
GEOLOGIC RESOURCES	Encourage geologic research by universities and other geologic science institutions.	- Identify hydrogeologic and geologic research needs and data gaps.
GEOLOGIC RESOURCES	Increase knowledge of biological soil crust within the park, its condition, and ecological role.	- Continue to work with I&M to monitor 35 macroplots in Joshua Tree wooded alliance every 3 to 6 years for presence and cover of biological soil crust (Might work with a short-term goal of: Improve understanding of the location and condition of BSC.). - Complete data summary for existing soil crust information and identify data gaps and management needs.

Table 4k. High-Priority Stewardship Activities for Priority Resource—Paleontological Resources

COMPONENT	SHORT-TERM STEWARDSHIP GOAL	HIGH-PRIORITY STEWARDSHIP ACTIVITIES
PALEONTOLOGICAL RESOURCES	Encourage paleontological research by universities and other geologic science institutions.	- Enhance and expand the partnership with the Western Science Center for paleontologist assistance to recover fossils and curate them (which links to the museum collections activity to complete and sign the repository agreement). - Request stipend from National Park Association to encourage graduate students or other paleontological specialists to assess newly identified paleontological areas and/or gather data to assess known paleontological sites.
PALEONTOLOGICAL RESOURCES	Gather information on presence and condition of paleontological resources from existing NPS sources, partners, and tribes.	- Assess risk of known paleontological resources to erosion and other long-term damage from climate change and prioritize high risk paleontological resources. - Request funding from National Park Association for annual Geoscientist in the Park (GIP) support to pay for a paleontology specialist to survey large sensitive areas in the park for presence/absence of paleontological resources (focusing on areas that are vulnerable to climate change). - Engage with I&M Inventories 2.0 Program to acquire support for management of paleontological resources.

Table 4l. High-Priority Stewardship Activities for Priority Resource—Water Resources

COMPONENT	SHORT-TERM STEWARDSHIP GOAL	HIGH-PRIORITY STEWARDSHIP ACTIVITIES
GROUNDWATER	Encourage/procure groundwater aquifer research.	- Install a second production/monitoring well at Cottonwood; existing well is fault bounded (with limited future yield.) Partner with facilities to accurately monitor consumption and mitigate with low flow (or no water) fixtures.
GROUNDWATER	Only high-efficiency water use appliances or facilities are used in all new and upgraded facilities within the park.	- Participate in planning and review of proposed projects that include water utilities and/or hardware to minimize water use in the park. - Quantify existing water consumption at the Cottonwood Visitor Center by metering and assessing the system for leaks. This will be used to inform use levels at the proposed facility.
GROUNDWATER	Improve education and outreach related to efficient human water use.	- Incorporate water conservation theme and water source information into interpretive displays, materials and at facilities.
WATER IMPOUNDMENTS	Conduct necessary research to understand the integrity of existing dams/impoundments for the future management of park infrastructure.	- Explore alternative options to provide and maintain a water source for bighorn sheep as a replacement to the aging and ailing historic impoundments (Barker Dam, Cow Camp, Keys Ranch) on which the sheep currently rely.

Table 4m. High-Priority Stewardship Activities for Priority Resource—Night Sky

COMPONENT	SHORT-TERM STEWARDSHIP GOAL	HIGH-PRIORITY STEWARDSHIP ACTIVITIES
NIGHT SKY	Identify and monitor the condition of the park's night sky resource.	- Continue to use night sky camera to collect night sky data quarterly at a variety of locations in the park every 3 to 5 years or as changing conditions warrant (locations include: Keyes View, Blackrock Campground, Cottonwood Springs, Pinto Wells, Hexahedron Mine).
NIGHT SKY	Improve health and safety of visitors and wildlife by improving the nocturnal environment through reducing artificial light impacts from NPS facilities and park operations, and from visitor-based activities.	- Ensure current and future park facilities are consistent with the lighting management plan.
NIGHT SKY	Partner with neighboring communities, landowners, and other entities to reduce artificial light impacts in the region.	- Continue working with the San Bernardino Night Sky Alliance (and other municipalities) to improve, educate, and enforce new ordinance relating to light pollution and light trespass from surrounding existing and proposed land use developments surrounding park. - Utilize data to update IDA tier status based on effectiveness of San Bernardino County ordinance implementation. - Advise local governments on active ways surrounding municipalities can help mitigate light pollution (Coachella Valley).

Table 4n. High-Priority Stewardship Activities for Priority Resource—Air Quality

COMPONENT	SHORT-TERM STEWARDSHIP GOAL	HIGH-PRIORITY STEWARDSHIP ACTIVITIES
AIR QUALITY	Improve understanding of air quality through continued monitoring, compiling existing information, identifying sensitive resources, assessing future research needs, and educating park staff about impacts to resources.	- (Mission Critical) Continue to support the NPS air quality monitoring programs and special studies including IMPROVE, CASTNET, NADP, NPS-GPMP, particulate matter, and Scene monitoring (Camera plus included on the AQ webcam page with associated AQ data) stations, including site operator staff and training. - (Mission Critical) Assess air quality monitoring needs and explore opportunities for sharing the costs and data with outside entities and agencies including EPA, CARB, SCAMD, and MAQMD. - Use existing online sources for understanding of the latest air quality information including: park conditions and trends, regional conditions and trends, air quality monitors map, JOTR Class I park air profile, park sensitive species, live ozone and weather data, park ozone exceedances, ozone levels and smoke plumes, and nearby sources of air pollution. - Investigate options to monitor PM2.5 and PM10 to optimize data needed for health advisories and to understand conditions across the park and monitor for exceedances - lack of data prevents the park from implementing mitigations. - Subscribe to the California Air Resources Board (CARB), South Coast Air Quality Management District, and Mojave Desert Air Quality Management District mailing list(s) to stay current on new and existing sources of air pollution by receiving public notices, division updates, warnings, and regulatory information.
AIR QUALITY	Provide information about air pollution impacts to NPS management, air regulatory agencies, the public, the scientific community and other stakeholders.	- (Mission Critical) Continue implementing park air quality health advisory postings in the morning report, at the three entrance stations, and at visitor centers. - Include park air quality health advisory information (ozone, particulate matter) in employee job hazard analysis (JHA) for staff working outdoors, in addition to weather hazards. Develop protocol for JHA for high ozone and PM levels.
AIR QUALITY	Be an environmental leader by reducing park air pollutant emissions, improving park sustainability and environmental management, (demonstrating the park's commitment to do its part for air quality, water quality, night sky and climate change).	- Comply with CARB regulations relating to diesel powered equipment and older I- Vehicles. Consider replacing equipment with greener alternatives. - Implement mitigations to reduce fugitive dust during road and/or shoulder maintenance, repair, and resource management activities.

Table 4n. High-Priority Stewardship Activities for Priority Resource—Air Quality (continued)

COMPONENT	SHORT-TERM STEWARDSHIP GOAL	HIGH-PRIORITY STEWARDSHIP ACTIVITIES
AIR QUALITY	Collaborate with other federal, state, regional and local planning organizations, and stakeholders to reduce air quality impacts in the park from sources of air pollution.	- (Mission Critical) Collaborate with NPS ARD on the next round of regional haze planning (due 2021) to ensure impact evaluations and park interests are represented for new and modified existing sources of air pollution. - With assistance from PWR and the NPS external renewable energy group, continue to collaborate with BLM, EPA, and ARD to identify and address potential resource impacts from the Riverside East Solar Energy Zone and other nearby projects. - Maintain existing and initiate new cooperative reimbursable agreements with developers to monitor air quality impacts.

Table 4o. High-Priority Stewardship Activities for Priority Resource—Soundscape

COMPONENT	SHORT-TERM STEWARDSHIP GOAL	HIGH-PRIORITY STEWARDSHIP ACTIVITIES
SOUNDSCAPE	Partner with neighboring communities, landowners, and other entities to reduce external noise impacts.	- Develop contacts at Miramar to discuss potential changes to their overflight path over the park in Pinto Basin (Western Air Space Range Council Meeting). - Pursue educational effort with municipal airports regarding considerations and impacts to the natural soundscape within the park.

Table 4p. High-Priority Stewardship Activities for Priority Resource—Scenic Views

COMPONENT	SHORT-TERM STEWARDSHIP GOAL	HIGH-PRIORITY STEWARDSHIP ACTIVITIES
SCENIC VIEWS	Inventory and assess park views over time to monitor changes in condition.	- Complete the 2015-17 visual resource inventory by finishing view importance information for remaining views (10 of 17) in the Enjoy the View (ETV) database. - Review and finalize the draft visual resource inventory summary report, including a visual resource management strategy and recommendations.
SCENIC VIEWS	Minimize changes, visual contrast, and intrusions to views to the extent possible within the park.	- Adopt ARD recommended or develop park visual resource best practices or facility design guidelines for facility development and/or improvements inside the park to be consistent with identified cultural landscapes and ecological values. (Cottonwood, West Entrance, Black Rock)
SCENIC VIEWS	Collaborate with adjacent landowners, municipalities, developers, and other stakeholders to promote cooperative conservation of views across park boundaries.	- In partnership with stakeholders, establish best practices and/or design guidelines for inholders and adjacent landowners.
SCENIC VIEWS	Provide enhanced opportunities for visitors to access and understand the importance of park views.	- Interpret the impacts from air pollution to the scenic views at Keys View. Collaborate with interpretation division to provide additional interpretation for the public at this site that highlights the scenic views.

Table 4q. High-Priority Stewardship Activities for Priority Resource—Wilderness Character

COMPONENT	SHORT-TERM STEWARDSHIP GOAL	HIGH-PRIORITY STEWARDSHIP ACTIVITIES
WILDERNESS CHARACTER	Understand the baseline wilderness character condition and changes over time.	- Complete Wilderness Character Assessment and baseline condition documentation FY2020. - Monitor indicators for visitor capacity in wilderness, as defined in various park plans; report findings to Wilderness Committee. - Maintain GIS layers to ensure accuracy of wilderness boundaries JOTR GIS server and Wilderness.net.
WILDERNESS CHARACTER	Maintain and restore wilderness character.	- (Mission Critical) Continue convening Wilderness Committee, responsible for work planning, Minimum Requirement Decision reviews and staff training. - Use park planning efforts to maintain or improve wilderness character (e.g., trail management plan, climbing management plan, overnight use plan). - Review Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) planning for 14 mill sites and work with Superintendent and Regional office to minimize impacts to wilderness; proposed activities include use of heavy equipment and establishing roads into wilderness to remove contaminants. - Conduct adaptive management actions in response to visitor capacity indicators exceeding thresholds.

Table 4r. High-Priority Stewardship Activities for Priority Resource—Landscape-scale and Cross-boundary Resources and Collaboration

COMPONENT	SHORT-TERM STEWARDSHIP GOAL	HIGH-PRIORITY STEWARDSHIP ACTIVITIES
LANDSCAPE-SCALE AND CROSS-BOUNDARY RESOURCES AND COLLABORATION	Improved storage and accessibility to resource information.	- Establish a procedure to archive and migrate GIS project data. - Annually update data management plan and staff accountability protocols. - Map and manage research equipment parkwide.
LANDSCAPE-SCALE AND CROSS-BOUNDARY RESOURCES AND COLLABORATION	Improve scientific understanding of landscape-scale and cross-boundary resource issues to inform park management.	- Build off GPRA Landscape Condition and standardize protocol for natural condition assessments to inform prioritization of science and stewardship efforts. - Broker priority research questions. - Maintain the Dr. James Buckner Luckie Study Center as a hub for high-quality applied research and learning through partnerships with academic, nonprofit, and professional organizations. Science-based results generated from center-sponsored activities inform park management on critical issues and benefit local scientific and residential communities.

Table 4r. High-Priority Stewardship Activities for Priority Resource—Landscape-scale and Cross-boundary Resources and Collaboration (continued)

COMPONENT	SHORT-TERM STEWARDSHIP GOAL	HIGH-PRIORITY STEWARDSHIP ACTIVITIES
LANDSCAPE-SCALE AND CROSS-BOUNDARY RESOURCES AND COLLABORATION	Appropriately manage visitor use to minimize impacts to natural and cultural resources.	- Confirm numerous efforts to collect visitor use data to inform resource management activities (e.g., KSU Visitor Use Survey and Cell Data Analysis, FLHP Bluetooth study). - Complete climbing management plan with Environmental Quality Division. - Complete overnight use/trail management plan with Denver Service Center. - Develop monitoring to assess efficacy and effectiveness of mitigations for visitor use impacts (will be developed as a part of forthcoming visitor use related planning). - Continue coordinated efforts to address vandalism (graffiti, looting, destruction of resources); implement JOTR Graffiti Standard Operating Procedure.
LANDSCAPE-SCALE AND CROSS-BOUNDARY RESOURCES AND COLLABORATION	Expanded outreach with partners, regional communities, and the public to increase awareness of landscape-scale resource issues and leverage collaboration on cross-boundary resource management.	- Develop talking points for cross-boundary concerns including air quality, night skies, scenic views, etc. to express during stakeholder/partnership meetings and during superintendent briefings to provide consistency in the discussion across multiple venues. This would be updated annually to stay current and to correlate with updates to the RSS goals/activities. - Develop a partnership strategy/plan (per foundation) for collaboration on the protection of cross boundary resources and response to climate change effects.
LANDSCAPE-SCALE AND CROSS-BOUNDARY RESOURCES AND COLLABORATION	Minimize impacts of fire suppression activities on park resources.	- Provide routine training and briefings to ensure and improve internal park and external fire-related partner comprehension of the contents of the park Resource Advisory Guide. - Annually review and revise the Resource Advisor Guide and GIS data.
LANDSCAPE-SCALE AND CROSS-BOUNDARY RESOURCES AND COLLABORATION	Minimize off-highway vehicle (OHV) incursions originating from the parks southern and eastern boundaries by funding and supporting an interdisciplinary approach and the Educate/Engineer/Enforce principles.	- Construct barricades in strategically located areas to reduce OHV incursion into park. - Increase law enforcement patrols to reduce OHV incursions. - Increase education and outreach efforts to OHV communities to help reduce OHV incursions in partnership with neighboring landowners through route planning and recreation management efforts. - Use active and passive restoration of resources damaged by OHV use in the park to camouflage areas and expedite recovery.
LANDSCAPE-SCALE AND CROSS-BOUNDARY RESOURCES AND COLLABORATION	Minimize impacts from external land development and land uses adjacent to the park (urbanization, commercial/industrial, energy development, water development, etc.).	- Evaluate and comment on potential impacts to the park from external development (e.g., energy and urban); create tool to track projects and responses to be consistent over time and build on previously submitted comments. - Complete a Unit Management Plan for Dingle Act lands.

Table 4r. High-Priority Stewardship Activities for Priority Resource—Landscape-scale and Cross-boundary Resources and Collaboration (continued)

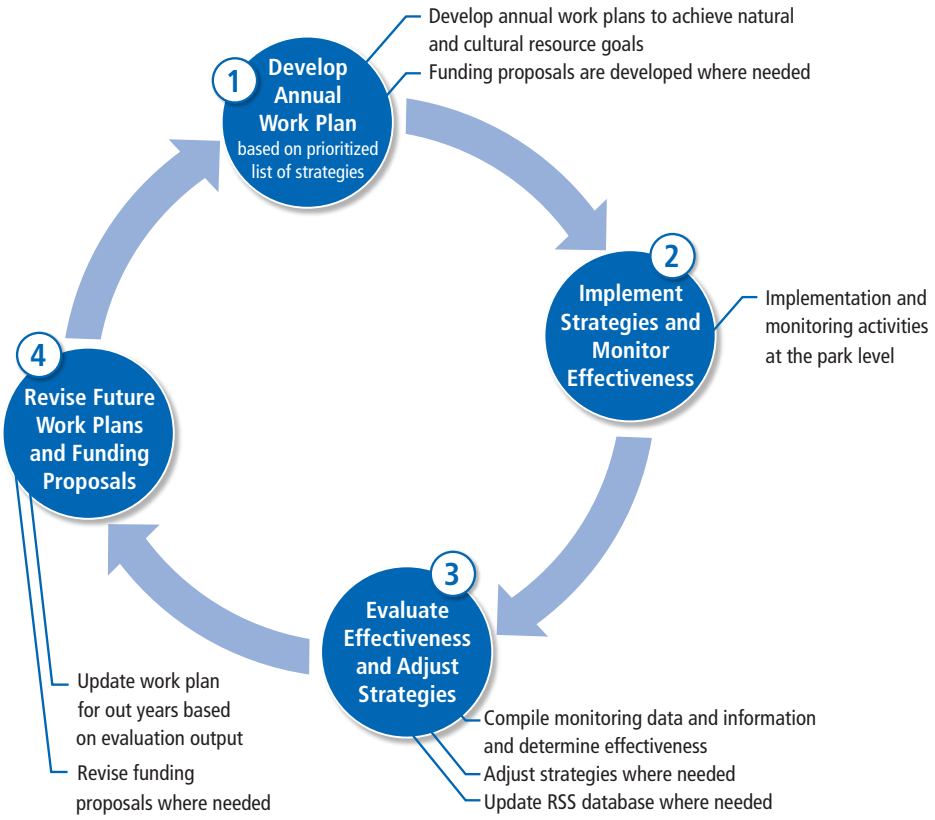
COMPONENT	SHORT-TERM STEWARDSHIP GOAL	HIGH-PRIORITY STEWARDSHIP ACTIVITIES
LANDSCAPE-SCALE AND CROSS-BOUNDARY RESOURCES AND COLLABORATION	Understand and manage resources on newly acquired Dingell Act properties.	- Submit Unit Management Plan funding request for newly acquired land under the Dingell Act.
LANDSCAPE-SCALE AND CROSS-BOUNDARY RESOURCES AND COLLABORATION	Integrate climate change science into resource management actions.	- Maintain temperature and precipitation time series from weather stations in the park. - Study trends in lightning strike and monsoon precipitation patterns (check available sources, such as military base). - Conduct climate change vulnerability assessments for cultural resources; use results to develop climate change adaptation strategies for cultural resources. - Preserve and protect refugia for species most affected by climate change.
LANDSCAPE-SCALE AND CROSS-BOUNDARY RESOURCES AND COLLABORATION	Maintain and extend leadership in the park serving as an example for addressing climate change.	- Integrate climate change information into the Resource Stewardship Strategy. - Create briefing statement and talking points for stakeholders on climate change management strategies. - Improve public understanding of climate change and its effects via interpretation/education programming. - Conduct presentations and training for park staff on climate change and its effects on park resources. - Engage with tribes on climate change issues and effects on ethnographic resources, particularly traditional medicine species.
LANDSCAPE-SCALE AND CROSS-BOUNDARY RESOURCES AND COLLABORATION	Reducing greenhouse gas emissions that cause climate change.	- Continue implementing the Joshua Tree National Park Climate Friendly Park action plan and Environmental Management System. - Update the Joshua Tree National Park Climate Friendly Park action plan, including new goals from the updated greenhouse gas inventory.

ONGOING IMPLEMENTATION OF THE RESOURCE STEWARDSHIP STRATEGY

The stewardship goals, activities, and other pertinent information of the resource stewardship strategy is managed and updated regularly using the RSS desktop application. This information will assist resource managers in determining what, how, when, and where resource management occurs in the park and will assist the parks' resource management staff in developing annual work plans. These work plans will be an important planning tool for park staff to determine what they will be able to realistically tackle over the coming years.

Long-term implementation of the resource stewardship strategy includes park managers monitoring resource information and conditions in order to evaluate the effectiveness of resource stewardship strategies over time. Regular monitoring of RSS progress will provide park managers an opportunity to evaluate whether the stewardship activities are making progress towards identified goals and consider whether adjustments are needed. See figure 4 for more information on the cyclical nature of this process. In addition, routine communication with the public is another important aspect of the implementation process. These outreach efforts are intended to improve public awareness about the science and strategies used to protect the park's diverse resources and values over time.

Figure 4. RSS Implementation Process



REFERENCES

Cornett, James W.

2008 The Desert Fan Palm Oasis. *Aridland Springs in North America: Ecology and Conservation, Ecology and Conservation.* Edited by Lawrence E. Stevens, Vicky J. Meretsky, and Gary Paul Nabhan.

National Park Service (NPS)

2012 *Black Rock Campground Rehabilitation Environmental Assessment.* Joshua Tree National Park. July.

2013 A Summary of the Joshua Tree National Park Vegetation Mapping Project. NPS Vegetation Inventory Program. Natural Resource Technical Report NPS/JOTR/NRTR—2013/723. Available on the internet at: https://irma.nps.gov/DataStore/DownloadFile/500914

2014 Joshua Tree National Park Resource Stewardship Strategy

2014b Joshua Tree Wilderness Acreage Totals. As calculated by Paul Morely, JOTR/Great Basin Institute Cartographic Specialist.

2015 Fan Palm Oases. Joshua Tree National Park website. Updated February 28, 2015. Accessed February 2020 at: https://www.nps.gov/jotr/learn/nature/oases.htm

2016a Groundwater Level Declines at the Oasis of Mara, Joshua Tree National Park, 1940-2015. Natural Resource Report. NPS/MOJN/NRR—2016/1242. Written by Geoff J. M. Moret, Sarah Wright, Jennifer L. Bailard, and Luke Sabala. Fort Collins, Colorado

2016b Natural Resource Condition Assessments for Six Parks in the Mojave Desert Network. Natural Resource Stewardship and Science.

2016 National Park Service Natural Resource Stewardship and Science Framework, Four pillars to guide natural resource activities and investments. Natural Resource Advisory Group, Natural Resource Stewardship and Science.

2017 Nature. Joshua Tree National Park website. Accessed January 2020 at: https://www.nps.gov/jotr/learn/nature/index.htm.

2017_ National Park Service, Air Resources Division. "Air Quality Conditions & Trends: Joshua Tree National Park, 2017 End Year." National Park Service. Denver, CO. Accessed January 2020 at: https://www.nps.gov/subjects/air/park-conditions-trends.htm.

Vogl, Richard J. and Lawrence T. McHargue

1966 Vegetation of California Fan Palm Oases on the San Andreas Fault. *Ecology. 47(4): 532-540.*

LITERATURE CITED IN "ANTHROPOGENIC CLIMATE CHANGE IN JOSHUA TREE NATIONAL PARK"

Abatzoglou, J.T. and C.A. Kolden

2011 Climate change in western US deserts: Potential for increased wildfire and invasive annual grasses. Rangeland Ecology and Management 64: 471-478.

Barrows, C.W.

2011 Sensitivity to climate change for two reptiles at the Mojave-Sonoran Desert interface. Journal of Arid Environments 75: 629-635.

Barrows, C.W. and M.L. Murphy-Mariscal

2012 Modeling impacts of climate change on Joshua trees at their southern boundary: How scale impacts predictions. Biological Conservation 152: 29-36.

Barrows, C.W., J. Hoines, K.D. Fleming, M.S. Vamstad, M. Murphy-Mariscal, K. Lalumiere, and M. Harding

2014 Designing a sustainable monitoring framework for assessing impacts of climate change at Joshua Tree National Park, USA. Biodiversity and Conservation 23: 3263-3285.

Brooks, M.L. and J.R. Matchett

2006 Spatial and temporal patterns of wildfires in the Mojave Desert, 1980–2004. Journal of Arid Environments 67: 148-164.

Byrne, M.P. and P.A. O'Gorman
2015 The response of precipitation minus evapotranspiration to climate warming: Why the "wet-get-wetter, dry-get-drier" scaling does not hold over land. Journal of Climate 28: 8078-8092.

Cole, K.L., K. Ironside, J. Eischeid, G. Garfin, P.B. Duffy, and C. Toney
2011 Past and ongoing shifts in Joshua tree distribution support future modeled range contraction. Ecological Applications 21: 137-149.

Curtis, C. and B. Bradley
2015 Climate change may alter both establishment and high abundance of red brome (*Bromus rubens*) and African mustard (*Brassica tournefortii*) in the semiarid southwest United States. Invasive Plant Science and Management 8: 341-352.

Epps, C.W., J.D. Wehausen, V.C. Bleich, S.G. Torres, and J.S. Brashares
2007 Optimizing dispersal and corridor models using landscape genetics. Journal of Applied Ecology 44: 714-724.

Epps, C.W., P.J. Palsbøll, J.D. Wehausen, G.K. Roderick, and D.R. McCullough
2006 Elevation and connectivity define genetic refugia for mountain sheep as climate warms. Molecular Ecology 15: 4295-4302.

Gonzalez, P., J.J. Battles, B.M. Collins, T. Robards, and D.S. Saah
2015 Aboveground live carbon stock changes of California wildland ecosystems, 2001-2010. Forest Ecology and Management 348: 68-77.

Gonzalez, P., F. Wang, M. Notaro, D.J. Vimont, and J.W. Williams
2018 Disproportionate magnitude of climate change in United States national parks. Environmental Research Letters 13: 104001. doi:10.1088/1748-9326/aade09.

Huxman, T.E., E.P. Hamerlynck, and S.D. Smith
1999 Reproductive allocation and seed production in *Bromus madritensis ssp. rubens* at elevated atmospheric CO2. Functional Ecology 13: 769-777.

Iknayan, K.J., and S.R. Beissinger
2018 Collapse of a desert bird community over the past century driven by climate change. Proceedings of the National Academy of Sciences 115: 8597-8602.

Intergovernmental Panel on Climate Change (IPCC)
2013 Climate Change 2013: The Physical Science Basis. Cambridge University Press, Cambridge, UK.

2014 Climate Change 2014: Impacts, Adaptation, and Vulnerability. Cambridge University Press, Cambridge, UK.

La Sorte, F.A. and F.R. Thompson
2007 Poleward shifts in winter ranges of North American birds. Ecology 88: 1803-1812.

National Park Service
2010 Climate Friendly Parks. Joshua Tree National Park Action Plan. National Park Service, Washington, DC.

Riddell, E.A., K.J. Iknayan, B.O. Wolf, B. Sinervo, and S.R. Beissinger
2019 Cooling requirements fueled the collapse of a desert bird community from climate change. Proceedings of the National Academy of Sciences 116: 21 609-21 615. doi:10.1073/pnas.1908791116.

Sweet, L.C., T. Green, J.G.C. Heintz, N. Frakes, N. Graver, J.S. Rangitsch, J.E. Rodgers, S. Heacox, and C.W. Barrows
2019 Congruence between future distribution models and empirical data for an iconic species at Joshua Tree National Park. Ecosphere 10: e02763. doi:10.1002/ecs2.2763.

APPENDIX A: JOSHUA TREE NATIONAL PARK COMPREHENSIVE LIST OF STEWARDSHIP STRATEGIES AND RESPECTIVE PRIORITIES

PRIORITY RESOURCE AND COMPONENT	LONG-TERM GOAL (10–20 YEARS)	SHORT-TERM GOAL (3–5 YEARS)	STEWARDSHIP ACTIVITIES (WITH PRIORITIES)
ARCHEOLOGICAL RESOURCES	Increased knowledge of the human past at Joshua Tree National Park through adequate research, field work, and documentation.	Archeological sites have current and complete baseline documentation to assist with management planning.	- Ensure that all newly recorded archeological sites are being documented according to NPS standards with sufficiently detailed information to guide management strategies. (High) - Prioritize a list of previously recorded sites that need to be brought up to NPS archeological recording standards. (Medium) - Prepare baseline documentation for known unrecorded archeological sites. (Medium) - Develop a strategy for addressing the backlog of known unrecorded archeological sites. (Low)
ARCHEOLOGICAL RESOURCES	Increased knowledge of the human past at Joshua Tree National Park through adequate research, field work, and documentation.	The Archeological Overview and Assessment (AOA) is complete and updated to include research and preservation strategies for all archeological site types.	- Update the AOA to include research and preservation strategies. (Low)
ARCHEOLOGICAL RESOURCES	Increased knowledge of the human past at Joshua Tree National Park through adequate research, field work, and documentation.	Prioritize research needs in the AOA and other park management documents.	- Develop a list of research needs and other research topics of interest to the academic community for archeological sites. (High) - Determine the appropriate strategy for incorporating archeological research needs into park management documents. (Low)
ARCHEOLOGICAL RESOURCES	Increased knowledge of the human past at Joshua Tree National Park through adequate research, field work, and documentation.	Encourage universities to conduct research (through field schools?) into park cultural resources, with a specific focus on landscape-scale contexts and Pleistocene/early Holocene (Archaic) time periods.	- Engage with partners/universities with an environmental justice focus to further understand landscape archeology and the human connection to develop enhanced interpretation and messaging. (Medium) - Promote archeological research opportunities in the park for graduate students, post-doc, and tenure-track professors. (Medium)

PRIORITY RESOURCE AND COMPONENT	LONG-TERM GOAL (10–20 YEARS)	SHORT-TERM GOAL (3–5 YEARS)	STEWARDSHIP ACTIVITIES (WITH PRIORITIES)
ARCHEOLOGICAL RESOURCES	Prehistoric and historic archeological sites are professionally inventoried, recorded and evaluated for the National Register of Historical Places (NRHP).	A reliable, and accurate inventory of archeological sites is created. Identified high priority archeological sites have complete, accurate and reliable data recorded in Cultural Resources Inventory System (CRIS) and GIS and are entered into Facility Management Software System (FMSS) as appropriate.	- Ensure that records in CRIS are updated and reliable. (High) - Ensure that GIS records are updated and reliable. (High) - Create location in FMSS for maintained archeological sites as appropriate. (Medium) - Develop inventory targets for areas with high impacts or planned projects. (Low)
ARCHEOLOGICAL RESOURCES	Prehistoric and historic archeological sites are professionally inventoried, recorded and evaluated for the NRHP.	Reliable temporal data is collected and analyzed at archeological sites.	- Develop a methodology for gathering reliable chronological information while recording archeological sites and determine appropriate analytical techniques. (Medium) - Implement a methodology for collecting temporal data while recording archeological sites and determine appropriate analytical techniques. (Low)
ARCHEOLOGICAL RESOURCES	Prehistoric and historic archeological sites are professionally inventoried, recorded and evaluated for the NRHP.	Determinations of Eligibility (DOE) are complete and accurate for historic properties.	- Ensure NRHP evaluations are completed for all archeological sites by a SOI qualified archeologist. (High)
ARCHEOLOGICAL RESOURCES	Prehistoric and historic archeological sites are preserved, protected and monitored for future research (and possibly limited interpretation of these sites).	Implement a strategy to complete archeological resource condition assessments.	- Annually export from CRIS sites due for completing condition assessments. (High) - Proactively complete condition assessments for archeological site as part of Section 106 surveys and other funded projects. (Medium)
ARCHEOLOGICAL RESOURCES	Prehistoric and historic archeological sites are preserved, protected and monitored for future research (and possibly limited interpretation of these sites).	Continue (establish) archeological site monitoring and implement treatment strategies.	- Support Visitor and Resource Protection (VRP) "Ranger Routes" for archeological site monitoring. (High) - Continue and reestablish a volunteer site steward program for archeological site monitoring. (Medium) - Review and implement recommended treatments and activities. (Low)

PRIORITY RESOURCE AND COMPONENT	LONG-TERM GOAL (10–20 YEARS)	SHORT-TERM GOAL (3–5 YEARS)	STEWARDSHIP ACTIVITIES (WITH PRIORITIES)
ARCHEOLOGICAL RESOURCES	Prehistoric and historic archeological sites are preserved, protected and monitored for future research (and possibly limited interpretation of these sites).	Establish a sustainable, consistent message from the park to the public to enhance stewardship goals.	- Collaborate with tribal partners to develop appropriate messaging regarding archeological resources. (High) (Mission Critical) - Coordinate with the social media team for messaging during archeological month. (Medium) - Update the park website with current information regarding archeological resources. (Low)
ARCHEOLOGICAL RESOURCES	Prehistoric and historic archeological sites are preserved, protected and monitored for future research (and possibly limited interpretation of these sites).	Recommendations for site treatments and activities are recorded in cultural resource plans.	- Identify and prepare appropriate plans for archeological site treatments. (Medium)
ARCHEOLOGICAL RESOURCES	Prehistoric and historic archeological sites are preserved, protected and monitored for future research (and possibly limited interpretation of these sites).	Determine impacts to archeological sites affected by recreational activities.	- Identify ongoing and emerging recreational activities and create a matrix of their potential effects to archeological sites to assist condition assessments and management plans. (Medium) - Conduct subsurface testing and monitor archeological sites for effects resulting from recreational activities. (Low)
ARCHEOLOGICAL RESOURCES	Prehistoric and historic archeological sites are preserved, protected and monitored for future research (and possibly limited interpretation of these sites).	An archeological management plan (AMP) is completed to address managing sites in various use areas.	- Identify the contents of what is needed in the AMP and its fundamental purpose for the protection of archeological resources at JOTR. (High) - Prepare PMIS project statements to fund the preparation of an AMP. (Medium) - Develop protection plans within the AMP for specific issues; i.e., illegal camping and OHV use, recreational activities, vandalism, and park infrastructure development, etc. (Medium)
ETHNOGRAPHY	Improve the understanding and relationship with traditionally associated peoples in the region and respect their traditional practices.	Establish active relationships with associated tribes to both renew their ties with still vital ancestral homelands and to expand knowledge of ethnographically important components that the park could prioritize for both natural and cultural resource management.	- Continue to build and improve relationships with tribal communities. (High) - Work with tribes to develop a prioritized list of ethnographically important components of integrated resources for both Sec. 110 baseline documentation and Sec. 106 considerations. (High) - Develop MOUs or similar partnership documents with individual tribes to formalize collaborative management of ethnographically significant resources. (Low)

PRIORITY RESOURCE AND COMPONENT	LONG-TERM GOAL (10–20 YEARS)	SHORT-TERM GOAL (3–5 YEARS)	STEWARDSHIP ACTIVITIES (WITH PRIORITIES)
ETHNOGRAPHY	Improve the understanding and relationship with traditionally associated peoples in the region and respect their traditional practices.	Ethnographic resources are identified and documented in consultation with associated tribes and other traditionally associated people. Complete, accurate and reliable information is retained in appropriate databases (CRIS-ER) with appropriate protection of confidential information and is used in all park management activities.	- Complete an ethnobotany study. (High) - Conduct outreach and consultation with tribes to expand understanding of night sky values and light pollution effects to protect dark night skies. (Medium) - Identify potential traditional cultural places and complete studies within the park. (Medium) - Establish protocols and procedures for sharing ethnographic data with traditionally associated communities. (Medium) - Complete ethnographic traditional use studies, or similar baseline documentation, for identified ethnographic resources. (Low)
ETHNOGRAPHY	Improve the understanding and relationship with traditionally associated peoples in the region and respect their traditional practices.	Expand/establish a tribal youth program to encourage participation from a broader array of associated tribes and support the program in the future.	- Continue partnerships and agreements with Conservation Legacy and their Ancestral Lands Program. (High) - Establish a local Southern California-based Ancestral Lands Program led and directed by tribal communities. (High)
ETHNOGRAPHY	Improve the understanding and relationship with traditionally associated peoples in the region and respect their traditional practices.	Encourage and facilitate the use of the park by associated communities.	- Facilitate tribal access to the park's educational programs and staff by ensuring annual updates of contact information for both park and tribal contacts. (High) - Encourage and facilitate tribal participation in service projects, science and research, and other park activities. (High) - Encourage and facilitate tribal access to the park for religious and traditional cultural practices and ensure access to properties of religious and cultural significance. (Medium) - Encourage and facilitate tribal members access to the park for recreation and other uses beyond traditional experiences. (Low)

PRIORITY RESOURCE AND COMPONENT	LONG-TERM GOAL (10–20 YEARS)	SHORT-TERM GOAL (3–5 YEARS)	STEWARDSHIP ACTIVITIES (WITH PRIORITIES)
ETHNOGRAPHY	Improve the understanding and relationship with traditionally associated peoples in the region and respect their traditional practices.	Ensure that tribes have access to traditional plants under the traditional plant gathering rule.	- Identify plants of interest to tribes that they wish to collect. (High) - Strategize compliance needs such as minimum requirement analysis for traditional plant gathering in wilderness areas. (High) - Prepare EAs for plants that have been requested for collection. (Medium) - Draft and execute the MOA for traditional plant gathering. (Medium) - Issue annual special use permits to allow plant collection. (Medium)
ETHNOGRAPHY	Improve inventory of ethnographic resources in the park.	Complete ethnographic resource and/or traditional use studies for prioritized list.	- Prioritize a list of ethnographic/ traditional use studies. (Low)
ETHNOGRAPHY	Improve inventory of ethnographic resources in the park.	Identify ethnographic collections and other connections with traditionally associated people.	- Revisit ethnobotany of homesteaders. (Low) - Define and identify ethnographic collections. (Low) - Identify other traditionally associated people with the park and explore funding options for documenting their connections. (Low)
HISTORY	Improve the comprehensive knowledge of the history of the region and the park.	Complete Historic Resource Studies (HRS) of significant historical themes (mining, climbing, homesteading, military) through inventory, research, compiling existing information, identifying sensitive resources, and assessing future research needs.	- Create a list of outstanding HRS needs. (High) - Create PMIS projects to complete HRSs. (Medium) - Complete HRSs. (Low)
HISTORY	Improve the comprehensive knowledge of the history of the region and the park.	Identify other potential historic themes and contexts.	- Complete periodic reassessments of new and emerging historic resource themes. (Low)

PRIORITY RESOURCE AND COMPONENT	LONG-TERM GOAL (10–20 YEARS)	SHORT-TERM GOAL (3–5 YEARS)	STEWARDSHIP ACTIVITIES (WITH PRIORITIES)
HISTORY	Improve the comprehensive knowledge of the history of the region and the park.	Establish a sustainable, consistent message from the park to the public to enhance stewardship goals.	- Make all HRSs available to the public via the park website and Integrated Resource Management Applications (IRMA). (High) - Annually coordinate with social media to promote relevant historic themes during emphasis months (ex: black history month, women's history month, etc.). (High) - Create or update a history-specific webpage. (Medium). - Collaborate with the interpretation division to develop interpretive programs highlighting the parks historical themes. (Low)
HISTORY	Improve the comprehensive knowledge of the history of the region and the park.	Update and complete NRHP nominations for sites and structures.	- Create PMIS projects for unevaluated sites and structures for NRHP nominations. (Medium) - Update existing PMIS statements to complete NRHP nominations. (Low)
HISTORY	Inventory and evaluation information is shared with park managers, and staff and incorporated into appropriate park planning documents to help properly manage cultural resources.	Improve the communication of historic themes (what they are) to park staff and understanding of potential implications to management activities/ options/directions.	- Explore alternatives for existing protocols in other parks for sharing historic themes and contexts to park staff. (Medium) - Develop a protocol to disseminate non-proprietary cultural resource information to park staff to be used for planning efforts. (Medium) - Provide briefing statements to park management as new park themes are identified. (Low)

PRIORITY RESOURCE AND COMPONENT	LONG-TERM GOAL (10–20 YEARS)	SHORT-TERM GOAL (3–5 YEARS)	STEWARDSHIP ACTIVITIES (WITH PRIORITIES)
HISTORY	NPS relations with historians, historical organizations, academic, other governmental agencies, and descendants of homesteaders are maintained.	Continue outreach to partners, stakeholders, descendants, agencies, educational institutions, etc. to gain a better understanding of park history and ties to the community.	- Continue partnerships and collaborations with UCR school of public history. (High) - Seek out and engage other academic history programs to help with the following elements: complete funded projects, identify new historical themes, complete DOEs or historic context statements for DOEs, develop internships, and foster career development cultural resource professionals. (Medium) - Improve and formalize partnership with the 29 Palms Historical Association for management of archives, collections of locally significant historic themes. (Medium) - Encourage engagement and collaboration with professional associations (ex: American Society for Environmental History (ASEH) for information sharing, developing partnerships and collaborative undertakings. (Low) - Engage with homesteader descendants to identify and acquire appropriate archival and collections materials and to improve knowledge of the history homesteading. (Low)
HISTORY	Complete and update National Register Documentation and nominations.	Develop a priority list by cross referencing the history of parkwide development.	- Identify all locally, regionally and nationally significant historic contexts and themes represented in the park and regularly update the administrative record with this information. (High) - Cross reference the identified historic themes with potentially eligible or unevaluated structures and properties. (Medium)
HISTORY	Complete and update National Register Documentation and nominations.	Properties with concurred upon DOEs are submitted to the Keeper for listing on the NRHP.	- Develop a prioritized list of previously concurred upon properties for listing to the NRHP. (High) - Complete nomination packages and submit to the Keeper. (Medium)
HISTORIC STRUCTURES	Protect historic structures and their character defining elements that may contribute to the listing or eligibility for listing on the National Register of Historic Places and provide for public enjoyment.	Maintain the List of classified structures (LCS) so that records are updated and recertified.	- Complete annual condition assessment according to the LCS schedule for historic structures. (High) (Mission Critical) - Update the LCS with change in condition, treatments are completed, and with baseline documentation for historic structures, including treatment plans, records of treatment and historic structure reports (HSRs). (Medium)

PRIORITY RESOURCE AND COMPONENT	LONG-TERM GOAL (10–20 YEARS)	SHORT-TERM GOAL (3–5 YEARS)	STEWARDSHIP ACTIVITIES (WITH PRIORITIES)
HISTORIC STRUCTURES	Protect historic structures and their character defining elements that may contribute to the listing or eligibility for listing on the National Register of Historic Places and provide for public enjoyment.	Complete Determinations of Eligibility (DOE) priority order for structures over 50 years.	- Identify funding to complete individual DOEs according to the prioritized list for historic structures. (Medium) - Prepare contracts, agreements, hire term positions or identify other avenues to complete individual DOEs according to the prioritized lists for historic structures. (Medium) - Prepare and submit completed DOEs according to the prioritized list to SHPO for historic structures. (Medium) - Submit a TAR to develop a priority list and strategy to complete NRHP documentation for historic structures. (Low)
HISTORIC STRUCTURES	Protect historic structures and their character defining elements that may contribute to the listing or eligibility for listing on the National Register of Historic Places and provide for public enjoyment.	Appropriate chronology, assessment, and treatment guidance is developed in an HSR and treatment recommendations are entered into FMSS as work orders.	- Prioritize the list of historic structures for completing HSRs. (High) - Prepare PMIS statements to complete HSRs for historic structures. (Medium) - Enter work orders for HSR treatments into FMSS. (Medium) - Submit HSRs for uploading documents into IRMA. (Low)
HISTORIC STRUCTURES	Protect historic structures and their character defining elements that may contribute to the listing or eligibility for listing on the National Register of Historic Places and provide for public enjoyment.	All historic structure locations and associated assets are accurately and consistently entered into FMSS and quality control is regularly conducted.	- Create assets records associated with historic structures. (High) (Mission Critical) - Identify Location records that need to be created for historic structures. (High) (Mission Critical) - Update CRVs regularly for historic structures when preparing work orders and projects. (Medium) - Review existing FMSS locations and cross reference against LCS, CLIs and other existing documentation for historic structures. (Medium) - Develop a protocol for how to enter historic structures into FMSS and resolve location versus assets discrepancies. (Low)
HISTORIC STRUCTURES	Protect historic structures and their character defining elements that may contribute to the listing or eligibility for listing on the National Register of Historic Places and provide for public enjoyment.	Treatment plans are developed and implemented to preserve historic structures where full HSRs are not applicable.	- Develop prioritized list of historic structures needing treatment plans. (Medium) - Prepare treatment plans for identified historic structures. (Medium) - Prepare FMSS work order and PMIS project statements to fund the treatment recommendations for historic structures. (Medium) - Complete stabilization treatments on the identified historic structures. (Medium)

PRIORITY RESOURCE AND COMPONENT	LONG-TERM GOAL (10–20 YEARS)	SHORT-TERM GOAL (3–5 YEARS)	STEWARDSHIP ACTIVITIES (WITH PRIORITIES)
HISTORIC STRUCTURES	Protect historic structures and their character defining elements that may contribute to the listing or eligibility for listing on the National Register of Historic Places and provide for public enjoyment.	Improve the condition of historic structures and increase the percentage of structures with upgraded condition.	- Identify historic structures in poor or fair condition and assess the feasibility of improving condition. (High) - Develop treatment recommendations for historic structures. (Medium) - Prepare FMSS work order and PMIS project statements to fund the treatment recommendations for historic structures. (Medium) - Complete stabilization treatments on the identified historic structures. (Medium)
HISTORIC STRUCTURES	Information regarding the proper management and protection of historic structures are shared with park managers, and staff and incorporated into appropriate park planning documents.	Develop a Cultural Resources Handbook that outlines the professional standards for properly managing historic structures to inform park staff.	- Develop a Cultural Resources Handbook that outlines the professional standards for properly managing historic structures to inform park staff. (Low)
HISTORIC STRUCTURES	Information regarding the proper management and protection of historic structures are shared with park managers, and staff and incorporated into appropriate park planning documents.	Establish a sustainable, consistent message from the park to the public to enhance stewardship goals.	- Annually coordinate with the social media team to disseminate a preservation message during national historic preservation month (consider annually identifying a message to promote each year; e.g., vandalism). (High) - Develop/revise the information on the park web page regarding historic structures. (Low) - Make historic structures documents available to the public as appropriate and upload into IRMA. (Low) - Continue working with interpretation division to conduct Keys Ranch tours to promote historic structure preservation message. (Low) - Work with the interpretive division to develop a program on historic structures. (Low)
HISTORIC STRUCTURES	Information regarding the proper management and protection of historic structures are shared with park managers, and staff and incorporated into appropriate park planning documents.	Update the existing "Keys Ranch Management Plan" to include routine and cyclic maintenance issues and long-term management.	- Develop routine and cyclic maintenance schedules for each structure and the landscape/grounds. (High) - Write project statements (FMSS work orders and PMIS project narratives) for funding routine and cyclic maintenance work. (Medium)

PRIORITY RESOURCE AND COMPONENT	LONG-TERM GOAL (10–20 YEARS)	SHORT-TERM GOAL (3–5 YEARS)	STEWARDSHIP ACTIVITIES (WITH PRIORITIES)
HISTORIC STRUCTURES	Develop a historic structures stewardship operation.	Work with facilities, utilities and trails program to explore the possibility of sharing positions that could support preservation activities.	- Identify positions and series that could be shared to support preservation activities for historic structures. (Medium) - Explore the possibilities of expanding shared positions to network scale (M&M network) for historic structures. (Low)
HISTORIC STRUCTURES	Develop a historic structures stewardship operation.	Explore the possibility of creating a career seasonal program lead position.	- Complete the announcement of recruitment hiring package for a career seasonal position for cultural resources. (High)
HISTORIC STRUCTURES	Information regarding historic structures is regularly conveyed to the public.	Partner with qualified organizations that can help complete historic preservation activities.	- Research and develop of list of qualified partners to complete historic preservation activities. (Low) - Develop cooperative agreements or other partnership documentation with identified organizations. (Low)
HISTORIC STRUCTURES	Information regarding historic structures is regularly conveyed to the public.	Use volunteers to help meet management and preservation goals.	- Continue to identify appropriate tasks for diverse volunteer groups to help meet historic preservation needs, goals, and specific projects. (High) - Continue Keys Ranch caretaker program. (High) - Explore expanding efforts to identify and recruit university volunteer groups that have the prerequisite skills necessary to help with historic preservation projects. (Medium) - Develop volunteer historic structure site docent program to convey proper site etiquette to visitors and discourage vandalism and graffiti. (Medium) - Continue and improve volunteer site steward program for historic structures. (Low)
HISTORIC STRUCTURES	Information regarding historic structures is regularly conveyed to the public.	Internal files are updated regularly, and information is organized in a standardized structure and files are made readily available.	- Update GIS information for historic structures. (High) - Cross-reference and organize the historic structure photo database with ICMS. (Medium) - Cross-reference archeological files with historic structures files to ensure comprehensive records management. (Medium) - Develop and implement a protocol for capturing all documentation and records for historic structures. (Low)

PRIORITY RESOURCE AND COMPONENT	LONG-TERM GOAL (10–20 YEARS)	SHORT-TERM GOAL (3–5 YEARS)	STEWARDSHIP ACTIVITIES (WITH PRIORITIES)
CULTURAL LANDSCAPES	Improve the understanding of historic integrity, significance, landscape characteristics, and features associated with ranching, homesteading, mining, and traditional cultural landscapes.	Complete CLRs following the prioritized list.	- Prepare and submit PMIS project requests for Key Ranch CLR. (High) - Develop priority CLR list for cultural landscapes. (Low)
CULTURAL LANDSCAPES	Improve the understanding of historic integrity, significance, landscape characteristics, and features associated with ranching, homesteading, mining, and traditional cultural landscapes.	Complete CLIs following the prioritized list.	- Complete CLI for Ironwood Mining District. (High) - Complete CLI for the Golden Eagle Mining District. (High) - Prepare and submit PMIS statements to complete the CLI for 29 Palms Mining District. (High) - Prepare and submit PMIS statements to complete CLI for Pinto Basin Mining District. (Medium) - Prepare and submit PMIS statements to complete CLI for Quail Springs Homesteading District. (Medium) - Develop priority CLI list for cultural landscapes. (Low) - Prepare and submit PMIS statements to complete CLI for Cottonwood Mining District. (Low)
CULTURAL LANDSCAPES	Improve the understanding of historic integrity, significance, landscape characteristics, and features associated with ranching, homesteading, mining, and traditional cultural landscapes.	Maintain and update CLI database in CRIS.	- Complete annual update with information from condition assessments for cultural landscapes. (High) - Update the CLI database as conditions change for cultural landscapes. (Medium)
CULTURAL LANDSCAPES	Improve the understanding of historic integrity, significance, landscape characteristics, and features associated with ranching, homesteading, mining, and traditional cultural landscapes.	Work with tribal communities to identify potential Traditional cultural landscapes.	- Engage with tribes to help identify potential traditional cultural landscapes. (Low) - Prepare and submit PMIS funding requests to complete Section 110 baseline documentation for traditional cultural landscapes. (Low)

PRIORITY RESOURCE AND COMPONENT	LONG-TERM GOAL (10–20 YEARS)	SHORT-TERM GOAL (3–5 YEARS)	STEWARDSHIP ACTIVITIES (WITH PRIORITIES)
CULTURAL LANDSCAPES	Improve the understanding of historic integrity, significance, landscape characteristics, and features associated with ranching, homesteading, mining, and traditional cultural landscapes.	Complete and update NRHP documentation.	- Create a prioritized list for districts to be listed to the NRHP for cultural landscapes. (High) - Update existing CLIs and complete listing of eligible cultural landscapes/districts to prepare for listing to the NRHP. (Low)
CULTURAL LANDSCAPES	Integrity of character and interrelationships between the structures and their historic setting maintained as landscapes change under climate change.	Maintain cultural landscapes in good condition and improve the historic character according to CLR treatment recommendations, while also being consistent with vegetation community stewardship goals.	- Prioritize the cultural landscapes for treatment. (High) - Prepare PIMS project statement to implement treatment recommendations for CLRs and CLIs. (Medium) - Implement treatment recommendations from the completed CLR and CLIs, while also being consistent with vegetation stewardship goals. (Low)
CULTURAL LANDSCAPES	Integrity of character and interrelationships between the structures and their historic setting maintained as landscapes change under climate change.	Utilize Climate Change Impact Assessment tool to manage and document cultural landscapes, characteristics and interrelationships that are under threat from climate change.	- Prioritize cultural landscapes for climate change impact assessments. (High) - Prepare climate change impact assessments for prioritized cultural landscapes. (High) - Prepare PMIS project statements to address treatment recommendations and mitigation measures for climate change impacts to cultural landscapes. (Medium)
MUSEUM COLLECTIONS AND ARCHIVES	Museum collection is maintained and readily accessible and researchable while maintaining NPS standards for preservation and use.	Improve the data quality of accession and catalog records.	- Ensure that hard copy museum records are put into ICMS. (High) - Complete processing of herbarium collection records to reduce backlog. (High) - Refine more accurate description of museum catalogue records including more accurate material and type descriptions, object names etc. (Medium) - Share herbarium collection information with the consortium of CA herbarium (CCH), and others. (Medium) - Complete deaccessioning of museum collection records. (Low)

PRIORITY RESOURCE AND COMPONENT	LONG-TERM GOAL (10–20 YEARS)	SHORT-TERM GOAL (3–5 YEARS)	STEWARDSHIP ACTIVITIES (WITH PRIORITIES)
MUSEUM COLLECTIONS AND ARCHIVES	Museum collection is maintained and readily accessible and researchable while maintaining NPS standards for preservation and use.	Increase the percentage of processed and digitized archives.	- Complete processing of backlog archive collection. (High) - Digitize historic photos and other photo collections and post to NP Gallery. (High) - Continue to digitize herbarium collection archives. (Medium) - Digitize superintendent/annual reports, major incident reports (central files) and planning documents. (Medium) - Establish a procedure to archive and migrate GIS project data. (Low)
MUSEUM COLLECTIONS AND ARCHIVES	Museum collection is maintained and readily accessible and researchable while maintaining NPS standards for preservation and use.	In collaboration with other CA desert parks, develop a museum management approach for the subregion.	- Complete a repository agreement with the Western Science Center for paleontological collections. (High) - Reach out to CA desert parks to engage them in a process to develop a common museum management approach. (Low) - Continue engagement with the Inland Empire museum managers collection group. (Low)
MUSEUM COLLECTIONS AND ARCHIVES	Museum collection is maintained and readily accessible and researchable while maintaining NPS standards for preservation and use.	Protocols are developed and reviewed for research collections and relevancy to the park.	- Continue interactions between the research coordinator and museum curator to hold permittees accountable to park to ensure research products are entered into park archives. (High) - Create a protocol for research permitting, data access, data sharing, and retrieving research products. (Medium)
MUSEUM COLLECTIONS AND ARCHIVES	Museum collection is maintained and readily accessible and researchable while maintaining NPS standards for preservation and use.	The percentage of catalogued objects is increased and assemblages that require updating in ICMs are identified.	- Continue to process backlog archival collections. (High) - Conduct 100% inventory of museum collections. (Medium)
MUSEUM COLLECTIONS AND ARCHIVES	Museum collection storage and exhibit facilities are maintained to full National Park Service standards.	Conservation assessments are in place for the archeological and cultural collections, with condition surveys for paper and photographs and archeological objects and natural history collections.	- Create PMIS statements and implement strategies to conduct cyclical conservation assessments and treatments for museum collections. (High) - Update and maintain HVAC system and compressed storage mechanisms to ensure continued physical access and environmental standards are met. (Medium) - Create PMIS statements to Update and review the collection management plan. (Low)

PRIORITY RESOURCE AND COMPONENT	LONG-TERM GOAL (10–20 YEARS)	SHORT-TERM GOAL (3–5 YEARS)	STEWARDSHIP ACTIVITIES (WITH PRIORITIES)
MUSEUM COLLECTIONS AND ARCHIVES	Park collection is searchable via finding aids and significant collection materials are digitized for access.	Archival records, including electronic records, are updated. A strategy for cataloging legacy archives is developed.	- Identify resources (intern, volunteer) to improve findings aids. (High) - Create PMIS statement to improve findings aids for archival records. (Medium) - Use media to make archives available to public (link on website). (Medium)
NATIVE FLORA—Mojave Desert and High-Elevation Plant Communities	Improve knowledge of changes to the distribution of Mojave and high-elevation plant communities and resilience to environmental change.	Improve scientific understanding of the effects of climate change, vegetation pathogens, and other stressors on Mojave Desert and high-elevation native plant communities in park.	- Analyze Mojave vegetation monitoring data for trends/changes in plant species composition and abundance possibly related to climate change. (High) - Continue to work with I&M to monitor 35 macroplots in Joshua Tree wooded alliance every 3 to 6 years for overall vegetation richness, composition, and cover. (Addresses stressors such as climate change, fire, invasive plants. soil erosion, and other human disturbance.) (Medium) - Explore opportunities to collaborate with partners to assess impacts to pinyon pine, juniper, oak, and other target species from pests and pathogens. (Medium) - Obtain and utilize the existing analysis of nitrogen deposition impacts to park vegetation from the NPS Air Resources Division; develop strategies to mitigate impacts to vegetation from Nitrogen deposition. (integrate with Air Quality analyses). (Low)
NATIVE FLORA—Mojave Desert and High-Elevation Plant Communities	Improve knowledge of changes to the distribution of Mojave and high-elevation plant communities and resilience to environmental change.	Refine and update mapping of blackbrush dominated plant communities.	- Assess the accuracy of current vegetation mapping data to delineate blackbrush dominated plant communities. If not accurate, utilize aerial imagery and/or conduct field surveys to refine mapping of these areas. (Medium) - Delineate GIS polygons of blackbrush-dominated communities. (Medium)
NATIVE FLORA—Mojave Desert and High-Elevation Plant Communities	Improve knowledge of changes to the distribution of Mojave and high-elevation plant communities and resilience to environmental change.	Improved understanding of natural fire regimes in high-elevation Mojave plant communities.	- Promote research and consult with fire scientists to better understand the natural role of fire in high-elevation plant communities in the Mojave portion of JOTR. (Low)
NATIVE FLORA—Mojave Desert and High-Elevation Plant Communities	Improve knowledge of changes to the distribution of Mojave and high-elevation plant communities and resilience to environmental change.	Better knowledge of changes to climate, especially freezing temperatures, in pinyon pine habitat.	- Collect temperature data from pinyon pine habitat, including Queen Mountain, Pushawalla Plateau, Coxcomb Mountains, and Eagle Mountains. (Low) - Analyze data to assess trends in freezing temperatures over time. (Low)

PRIORITY RESOURCE AND COMPONENT	LONG-TERM GOAL (10–20 YEARS)	SHORT-TERM GOAL (3–5 YEARS)	STEWARDSHIP ACTIVITIES (WITH PRIORITIES)
NATIVE FLORA—Mojave Desert and High-Elevation Plant Communities	Conserve biodiversity of native Mojave and high-elevation flora within potential ranges under climate change and minimize invasive annual grass-driven fires.	Improved understanding of spatial distribution, abundance, and interannual changes of invasive annual grass infestations in fire prone areas of the Mojave.	- Develop prioritization system for treating invasive annual grasses that alter Mojave fire regime. System should include prioritization of blackbrush dominated plant communities. (High) - Locate areas in the Mojave with these characteristics: healthy mature Joshua trees, Joshua tree recruitment, shrub component, and high coverage of invasive annual grasses. (High) - Determine configuration, location, and most effective techniques for invasive annual grass treatments in the Mojave according to fire behavior and ecological principles in collaboration with BLM fire and fuels specialists. (High) - Develop and implement a monitoring protocol to measure annual variation in invasive annual grass abundance in fire-prone areas of the Mojave. (Medium)
NATIVE FLORA—Mojave Desert and High-Elevation Plant Communities	Conserve biodiversity of native Mojave and high-elevation flora within potential ranges under climate change and minimize invasive annual grass-driven fires.	Remove invasive annual grasses in the Mojave to reduce unnatural fire occurrence.	- Systematically and cyclically treat invasive annual grass fuels in high priority treatment areas of the Mojave. (High) - Coordinate fuels management, campfire restrictions, and fire readiness with fire management. (High)
NATIVE FLORA—Mojave Desert and High-Elevation Plant Communities	Conserve biodiversity of native Mojave and high-elevation flora within potential ranges under climate change and minimize invasive annual grass-driven fires.	Protect blackbrush dominated plant communities from wildfire and invasive plants.	- Identify and implement potential fire suppression actions to protect blackbrush-dominated communities. (Medium)

PRIORITY RESOURCE AND COMPONENT	LONG-TERM GOAL (10–20 YEARS)	SHORT-TERM GOAL (3–5 YEARS)	STEWARDSHIP ACTIVITIES (WITH PRIORITIES)
NATIVE FLORA—Colorado Desert and Transition Zone Plant Communities	Increased knowledge of community structure, distribution and trends of Colorado Desert flora.	Improve understanding of changes to the distribution and condition of target Colorado Desert Plant species (e.g., Ocotillo, Ironwood) and native plant communities.	- Refine protocols to understand the distribution and abundance of target Colorado Desert plant species based upon climate change vulnerability assessments. (High) - Redefine spatial information on the current desert transition zone through an analysis of the distribution of indicator plant species. (High) - Continue to monitor established vegetation plots in the Colorado Desert and transition zone. Add more plots to increase sample size to better understand change over time. (Medium) - Continue to monitor the phenology of Ocotillo at Ocotillo Patch to understand how climate change may alter the timing and frequency of flowering and leaf production of this species. Add another phenology monitoring site for Ocotillo near Bajada Nature Trail. (Medium) - Promote the use of citizen science tools to collect observations on target Colorado Desert plant species (e.g., iNaturalist, Naturalista, etc.). Periodically download species observations of target species from citizen science tools, perform quality checks of these data, and incorporate data into species' distribution geodatabase. (Low)
NATIVE FLORA—Colorado Desert and Transition Zone Plant Communities	Conserve biodiversity of native Colorado Desert and transition zone flora within potential ranges under climate change and minimize impacts to biodiversity from invasive plant infestations.	Improved understanding of spatial distribution and abundance of fountaingrass.	- Continue to conduct ground surveys of fountaingrass infestations, with assistance from volunteers and IPMT. (High) - Conduct aerial monitoring of fountaingrass infestations. (Medium) - Continue to collaborate with USGS on fountaingrass distribution modeling. (Low) - Explore opportunities to support research on fountaingrass seed dispersal vectors to inform distribution modeling efforts. (Low)

PRIORITY RESOURCE AND COMPONENT	LONG-TERM GOAL (10–20 YEARS)	SHORT-TERM GOAL (3–5 YEARS)	STEWARDSHIP ACTIVITIES (WITH PRIORITIES)
NATIVE FLORA—Colorado Desert and Transition Zone Plant Communities	Conserve biodiversity of native Colorado Desert and transition zone flora within potential ranges under climate change and minimize impacts to biodiversity from invasive plant infestations.	Limit the spread and control infestations of fountaingrass.	- Conduct outreach to expand public awareness of fountaingrass. (High) - Partner with IPMT to control fountaingrass throughout this zone so that infestations are easily controlled on an annual basis. (High) - Partner with adjacent landowners and municipalities to remove fountaingrass plants from landscaping. (Medium) - Support efforts to control urban infestations of fountaingrass in municipalities adjacent to the park, including Twentynine Palms, Joshua Tree, and Desert Hot Springs. (Medium) - Promote the use of native and non-invasive plants in landscaping as an alternative to fountaingrass. (Medium) - Contact nurseries to urge the termination of fountaingrass sales. (Low) - Work with local governments to enact zoning restrictions on the use of fountaingrass. (Low)
NATIVE FLORA—Joshua Trees	Sustain Joshua tree populations within their potential range under climate change.	Control wildfires within Joshua tree climate change refugia.	- Annually maintain Covington Flats road network fire break to protect Joshua tree refugia. (High) - Develop a strategy to utilize fuel breaks on a landscape level to protect Joshua tree refugia. (High) - Utilize Resource Advisor Guide to inform and promote rapid fire suppression in Joshua tree refugia. (High)
NATIVE FLORA—Joshua Trees	Sustain Joshua tree populations within their potential range under climate change.	Remove invasive exotic plant species within Joshua tree climate change refugia.	- Explore a variety of methods to control invasive annual grasses including mechanical removal, various herbicides, and the promotion of biological control agents. (High) - Systematically and cyclically treat invasive annual grass fuels in climate change refugia for Joshua trees using the most effective methods. Adjust methods following adaptive management principles. (High)

PRIORITY RESOURCE AND COMPONENT	LONG-TERM GOAL (10–20 YEARS)	SHORT-TERM GOAL (3–5 YEARS)	STEWARDSHIP ACTIVITIES (WITH PRIORITIES)
NATIVE FLORA—Joshua Trees	Sustain Joshua tree populations within their potential range under climate change.	Direct visitor activity to areas outside of climate change refugia to minimize trampling of young trees.	- Continue outreach, education, and enforcement efforts to deter visitors from damaging Joshua trees (climbing, hammock control, etc.). (Medium) - Evaluate visitor use and their impacts in Joshua tree refugia. (Low) - Consider managing visitor use in Joshua tree refugia, including better delineation of access routes to minimize the effects of trampling and soil compaction on Joshua tree survival and reproduction. (Low)
NATIVE FLORA—Joshua Trees	Sustain Joshua tree populations within their potential range under climate change.	Restoration of degraded refugia for Joshua trees, especially burned areas.	- Utilize native plant materials, including nursery grown Joshua tree seedlings, to restore burned Joshua tree climate change refugia. (High) - Collect Joshua tree seeds in years of high fruit production for storage and revegetation. (Medium)
NATIVE FLORA—Joshua Trees	Improved understanding of the trends in Joshua tree distribution, resilience to environmental change, and the effects of other stressors on Joshua trees.	Improved understanding long-term demographic changes to Joshua tree populations parkwide.	- Establish a network of long-term monitoring plots to assess changes to Joshua tree populations. Plots should be sampled on a five-year rotation, and individual trees should be resampled. (High) - Conduct demographic analysis to understand the health of Joshua tree populations using long-term monitoring data. Produce a five-year report on the condition of Joshua trees parkwide. (High) - Continue to work with I&M to monitor Joshua tree mortality and recruitment on 35 macroplots in Joshua Tree wooded alliances. (Medium)
NATIVE FLORA—Joshua Trees	Improved understanding of the trends in Joshua tree distribution, resilience to environmental change, and the effects of other stressors on Joshua trees.	Improved knowledge of the spatial distribution of Joshua trees in the park and potential range contraction.	- Determine the exact spatial distribution of Joshua trees within the park. (Medium) - Establish "range-edge" plots to detect initial changes to Joshua tree distribution and any potential range contraction as a result of climate change. (Medium)

PRIORITY RESOURCE AND COMPONENT	LONG-TERM GOAL (10–20 YEARS)	SHORT-TERM GOAL (3–5 YEARS)	STEWARDSHIP ACTIVITIES (WITH PRIORITIES)
NATIVE FLORA—Joshua Trees	Improved understanding of the trends in Joshua tree distribution, resilience to environmental change, and the effects of other stressors on Joshua trees.	Improved understanding of Joshua tree resiliency to climate change through research.	- Promote research to better understand Joshua tree reproduction, including relationships with pollinators, masting, seed dispersal mechanisms, nurse plants, and asexual reproduction (sprouting). (High) - Promote research to better understand the ecophysiology of Joshua trees, their environmental tolerances, and how these may be impacted by climate change. (Medium) - Establish monitoring plots in burned areas to better understand the long-term recovery of Joshua trees following fire. (Medium) - Promote research to understand the effects of pests and pathogens on Joshua trees and how these stressors may change with a changing climate. (Medium)
NATIVE FLORA—Joshua Trees	Improved understanding of the trends in Joshua tree distribution, resilience to environmental change, and the effects of other stressors on Joshua trees.	Improved scientific understanding of the effects of climate change, invasive species, and other stressors on Joshua trees in the park.	- Conduct attribution analyses of the relative importance of potential factors for causing the observed changes in Joshua tree distribution, abundance, or health. (Medium)
NATIVE FLORA—Parkwide Native Plants	The abundance and diversity of spring and summer annual plant blooms follow natural cycles tied to precipitation events and are not impacted by invasive plants across the entire park.	Improved understanding of distribution of species, composition, and abundance spring and summer flower blooms (i.e., monitoring goal).	- Identify areas in the park where native annual plant diversity and abundance are highest. (High) - Establish and implement long-term monitoring strategies to assess changes to annual plant communities. Monitor changes on an annual basis. (Medium)
NATIVE FLORA—Parkwide Native Plants	The abundance and diversity of spring and summer annual plant blooms follow natural cycles tied to precipitation events and are not impacted by invasive plants across the entire park.	Improve scientific understanding of the effects of climate change, invasive species, and other stressors on wildflower species in the park.	- Promote research on the dynamics of native annual and nonnative annual plants to gain a better understanding of the impact nonnative annuals are having on the diversity, abundance, and phenology of native annual plants. (Medium) - Assess the effects of visitor use (social trails, trampling) on native wildflower blooms. (Medium)

PRIORITY RESOURCE AND COMPONENT	LONG-TERM GOAL (10–20 YEARS)	SHORT-TERM GOAL (3–5 YEARS)	STEWARDSHIP ACTIVITIES (WITH PRIORITIES)
NATIVE FLORA—Parkwide Native Plants	The abundance and diversity of spring and summer annual plant blooms follow natural cycles tied to precipitation events and are not affected by invasive plants across the entire park.	Minimization of impacts from stressors on native annual plants to help maintain abundance and diversity.	- Consider the creation of "wildflower viewing areas" to focus efforts to maintain native annual diversity and abundance, to create visitor viewing opportunities that limit impacts from trampling and remove invasive annual plant infestations. (Medium) - Test different treatment strategies to remove invasive annual plants and re-establish native annual plants such as pre and post-emergent herbicides, mechanical and hand pulling treatments, and direct seeding. (Low) - Limit social trailing and prevent OHV use in areas identified as most important for native annual plant diversity and abundance. (Low)
NATIVE FLORA—Parkwide Native Plants	Most populations of rare, threatened and endangered plants are stable or increasing; with high quality habitat and minimized human impacts.	Preservation of the two rare hybrid oak trees with no visitor caused damage (carving, graffiti).	- The phenology and condition of this tree is monitored on a weekly basis to ensure health Continue to monitor the phenology and condition of the rare hybrid oak by Live Oak Picnic Area on a weekly basis to ensure its health and detect changes over time. (Medium) - Place interpretive panel near tree to educate visitors on stewardship and importance. (Low) - Consider engineering solutions to prevent visitor access to tree. (Low)
NATIVE FLORA—Parkwide Native Plants	Most populations of rare, threatened and endangered plants are stable or increasing; with high quality habitat and minimized human impacts.	Improved understanding of targeted rare plant populations.	- Complete a genetic analysis of endangered plant Astragalus tricarinatus. (High) - Continue long-term monitoring of federally listed plants Astragalus tricarinatus and Erigeron parishii on an annual basis. (High) - Produce a report every 5 years analyzing monitoring data to assess trends in the condition of these species. Provide information to USFWS. (High) - Monitor a suite of rare plant populations on a cyclic basis to understand changes in distribution, abundance and health. (Medium) - Search for new occurrences of rare and listed plants and update GIS data annually with new observations. (Low)

PRIORITY RESOURCE AND COMPONENT	LONG-TERM GOAL (10–20 YEARS)	SHORT-TERM GOAL (3–5 YEARS)	STEWARDSHIP ACTIVITIES (WITH PRIORITIES)
NATIVE FLORA—Parkwide Native Plants	Most populations of rare, threatened and endangered plants are stable or increasing; with high quality habitat and minimized human impacts.	Vulnerable rare plant populations are protected from impacts of invasive plants, fire, and visitor caused damage (OHV incursions, social trailing, rock climbing).	- Regularly update spatial fire management plan with rare plant GIS data. (Low) - Limit vehicular access to rare plant populations through barricades and road delineation. (Low) - Through climbing management plan, analyze impacts to rare plants in climbing areas including social trails. (Low)
NATIVE FLORA—Parkwide Native Plants	Invasive plants become a lesser component of the ecosystem that does not substantially affect ecosystem function and biodiversity.	Improved understanding of spatial distribution, abundance, and interannual changes of invasive annual grasses and mustard infestations in park.	- Inventory and map the extent of mustard infestations in park. (High) - Define a control grid for mustard infestations and identify priority grid cells to implement control treatments. (High) - Develop and implement a monitoring protocol to measure annual variation in invasive annual grass abundance. (Medium) - Develop prioritization system for managing invasive annual grasses. (Medium) - Identify priority areas for treating annual grasses in the park. (Medium)
NATIVE FLORA—Parkwide Native Plants	Invasive plants become a lesser component of the ecosystem that does not substantially affect ecosystem function and biodiversity.	Remove invasive annual grasses and mustard species to reduce adverse effects on ecosystem function.	- Systemically and cyclically remove mustard infestations by targeting priority grid cells of mapped mustard infestations. Evaluate the effectiveness of control treatments in treated grid cells, and over time add more grid cells into the treatment scheme. (High) - Systematically and cyclically treat high priority infestations of invasive annual grasses. (Medium)

PRIORITY RESOURCE AND COMPONENT	LONG-TERM GOAL (10–20 YEARS)	SHORT-TERM GOAL (3–5 YEARS)	STEWARDSHIP ACTIVITIES (WITH PRIORITIES)
NATIVE FLORA—Parkwide Native Plants	Invasive plants become a lesser component of the ecosystem that does not substantially affect ecosystem function and biodiversity.	Conduct Early Detection and Rapid Response for new invaders and satellite infestations, and implement measures to prevent spread of invasive plants.	- Maintain a prioritized treatment list of exotic invasive plant species; review list periodically to focus efforts on species with highest impacts to ecosystems and highest probability to control. Add new species that pose threats to park resources as a result of new introductions within the region. (High) - Use volunteers to survey and treat satellite infestations through an iNaturalist project. (High) - Continue to implement a program to train volunteers and park staff on invasive plant identification in coordination with MOJN. (Medium) - Explore methods to document where invasive plants are not located (negative data). (Medium) - Collaborate with the Low Desert Weed Management Area and other land managers regionally to identify new invaders to be on the lookout for. (Medium) - Implement cultural practices for staff to prevent the spread of invasive plant propagules (e.g., vehicle washing, cleaning tools, minimizing disturbance). (Medium) - Collaborate with Roads Program to ensure that fill and other material brought into the park is unlikely to spread invasive plant propagules into project areas. Conduct quarry inspections for invasive plant infestations and avoid using contaminated material. (Medium)
NATIVE FAUNA—Desert Tortoise	Improved knowledge of abundance and distribution of desert tortoise in the park.	Maintain partnerships and promote research to improve desert tortoise understanding.	- Support Line Distance Sampling effort coordinated by the USFWS. (High) - Encourage research in the Park by UC-Riverside, USGS, and others to address tortoise data gaps. (High) - Attend and contribute to the multi-agency Recovery Implementation Team (RIT) for desert tortoise. (Medium) - Collaborate with researchers to identify data gaps with desert tortoise and explore ways to fund research. (Medium)

PRIORITY RESOURCE AND COMPONENT	LONG-TERM GOAL (10–20 YEARS)	SHORT-TERM GOAL (3–5 YEARS)	STEWARDSHIP ACTIVITIES (WITH PRIORITIES)
NATIVE FAUNA—Desert Tortoise	Improved knowledge of abundance and distribution of desert tortoise in the park.	Continue to track desert tortoise sightings in the park using a variety of methods (e.g., observation cards, iNaturalist).	- Analyze tortoise sighting data to identify "hot spots," develop population models, and assess other trends. (High) - Encourage and promote the use of citizen science tools to report tortoise sightings accurately (e.g., iNaturalist, Naturalista, wildlife observation cards, etc.). (Low) - Integrate iNaturalist tortoise data gathering into social media, park website, etc. (Low)
NATIVE FAUNA—Desert Tortoise	Minimization of negative effects to tortoises from human activities.	Improved understanding of human impacts on desert tortoises and their habitat.	- Track tortoise mortalities on park roads and develop actions to reduce this threat. (High) - Initiate research to establish the significance that road mortality may have on the population of desert tortoise within the park. (Medium) - Explore ways to characterize non-road-mortality visitor effects on tortoise. (Medium)
NATIVE FAUNA—Desert Tortoise	Minimization of negative effects to tortoises from human activities.	Improve visitor and park staff awareness of desert tortoises to support tortoise conservation.	- Work with interpretation staff to incorporate high-level protection messages for tortoise and other resources in the park map. (High) - Provide training to all park staff on desert tortoise conservation and awareness. (High) - Develop outreach materials and goals to educate visitors on endangered desert tortoise conservation and visitor effects on tortoise (via social media, website, park newspaper, etc.). (High) - Maintain and expand the Joshua Tree Creep Team to raise tortoise road mortality awareness and other conservation activities. (Medium)
NATIVE FAUNA—Desert Tortoise	Minimization of negative effects to tortoises from human activities.	Implementation of mitigation measures to reduce tortoise threats that result from indirect human interactions.	- Continue monitoring park construction projects and activities that pose a threat to desert tortoise. (High) - Work with USFWS to develop management actions to reduce tortoise mortality. (High) - Identify visitor activities that subsidize predatory ravens (e.g., visitor feeding, open dumpsters) and promote actions that reduce these subsidies (e.g., raven proof dumpsters). (Medium)

PRIORITY RESOURCE AND COMPONENT	LONG-TERM GOAL (10–20 YEARS)	SHORT-TERM GOAL (3–5 YEARS)	STEWARDSHIP ACTIVITIES (WITH PRIORITIES)
NATIVE FAUNA—Desert Tortoise	Sustain desert tortoise populations within their potential range under climate change.	Identify potential climate refugia in the park for desert tortoise and reduce potential conflicts with conserving tortoise in these habitats.	- Work with park vegetation staff to explore ways to protect and restore potential tortoise refugia from other factors that may degrade the habitat (e.g., fire, invasive species, etc.). (High) - Review potential reanalysis of current desert tortoise climate change projections using all available observations. (Low)
NATIVE FAUNA—Desert Tortoise	Sustain desert tortoise populations within their potential range under climate change.	Maintain research partnerships as it relates to climate change projections for desert tortoise.	- Support climate change research on desert tortoise (funding, researcher housing and field expertise). (High)
NATIVE FAUNA—Bighorn Sheep	Improved understanding of range and metapopulation structure of desert bighorn sheep.	Identify habitat use patterns and population dynamics in the park. Identify and address potential conflicts from visitation and disease spread to and from nearby populations outside the park.	- Work collaboratively with California Dept. Fish & Wildlife on gathering bighorn sheep data through survey and collaring projects. (High) - Continue to foster research on bighorn sheep abundance, behavior, health and genetics to identify and respond to problems (e.g., disease outbreak). (High) - Continue to solicit reports from visitors and staff relating to sick bighorn sheep seen at popular water sources. (High) - Continue game camera data collection and analysis; continue use of cameras to gauge visitor compliance with closures and overall use. (High) - Encourage and promote the use of citizen science tools to report bighorn sheep sightings accurately (e.g., iNaturalist, Naturalista, wildlife observation cards, etc.). (Medium) - Analyze bighorn sheep sighting data to identify hot spots, develop population models, and assess other trends important for conservation. (Medium) - Integrate iNaturalist bighorn sheep data into social media, website, etc. (Low)
NATIVE FAUNA—Bighorn Sheep	Improved understanding of range and metapopulation structure of desert bighorn sheep.	Maintain partnerships to accomplish conservation goals.	- Support survey and collaring effort coordinated by the California Department of Fish and Wildlife with funds, housing and field expertise. (High) - Encourage research in the park by universities and conservation groups (Oregon State University, Society for the Conservation of Bighorn Sheep, Wild Sheep Society, Desert Bighorn Council, and California Department of Fish & Wildlife) through networking. (High)

PRIORITY RESOURCE AND COMPONENT	LONG-TERM GOAL (10–20 YEARS)	SHORT-TERM GOAL (3–5 YEARS)	STEWARDSHIP ACTIVITIES (WITH PRIORITIES)
NATIVE FAUNA—Bighorn Sheep	Sustain bighorn sheep populations within their current/potential range to the extent possible under climate change.	Identify and model potential effects to the current range and distribution of bighorn sheep from climate change, especially as it relates to water availability.	- Utilize I&M spring data to identify status and trends in water availability, both in terms of distribution on the landscape and changes in seasonality of discharge. These data can then be used to assess and prioritize spring conservation and identify management tools to achieve conservation goals. (High) - Explore ways to maintain water sources and habitat connectivity for bighorn sheep based on existing climate change analysis. (Medium) - Consider the strategic use of management tools (water developments) to mitigate the loss of water sources from climate change or other human based activities. (Medium)
NATIVE FAUNA—Bighorn Sheep	Minimize disturbance to bighorn sheep from park visitors and adjacent communities at locations where interactions occur.	Identify sensitive locations and times of the year for bighorn sheep to explore actions that reduce stress to the animal.	- Maintain sensitive area closures at Cow Camp and Keys Ranch. Implement measures to protect sheep populations from visitor impacts at 49 Palms Oasis, Barker Dam, and other water sources. (High) - Identify sensitive lambing areas and develop a process for seasonal closures, if needed. (Medium)
NATIVE FAUNA—Bighorn Sheep	Minimize disturbance to bighorn sheep from park visitors and adjacent communities at locations where interactions occur.	Research and identify threats to sheep from visitation and neighboring communities.	- Support the USGS on a research project that explores visitor effects on sheep. (High) - Identify risk from nearby communities with domesticated animals for disease transmission into Park bighorn sheep herds. (Medium)
NATIVE FAUNA—Mammals	Identify and preserve bat habitats and monitor bat diversity and abundance.	Develop greater understanding of current bat species in the park and their status, current habitat locations, and protection needs.	- Continue to work with I&M to deploy acoustic bat detectors biannually at NABat priority cells and other targeted cells to identify species presence and distribution. (Medium)
NATIVE FAUNA—Mammals	Identify and preserve bat habitats and monitor bat diversity and abundance.	Establish protocol for protecting bat species from visitor activity.	- Design abandoned mine closures to minimize impacts to bat habitat; limit physical closures to high and medium health and safety risks. (High) - Continue to review projects in the Park that may affect bats (historic structures, palm frond trimming and removal, exclusions). (Medium) - Identify visitor activities that may affect bats and explore ways to protect them. (Low)

PRIORITY RESOURCE AND COMPONENT	LONG-TERM GOAL (10–20 YEARS)	SHORT-TERM GOAL (3–5 YEARS)	STEWARDSHIP ACTIVITIES (WITH PRIORITIES)
NATIVE FAUNA—Mammals	Identify and preserve bat habitats and monitor bat diversity and abundance.	Monitor for white-nose syndrome and other threats to bats.	- Continue to work with I&M to swab bats annually at NABat priority cells and other targeted cells to detect the presence or absence of white-nose syndrome. (High)
NATIVE FAUNA—Mammals	Respond to threats and concerns for mammal species of concern or where new threats are identified and may affect park populations.	Remain vigilant to species of mammals that are of concern for the park (e.g., mountain lion, American badgers, kit fox, ringtail, bobcat, etc.).	- Attend and participate in conferences and groups that identify problems with species of mammals found inside the park. (Low) - Maintain communications with a network of scientists for changes in status for mammal species. (Low)
NATIVE FAUNA—Birds	Improve understanding of trends in bird species richness and distribution in the Park.	Inventory, map, and monitor eagle and raptor nesting locations near external development activities that may affect nesting and foraging.	- Work with developers and conservation groups to explore ways to reduce the effects of development on raptors and eagles. (Medium)
NATIVE FAUNA—Birds	Improve understanding of trends in bird species richness and distribution in the Park.	Encourage citizen science-based activities to report bird sightings.	- Explore ways to promote surveys and events in the Park. Encourage the participation in Breeding Bird Surveys, Christmas Bird Counts and other citizen science programs that track bird populations and diversity. (Medium)
NATIVE FAUNA—Birds	Identify effects to native bird populations within their range under climate change.	Describe bird occupancy shifts and changes in the park.	- Continue to monitor bird assemblages on long term established plots to identify changes in occupancy over time from climate change and other stressors such as light pollution. (High)
NATIVE FAUNA—Birds	Minimize disturbances to raptor nesting from recreation activities.	Protect raptor nesting through seasonal closures and visitor education.	- Survey habitats for raptor nesting annually that are located in areas where visitor activities may affect nesting. Enact seasonal closures or other actions to reduce interactions. (High)
NATIVE FAUNA—Birds	Minimize disturbances to raptor nesting from recreation activities.	Encourage raptor nesting reporting by visitors, especially user groups like climbers and bird watchers.	- Continue supporting the Climber's Coffee program to educate visitors on raptor nesting and efforts to conserve these species in the Park. Update outreach materials annually and train climbing stewards to assist with nest reporting. (Low)
NATIVE FAUNA—Herpetofauna	Improved understanding of reptile and amphibian species richness in park.	Develop greater understanding of trends in herpetofauna populations with focus on species of conservation concern.	- Develop and implement monitoring programs for species with conservation concern. (Medium) - Assess changes in the distribution of herpetofauna resulting from climate change. (Medium)

PRIORITY RESOURCE AND COMPONENT	LONG-TERM GOAL (10–20 YEARS)	SHORT-TERM GOAL (3–5 YEARS)	STEWARDSHIP ACTIVITIES (WITH PRIORITIES)
NATIVE FAUNA—Herpetofauna	Improved understanding of reptile and amphibian species richness in park.	Contribute to knowledge of herpetofauna through collaborative research and citizen science.	- Encourage and promote the use of citizen science tools to report herpetofauna observations (e.g., iNaturalist, Naturalista, wildlife observation cards, etc.). (Medium) - Periodically download and evaluate quality of herpetofauna observation data from iNaturalist, etc. (Medium)
NATIVE FAUNA—Herpetofauna	Maintain, where possible, California treefrog populations in historically occupied habitats in the Park.	Determine habitat needs of California treefrogs at current and historic locations to inform future goals for conservation.	- Monitor California treefrog locations regularly for habitat needs (e.g., water levels, prey abundance) to inform future management considering a dryer future under climate change scenarios. (Medium)
NATIVE FAUNA—Invertebrates	Respond to threats and concerns for invertebrate species of concern or where new threats are identified.	Remain vigilant to species of invertebrates that may arise to a level of conservation concern for the Park (e.g., yucca moths, Casey's June beetle, monarch butterflies, etc.)	- Maintain communications with scientists for changes in status for invertebrate species. (Medium) - Attend and participate in conferences and groups that identify invertebrate conservation issues. (Low) - Encourage research on invertebrate conservation issues. (Low)
OASES, SPRINGS, AND OTHER RIPARIAN AREAS	Ecological integrity and cultural authenticity of oases and riparian areas are maintained or improved to support all native species and natural processes under climate change.	Improve and enhance visitor education, interpretation, and visitor mgmt.to protect natural and cultural resources at oases and riparian areas (incl. maintaining water quality at attraction sites, interpreting the Oasis of Mara, etc.).	- Identify and prioritize strategies and locations to better manage visitors at oases and riparian areas to help reduce trampling oases and riparian resources; seek tribal input regarding ethnographically important oases components to inform prioritization. (High) - Continue swimming prohibitions and trail closures to oases during times of drought to provide wildlife access, primarily bighorn sheep. (High) - Review, update, and apply educational materials and programs to increase public understanding and awareness of traditional ecological knowledge and scientific understanding of oases and riparian areas. (Medium) - Assess effectiveness of visitor use education/mgmt. measures at oases and riparian areas in protecting resources. (Medium) - Provide annual training for park staff who do park work in the oases on the cultural and natural resource values of the oases and riparian areas. (Low)

PRIORITY RESOURCE AND COMPONENT	LONG-TERM GOAL (10–20 YEARS)	SHORT-TERM GOAL (3–5 YEARS)	STEWARDSHIP ACTIVITIES (WITH PRIORITIES)
OASES, SPRINGS, AND OTHER RIPARIAN AREAS	Ecological integrity and cultural authenticity of oases and riparian areas are maintained or improved to support all native species and natural processes under climate change.	Understand and address the effect of groundwater withdrawals in the Twentynine Palms area on the Oasis of Mara.	- Continue groundwater monitoring at the Oasis of Mara. (High) - Develop comprehensive water budget model of the Oasis of Mara that incorporates climate change, and assess water movement to the west of the Oasis of Mara comprehensive water budget. (High) - Engage Twentynine Palms Water District, The 29 Palms Inn and the Twentynine Palms Band (casino) to pursue ways to mitigate adverse effects of the District's groundwater withdrawals on the Oasis of Mara. (Medium)
OASES, SPRINGS, AND OTHER RIPARIAN AREAS	Ecological integrity and cultural authenticity of oases and riparian areas are maintained or improved to support all native species and natural processes under climate change.	Manage and maintain the Oasis of Mara to be consistent with cultural landscapes, ethnographic values, and native natural communities under climate change.	- Continue irrigating Oasis of Mara manually to maintain vegetation until the irrigation system is upgraded/ replaced. (High) - Develop a management strategy for cultural and natural resources at the Oasis of Mara that incorporates tribal values, climate change (species viability), and groundwater extraction. (High) - Replace and upgrade the irrigation system at Oasis of Mara. (High) - Develop and implement interpretive programming and exhibits re: ethnographic values and anthropogenic impacts to the Oasis of Mara. (High) - Provide update on Oasis of Mara management strategy at annual tribal meeting. (High) - Compile and produce a briefing statement summarizing recent management at the Oasis of Mara to understand past efforts and their effectiveness. (Medium)
OASES, SPRINGS, AND OTHER RIPARIAN AREAS	Ecological integrity and cultural authenticity of oases and riparian areas are maintained or improved to support all native species and natural processes under climate change.	Limit the impact of invasive species on native species dependent on oasis/ riparian conditions.	- Remove invasive, exotic plant species from oases and riparian areas (e.g., tamarisk, fountain grass) to protect native vegetation. (High) - Trap and remove invasive black rats from the Oasis of Mara to protect California fan palms. (Low)

PRIORITY RESOURCE AND COMPONENT	LONG-TERM GOAL (10–20 YEARS)	SHORT-TERM GOAL (3–5 YEARS)	STEWARDSHIP ACTIVITIES (WITH PRIORITIES)
OASES, SPRINGS, AND OTHER RIPARIAN AREAS	Improved understanding of the natural resources and traditional human interactions associated with the oases, springs, and riparian areas within the park.	Improve understanding of locations and water quantity/quality trends in springs, oases, and seeps based on hydrological condition, including interannual variability and reduction of water flows due to climate change.	- With assistance from I&M, continue to monitor water quality and quantity at springs and oases. (49 Palms and Smithwater monitored quarterly with additional biennial water chemistry sampling, ten springs monitored annually with additional data loggers that detect seasonality of surface water, 25 springs monitored every 3 years.) (Medium)
OASES, SPRINGS, AND OTHER RIPARIAN AREAS	Improved understanding of the natural resources and traditional human interactions associated with the oases, springs, and riparian areas within the park.	Increase knowledge and monitoring of species that are dependent on desert aquatic and riparian habitat.	- Continue monitoring palm and mesquite health at the Oasis of Mara. (High) - Continue to work with I&M to monitor spring vegetation at 49 Palms, Smithwater, and Cottonwood (percent cover and composition). (High) - Continue to work with I&M to monitor benthic macroinvertebrates at 49 Palms Oasis and Smithwater Canyon. (High) - Assess the scope of current I&M vegetation monitoring efforts at 49 Palms, Smithwater, and Cottonwood Springs to identify if additional protocol is warranted or if there is need for citizen science projects to monitor native vegetation at other riparian areas. (Medium) - Develop and implement protocol to acquire and analyze remotely sensed data of vegetation in springs and riparian areas. (Low)
OASES, SPRINGS, AND OTHER RIPARIAN AREAS	Improved understanding of the natural resources and traditional human interactions associated with the oases, springs, and riparian areas within the park.	Improve understanding of human connections and traditional associations with spring, oasis, and riparian areas and transportation routes between these water sources.	- Conduct assessment of historic water uses and modifications at oases, riparian areas, and seeps/springs. (High) - Conduct archaeological investigations at palm oases to improve understanding of the role of fire in palm oases. (Low) - Expand oral history knowledge on the role of fire at palm oases. (Low)
GEOLOGIC RESOURCES	Improved understanding of tectonic processes and the processes that create desert landforms within the park in order to integrate knowledge into operations, planning, and interpretation for park visitors.	Encourage geologic research by universities and other geologic science institutions.	- Identify hydrogeologic and geologic research needs and data gaps. (High) - Request stipend from National Park Association to encourage graduate students to conduct geologic and hydrogeologic research within the park. (Medium)

PRIORITY RESOURCE AND COMPONENT	LONG-TERM GOAL (10–20 YEARS)	SHORT-TERM GOAL (3–5 YEARS)	STEWARDSHIP ACTIVITIES (WITH PRIORITIES)
GEOLOGIC RESOURCES	Improved understanding of tectonic processes and the processes that create desert landforms within the park in order to integrate knowledge into operations, planning, and interpretation for park visitors.	Expand geologic science expertise, knowledge, and/or representation in park staffing.	- Annually engage interpretive staff on new findings on geology and tectonics. (Medium)
GEOLOGIC RESOURCES	Preserve biological soil crust (BSC) and increase knowledge of the role it plays with soil stabilization and other ecological services.	Increase knowledge of biological soil crust within the park, its condition, and ecological role.	- Continue to work with I&M to monitor 35 macroplots in Joshua Tree wooded alliance every 3 to 6 years for presence and cover of biological soil crust (Might work with a short-term goal of: Improve understanding of the location and condition of BSC.) (High) - Complete data summary for existing soil crust information and identify data gaps and management needs. (High)
GEOLOGIC RESOURCES	Preserve biological soil crust and increase knowledge of the role it plays with soil stabilization and other ecological services.	Improve preservation of biological crust through increased education, outreach, and restoration.	- Continue outreach to climbing community to increase awareness of biological soil crust (e.g., climber coffee). (Medium) - Apply trail management mitigation techniques to reduce social trails and trampling including directing visitors in concentrated routes to protect of biological soil crust. (Medium) - Salvage topsoil for use in restoration projects. (Low) - Explore opportunities to restore areas of damaged biological soil crust via new technologies (tap university research on techniques). (Low) - Improve visitor awareness of biological soil crust, its ecological value, and threats to it via expanded interpretive programming and visitor outreach. (Low)

PRIORITY RESOURCE AND COMPONENT	LONG-TERM GOAL (10–20 YEARS)	SHORT-TERM GOAL (3–5 YEARS)	STEWARDSHIP ACTIVITIES (WITH PRIORITIES)
PALEONTOLOGICAL RESOURCES	Improved understanding of paleontological deposits in the context of climate change.	Encourage paleontological research by universities and other geologic science institutions.	- Enhance and expand the partnership with the Western Science Center for paleontologist assistance to recover fossils and curate them (which links to the Museum Collections activity to complete and sign the repository agreement). (High) - Request stipend from National Park Association to encourage graduate students or other paleontological specialists to assess newly-identified paleontological areas and/or gather data to assess known paleontological sites. (High) - Continue partnerships with USGS (currently Kathleen Springer) doing geo-chronological research to inform paleontological research. (Medium) - Promote professional paleontology publications to help prompt research interest in park paleontological resources. (Low)
PALEONTOLOGICAL RESOURCES	Improved understanding of paleontological deposits in the context of climate change.	Gather information on presence and condition of paleontological resources from existing NPS sources, partners, and tribes.	- Assess risk of known paleontological resources to erosion and other long-term damage from climate change and prioritize high risk paleontological resources. (High) - Request funding from National Park Association for annual Geoscientist in the Park (GIP) support to pay for a paleontology specialist to survey large sensitive areas in the park for presence/absence of paleontological resources (focusing on areas that are vulnerable to climate change). (High) - Engage with I&M Inventories 2.0 Program to acquire support for management of paleontological resources. (High) - Engage tribal partners to better understand their perspective on paleontological resources. (Medium)
PALEONTOLOGICAL RESOURCES	Protect, preserve and manage paleontological resource for education, scientific value and interpretive goals.	Protect paleontological discoveries, particularly in relation to exposure to climate change-enhanced fire, flood erosion, etc.	- Maintain and regularly update paleontology-geology GIS database. (Medium) - Develop park protocol for paleontological discoveries protection (which also addresses prioritized highly vulnerable areas). (Low)

PRIORITY RESOURCE AND COMPONENT	LONG-TERM GOAL (10–20 YEARS)	SHORT-TERM GOAL (3–5 YEARS)	STEWARDSHIP ACTIVITIES (WITH PRIORITIES)
PALEONTOLOGICAL RESOURCES	Protect, preserve and manage paleontological resource for education, scientific value and interpretive goals.	Minimize visitor use impacts to in situ paleontological sites via education and interpretation.	- Participate in Earth Science Week and National Fossil Day via social media posts and potential interpretive programs. (Medium) - Use surveillance technology in strategic locations to alert LE when visitors are encroaching on paleontological sites (e.g., Pinto Wells). (Low) - Integrate paleontological resource protection into work plans for boundary protection, interpretation, and visitor use management programs. (Low)
WATER RESOURCES— Groundwater	Increased knowledge of local and regional groundwater hydrology and potential reduction of recharge under climate change.	Encourage/procure groundwater aquifer research.	- Install a second production/monitoring well at Cottonwood existing well is fault bounded (with limited future yield.) Partner with facilities to accurately monitor consumption and mitigate with low flow (or no water) fixtures. (High) - Compile a well monitoring summary of the monitoring activity to date within the park (STAR). (Medium) - Connect with the CA Water Quality Control Board (local division) to get information from their local water basin management planning efforts. (Low) - Continue to collect data from the existing monitoring wells within the park on a quarterly basis and periodically transfer the data to inventory and monitoring division (IMD). (Low)
WATER RESOURCES— Groundwater	Minimize human use of groundwater resources in the park and improve/increase visitor understanding of water use in the park (and its effects).	Only high-efficiency water use appliances or facilities are used in all new and upgraded facilities within the park.	- Participate in planning and review of proposed projects that include water utilities and/or hardware to minimize water use in the park. (High) - Quantify existing water consumption at the Cottonwood Visitor Center by metering and assessing the system for leaks. This will be used to inform use levels at the proposed facility. (High) - Pursue cyclic maintenance funding to periodically evaluate for leaks and inefficiencies in the park's groundwater systems. (Medium)
WATER RESOURCES— Groundwater	Minimize human use of groundwater resources in the park and improve/increase visitor understanding of water use in the park (and its effects).	Improve education and outreach related to efficient human water use.	- Incorporate water conservation theme and water source information into interpretive displays, materials and at facilities. (High) - Provide an interpretive exhibit at Cottonwood about sustainable groundwater consumption use at the facility. (Medium)

PRIORITY RESOURCE AND COMPONENT	LONG-TERM GOAL (10–20 YEARS)	SHORT-TERM GOAL (3–5 YEARS)	STEWARDSHIP ACTIVITIES (WITH PRIORITIES)
WATER RESOURCES— Water Impoundments	Water impoundments are managed for wildlife use, wildlife viewing, cultural resources management, and safety to minimize negative impacts to other park values and resources.	Conduct necessary research to understand the integrity of existing dams/impoundments for the future management of park infrastructure.	- Explore alternative options to provide and maintain a water source for bighorn sheep as a replacement to the aging and ailing historic impoundments (Barker Dam, Cow Camp, Keys Ranch) on which the sheep currently rely. (High) - Identify the NPS dam safety person to obtain the final safety report that was previously conducted. (Medium)
NIGHT SKY	Continue to assess night sky quality in the park, especially in wilderness areas, and work within boundaries and with neighboring communities to raise awareness and improve conditions of the nocturnal environment.	Identify and monitor the condition of the park's night sky resource.	- Continue to use night sky camera to collect night sky data quarterly at a variety of locations in the park every 3 to 5 years or as changing conditions warrant (locations include: Keyes View, Blackrock Campground, Cottonwood Springs, Pinto Wells, Hexahedron Mine). (High) - Assess night sky data annually to determine condition change over time. (Low)
NIGHT SKY	Continue to assess night sky quality in the park, especially in wilderness areas, and work within boundaries and with neighboring communities to raise awareness and improve conditions of the nocturnal environment.	Identify sensitive species that are likely to be affected by impaired night sky quality.	- Seek researchers to help identify sensitive species (such as Yucca Moth and Joshua trees) to determine how they are impacted by light pollution in different areas of the park and how these populations impact Joshua Tree recruitment, and complete assessment report. (Medium)
NIGHT SKY	Continue to assess night sky quality in the park, especially in wilderness areas, and work within boundaries and with neighboring communities to raise awareness and improve conditions of the nocturnal environment.	Improve health and safety of visitors and wildlife by improving the nocturnal environment through reducing artificial light impacts from NPS facilities and park operations, and from visitor-based activities.	- Ensure current and future park facilities are consistent with the lighting management plan. (High) - Evaluate the potential impacts of visitor personal-use lights on night skies, and potentially update compendium (and enforce), as needed. (Medium) - Determine need and capacity for designated astronomy viewing areas using visitor use planning efforts. (Medium) - Assess visitor lighting needs in/around campgrounds (and use NSNSD and their data for assistance). (Low)

PRIORITY RESOURCE AND COMPONENT	LONG-TERM GOAL (10–20 YEARS)	SHORT-TERM GOAL (3–5 YEARS)	STEWARDSHIP ACTIVITIES (WITH PRIORITIES)
NIGHT SKY	Continue to assess night sky quality in the park, especially in wilderness areas, and work within boundaries and with neighboring communities to raise awareness and improve conditions of the nocturnal environment.	Partner with neighboring communities, landowners, and other entities to reduce artificial light impacts in the region.	- Continue working with the San Bernardino Night Sky Alliance (and other municipalities) to improve, educate, and enforce new ordinance relating to light pollution and light trespass from surrounding existing and proposed land use developments surrounding park. (High) - Utilize data to update IDA tier status based on effectiveness of San Bernardino County ordinance implementation. (High) - Advise local governments on active ways surrounding municipalities can help mitigate light pollution (Coachella Valley). (High) - Collaborate with local tribes to understand the value of night skies and mitigate light pollution from existing and proposed development (Twentynine Palms Band casino). (Medium) - Collaborate with Basin & Range Dark Sky Coalition to improve dark night sky condition. (Low)
NIGHT SKY	Continue to assess night sky quality in the park, especially in wilderness areas, and work within boundaries and with neighboring communities to raise awareness and improve conditions of the nocturnal environment.	Improve public understanding of the value of the nocturnal environment on park resources and experiences.	- Continue to participate in astronomy events partnering with Sky's the Limit Observatory and other partners to promote enthusiasm about the night sky resource at JOTR. (Medium) - Conduct annual work planning meeting with Interpretive and education program to expand visitor understanding on night sky values and light pollution effects (to protect dark night skies). (Medium) - Support the Night Sky Festival. (Low)

PRIORITY RESOURCE AND COMPONENT	LONG-TERM GOAL (10–20 YEARS)	SHORT-TERM GOAL (3–5 YEARS)	STEWARDSHIP ACTIVITIES (WITH PRIORITIES)
AIR QUALITY	Improve understanding of air quality condition, trends, and pollution impacts; and maintain the long-term air quality data record, through continued monitoring of visibility, particulate matter, ozone, and pollutant deposition.	Improve understanding of air quality through continued monitoring, compiling existing information, identifying sensitive resources, assessing future research needs, and educating park staff about impacts to resources.	- Continue to support the NPS air quality monitoring programs and special studies including IMPROVE, CASTNET, NADP, NPS-GPMP, particulate matter, and Scene monitoring (Camera plus included on the AQ webcam page with associated AQ data) stations, including site operator staff and training. (High) (Mission Critical) - Assess air quality monitoring needs and explore opportunities for sharing the costs and data with outside entities and agencies including (EPA, CARB, SCAMD, and MAQMD). (High) (Mission Critical) - Use existing online sources for understanding of the latest air quality information including: park conditions and trends, regional conditions and trends, air quality monitors map, JOTR Class I park air profile, park sensitive species, live ozone and weather data, park ozone exceedances, ozone levels and smoke plumes, and nearby sources of air pollution. (High) - Investigate options to monitor PM2.5 and PM10 to optimize data needed for health advisories and to understand conditions across the park and monitor for exceedances - lack of data prevents the park from implementing mitigations. (High) - Subscribe to the California Air Resources Board (CARB), South Coast Air Quality Management District, and Mojave Desert Air Quality Management District mailing list(s) to stay current on new and existing sources of air pollution by receiving public notices, division updates, warnings, and regulatory information. (High) - Develop/Update existing park air quality summary, including compilation of existing data, condition, threats, sensitive resources, and research (with assistance from ARD). Distribute this summary strategically. Engage interpretive staff to translate the information for a broader public audience. (Medium)

PRIORITY RESOURCE AND COMPONENT	LONG-TERM GOAL (10–20 YEARS)	SHORT-TERM GOAL (3–5 YEARS)	STEWARDSHIP ACTIVITIES (WITH PRIORITIES)
AIR QUALITY (CONTINUED)	**CONTINUED**	**CONTINUED**	- Include air quality summary information into staff training and handbook. Give annual briefing to the management team. (Medium) - Determine the need for continued participation in the national dragonfly mercury project coordinated by ARD. Dragonfly Mercury Project Core Team sampled dragonfly larvae March 2020 from 49 Palms Oasis. (Medium) - Assess future needs in air quality research and ecosystem responses to identify and improve understanding of impacts to sensitive resources from nitrogen deposition and other pollutants. (including soil crust and lichen potentials, and including potential nitrogen deposition from agricultural and golf course sources). (Low) - Further investigate injury to the park's ozone-sensitive plant species including sandbar willow, Goodding's black willow, dogbane, and skunkbush (NPSpecies database). (Low)

PRIORITY RESOURCE AND COMPONENT	LONG-TERM GOAL (10–20 YEARS)	SHORT-TERM GOAL (3–5 YEARS)	STEWARDSHIP ACTIVITIES (WITH PRIORITIES)
AIR QUALITY	Improve understanding of air quality condition, trends, and pollution impacts; and maintain the long-term air quality data record, through continued monitoring of visibility, particulate matter, ozone, and pollutant deposition.	Provide information about air pollution impacts to NPS management, air regulatory agencies, the public, the scientific community and other stakeholders.	- Continue implementing park air quality health advisory postings in the morning report, at the three entrance stations, and at visitor centers. (High) (Mission Critical) - Include park air quality health advisory information (ozone, particulate matter) in employee job hazard analysis (JHA) for staff working outdoors, in addition to weather hazards. Develop protocol for JHA for high ozone and PM levels. (High) - Improve the air quality section on the park website including links to webcam, live data, ozone exceedances, and conditions and trends. Review trip planning page to encourage reduced vehicle emissions (encourage carpooling, etc.). (Medium) - Implement long range interpretive plan and integrate air quality and the impacts it has on the park, regionally, and globally into interpretive programing, messaging, and materials (Annual interpretive training, Student Climate Change Summit, Desert Institute). (Medium) - Consider installing an EPA Village Green Air Monitoring Bench (interactive interpretive element) in a high-visitor use area. (Medium) - Explore options to inform visitors of real-time ozone levels in locations throughout the park to improve awareness of current conditions. (Medium) - Explore creation and use of an ozone garden with the park's ozone-sensitive plant species for a tangible connection with park resources. (Low) - Explore labelling existing Cap Rock Nature Trail ozone-sensitive plant species. (Low) - Investigate adding PM advisory postings at entrance stations and at visitor centers. (Low)

PRIORITY RESOURCE AND COMPONENT	LONG-TERM GOAL (10–20 YEARS)	SHORT-TERM GOAL (3–5 YEARS)	STEWARDSHIP ACTIVITIES (WITH PRIORITIES)
AIR QUALITY	Seek to perpetuate the best possible air quality condition for the protection of resources affected by air pollution, eliminating human caused visibility impairment by the year 2064 (where the average visibility is < 2 deciviews above natural conditions), and achieving attainment for the EPA National Ambient Air Quality Standards (NAAQS).	Be an environmental leader by reducing park air pollutant emissions, improving park sustainability and environmental management, [demonstrating the park's commitment to do its part for air quality, water quality, night sky and climate change].	- Comply with CARB regulations relating to diesel powered equipment and older I- Vehicles. Consider replacing equipment with greener alternatives. (High) - Implement mitigations to reduce fugitive dust during road and/or shoulder maintenance, repair, and resource management activities. (High) - Explore strategies to reduce fugitive dust on unpaved roads within the park, including potentially reducing speed limits and the use of environmentally friendly dust palliatives on heavily traveled roads. (Low) - Develop and implement a park Air Resources Strategy. (Low)
AIR QUALITY	Seek to perpetuate the best possible air quality condition for the protection of resources affected by air pollution, eliminating human caused visibility impairment by the year 2064 (where the average visibility is < 2 deciviews above natural conditions), and achieving attainment for the EPA National Ambient Air Quality Standards (NAAQS).	Collaborate with other federal, state, regional and local planning organizations, and stakeholders to reduce air quality impacts in the park from sources of air pollution.	- Collaborate with NPS ARD on the next round of regional haze planning (due 2021) to ensure impact evaluations and park interests are represented for new and modified existing sources of air pollution. (High) (Mission Critical) - With assistance from PWR and the NPS external renewable energy group, continue to collaborate with BLM, EPA, and ARD to identify and address potential resource impacts from the Riverside East Solar Energy Zone and other nearby projects. (High) - Maintain existing and initiate new cooperative reimbursable agreements with developers to monitor air quality impacts. (High) - Work cooperatively and maintain relationships with EPA, California Air Resources Board, BLM, Marine Corps Air Ground Combat Center, South Coast Air Quality Management District, Mojave Desert Air Quality Management District, and the municipalities of the Coachella Valley and the Morongo Basin to reduce air quality impacts from sources of air pollution and public messaging. (Medium) - Collaborate with the Salton Sea Authority, State of California, and NPS legislative affairs to stay informed and work towards reducing air pollution from the evaporation of the Salton Sea. Consider submitting a technical assistance request to the NPS Air Resources Division. (Medium) - Seek voluntary opportunities for collaboration on messaging regarding pollution sources. (Low)

PRIORITY RESOURCE AND COMPONENT	LONG-TERM GOAL (10–20 YEARS)	SHORT-TERM GOAL (3–5 YEARS)	STEWARDSHIP ACTIVITIES (WITH PRIORITIES)
SOUNDSCAPE	Continue to assess soundscape quality in the park, especially wilderness areas, and reduce nonnatural and inappropriate noise in and around the park to protect and enhance the condition of the natural soundscape.	Identify and monitor the condition of the acoustic resource.	- Analyze and report on existing acoustic data (from NSNSD and the park) from 2011-2019. Work with NSNSD to develop acoustic sampling for the park to capture and mitigate noise sources that impact resources in the park. (Medium) - Archive raw acoustic data from NSNSD within 30 days of collection. (Medium)
SOUNDSCAPE	Continue to assess soundscape quality in the park, especially wilderness areas, and reduce nonnatural and inappropriate noise in and around the park to protect and enhance the condition of the natural soundscape.	Partner with neighboring communities, landowners, and other entities to reduce external noise impacts.	- Develop contacts at Miramar to discuss potential changes to their overflight path over the park in Pinto Basin (Western Air Space Range Council Meeting). (High) - Pursue educational effort with municipal airports regarding considerations and impacts to the natural soundscape within the park. (High) - Work with the Marine Corps Air Ground Combat Center in Twentynine Palms, California to consider acoustic and resource impacts from combat center operations including overflights. Establish a yearly meeting to discuss park resources and how the MCAGCC can avoid damage to these resources. (Medium) - Track emerging development of air tours over the park and regional commercial airport expansion (Medium).
SOUNDSCAPE	Continue to assess soundscape quality in the park, especially wilderness areas, and reduce nonnatural and inappropriate noise in and around the park to protect and enhance the condition of the natural soundscape.	Improve public understanding of the effects of nonnatural sounds on park resources and experiences.	- Implement the long-range interpretive plan to incorporate natural sounds, natural skies, and scenic views into interpretive materials and in visitor center exhibits. (Low) - Celebrate and provide exhibits for World Listening Day within the park (in July). (Low)

PRIORITY RESOURCE AND COMPONENT	LONG-TERM GOAL (10–20 YEARS)	SHORT-TERM GOAL (3–5 YEARS)	STEWARDSHIP ACTIVITIES (WITH PRIORITIES)
SCENIC VIEWS	Protect, improve, and monitor the condition of views important for natural scenery and cultural resources both within and across park boundaries to maintain or improve visual character.	Inventory and assess park views over time to monitor changes in condition.	- Complete the 2015-17 visual resource inventory by finishing view importance information for remaining views (10 of 17) in the Enjoy the View (ETV) database. (High) - Review and finalize the draft visual resource inventory summary report, including a visual resource management strategy and recommendations. (High) - Repeat visual resource inventory every 5-10 years or as landscape changes are observed, to monitor changes in condition. (Medium) - Assess vulnerability of park views using NPS ARD guidance to understand protections and threats. (Low) - Continue coordinating with ARD to conduct visual impact assessments for proposed development in the vicinity of the park, including the Riverside East Solar Energy Zone communication facilities. (Low)
SCENIC VIEWS	Protect, improve, and monitor the condition of views important for natural scenery and cultural resources both within and across park boundaries to maintain or improve visual character.	Minimize changes, visual contrast, and intrusions to views to the extent possible within the park.	- Adopt ARD recommended or develop park visual resource best practices or facility design guidelines for facility development and/or improvements inside the park, and to be consistent with identified cultural landscapes and ecological values. (Cottonwood, West Entrance, Black Rock). (High) - Remove unused facilities, structures (including pumphouse, air monitoring shed), signs or other visual intrusions in the park. (Low)

PRIORITY RESOURCE AND COMPONENT	LONG-TERM GOAL (10–20 YEARS)	SHORT-TERM GOAL (3–5 YEARS)	STEWARDSHIP ACTIVITIES (WITH PRIORITIES)
SCENIC VIEWS	Protect, improve, and monitor the condition of views important for natural scenery and cultural resources both within and across park boundaries to maintain or improve visual character.	Collaborate with adjacent landowners, municipalities, developers, and other stakeholders to promote cooperative conservation of views across park boundaries.	- In partnership with stakeholders, establish best practices and/or design guidelines for inholders and adjacent landowners. (High) - Build/maintain partnerships with neighboring land managers, BLM, DOT, San Bernardino County, military, communication companies, urban planners, park neighbors, developers, and other stakeholders to develop understanding of shared visual values/educate about scenic view protection. (Medium) - Engage with partners to share JOTR concerns and advocate for local municipalities/governments to develop, implement and enforce master planning and zoning policies that maintain or improve view character. (Most municipalities have master planning and zoning policies but limited implementation and enforcement). (Medium)
SCENIC VIEWS	Protect, improve, and monitor the condition of views important for natural scenery and cultural resources both within and across park boundaries to maintain or improve visual character.	Provide enhanced opportunities for visitors to access and understand the importance of park views.	- Interpret the impacts from air pollution to the scenic views at Keys View. Collaborate with interpretation division to provide additional interpretation for the public at this site that highlights the scenic views. (High) - Engage the park's social media team to ponder ways to entice and improve public value of scenic views within the park. (Medium) - Include important views chosen for the visual resource inventory into the scenic photo gallery on the park's website. (Low)

PRIORITY RESOURCE AND COMPONENT	LONG-TERM GOAL (10–20 YEARS)	SHORT-TERM GOAL (3–5 YEARS)	STEWARDSHIP ACTIVITIES (WITH PRIORITIES)
WILDERNESS CHARACTER	Joshua Tree National Park Wilderness, including physical resources, intangible values, and wilderness character qualities, is protected, preserved, and access is maintained.	Understand the baseline wilderness character condition and changes over time.	- Complete Wilderness Character Assessment and baseline condition documentation FY20. (High) - Monitor indicators for visitor capacity in wilderness, as defined in various park plans; report findings to Wilderness Committee. (High) - Maintain GIS layers to ensure accuracy of wilderness boundaries JOTR GIS server and Wilderness.net. (High) - Add Wilderness Character Assessment data into interagency wilderness character monitoring database; maintain data with Wilderness.net. (Medium) - Develop geodatabase of climbing routes to inform bolt removal, replacement and installation requests in conformance with DO-41. (Medium) - Every 5 years, use the monitoring plan to measure wilderness conditions to determine if/where the five qualities of wilderness character are changing (FY24, FY29, FY34…) (Medium)

PRIORITY RESOURCE AND COMPONENT	LONG-TERM GOAL (10–20 YEARS)	SHORT-TERM GOAL (3–5 YEARS)	STEWARDSHIP ACTIVITIES (WITH PRIORITIES)
WILDERNESS CHARACTER	Joshua Tree National Park Wilderness, including physical resources, intangible values, and wilderness character qualities, is protected, preserved, and access is maintained.	Maintain and restore wilderness character.	- Continue convening Wilderness Committee, responsible for work planning, Minimum Requirement Decision reviews and staff training. (High) (Mission Critical) - Use park planning efforts to maintain or improve wilderness character (e.g., trail management plan, climbing management plan, overnight use plan). (High) - Review CERCLA planning for 14 mill sites and work with Superintendent and Regional office to minimize impacts to wilderness; proposed activities include use of heavy equipment and establishing roads into wilderness to remove contaminants. (High) - Conduct adaptive management actions in response to visitor capacity indicators exceeding thresholds. (High) - Develop/Update wilderness stewardship plan. (Medium) - Establish guidelines for installation of signs in wilderness to balance SAR related impacts with unconfined recreational experience. (Medium) - Establish protocol to protect and improve wilderness stewardship in the park and to improve areas where multiple wilderness qualities are compromised (tracking prohibited uses, such as helicopter landings, installations). (Low) - Continue to support MDLT to acquire inholdings in Wilderness. (Low)
LANDSCAPE-SCALE AND CROSS-BOUNDARY RESOURCES AND COLLABORATION	Improved storage and accessibility to resource information.	NA	- Establish a procedure to archive and migrate GIS project data. (High) - Annually update data management plan and staff accountability protocols. (High) - Map and manage research equipment parkwide. (High) - Digitize superintendent/annual reports, major incident reports (central files) and planning documents. (Medium) - Improve reporting mechanisms to NRSS, IRMA, eTIC, etc. (Medium) - Annually update national GIS servers with park GIS data. (Medium)

PRIORITY RESOURCE AND COMPONENT	LONG-TERM GOAL (10–20 YEARS)	SHORT-TERM GOAL (3–5 YEARS)	STEWARDSHIP ACTIVITIES (WITH PRIORITIES)
LANDSCAPE-SCALE AND CROSS-BOUNDARY RESOURCES AND COLLABORATION	Park resources are managed with a more holistic, regional perspective that explicitly considers cross-boundary resource needs and proactively addresses cross-boundary resource threats.	Improve scientific understanding of landscape-scale and cross-boundary resource issues to inform park management.	- Build off GPRA Landscape Condition and standardize protocol for natural condition assessments to inform prioritization of science and stewardship efforts. (High) - Broker priority research questions. (High) - Maintain the Dr. James Buckner Luckie Study Center as a hub for high quality applied research and learning through partnerships with academic, nonprofit, and professional organizations. Science-based results generated from center-sponsored activities inform park management on critical issues and benefit local scientific and residential communities. (High) - Identify regional wildlife migration corridors / patterns. (Medium) - Build and develop partnerships with ESRI, local governments, etc. to promote cross-boundary GIS sharing. (Medium)
LANDSCAPE-SCALE AND CROSS-BOUNDARY RESOURCES AND COLLABORATION	Park resources are managed with a more holistic, regional perspective that explicitly considers cross-boundary resource needs and proactively addresses cross-boundary resource threats.	Appropriately manage visitor use to minimize impacts to natural and cultural resources.	- Continue numerous efforts to collect visitor use data to inform resource management activities (e.g., KSU Visitor Use Survey and Cell Data Analysis, FLHP Bluetooth study). (High) - Complete climbing management plan with Environmental Quality Division. (High) - Complete overnight use/trail management plan with Denver Service Center. (High) - Develop monitoring to assess efficacy and effectiveness of mitigations for visitor use impacts (will be developed as a part of forthcoming visitor use related planning). (High) - Continue coordinated efforts to address vandalism (graffiti, looting, destruction of resources); implement JOTR Graffiti Standard Operating Procedure. (High) - Identify funding and hire an Outdoor Rec Planner; integrate position into SRS or Park Planning Team. (Medium) - Maintain Visitor Use Management Briefing Statement to track actions to improve visitor experience and maintain or improve resource condition. (Low)

PRIORITY RESOURCE AND COMPONENT	LONG-TERM GOAL (10–20 YEARS)	SHORT-TERM GOAL (3–5 YEARS)	STEWARDSHIP ACTIVITIES (WITH PRIORITIES)
LANDSCAPE-SCALE AND CROSS-BOUNDARY RESOURCES AND COLLABORATION	Park resources are managed with a more holistic, regional perspective that explicitly considers cross-boundary resource needs and proactively addresses cross-boundary resource threats.	Protect park resources via cross-boundary stewardship by partnering with neighboring communities, landowners, and other entities to protect natural resources within the park.	- Partner with neighboring communities, landowners, and other entities to protect wildlife migration patterns and maintain habitat connectivity. Consider the effects of climate change and other stressors/ barriers to these migration patterns and habitats. (Medium)
LANDSCAPE-SCALE AND CROSS-BOUNDARY RESOURCES AND COLLABORATION	Park resources are managed with a more holistic, regional perspective that explicitly considers cross-boundary resource needs and proactively addresses cross-boundary resource threats.	Expanded outreach with partners, regional communities, and the public to increase awareness of landscape-scale resource issues and leverage collaboration on cross-boundary resource management.	- Develop talking points for cross-boundary concerns including air quality, night skies, scenic views, etc. to express during stakeholder/partnership meetings and during superintendent briefings to provide consistency in the discussion across multiple venues. This would be updated annually to stay current and to correlate with updates to the RSS goals/ activities. (High) - Develop a partnership strategy/plan (per foundation) for collaboration on the protection of cross boundary resources and response to climate change effects. (High) - Conduct annual meeting with interpretation and education to target public understanding of particular resources and broader cross-boundary resource issues. (Medium) - Continue coordination with the Basin and Range Dark Sky cooperative. (Medium)
LANDSCAPE-SCALE AND CROSS-BOUNDARY RESOURCES AND COLLABORATION	Reduce adverse effects of cross-boundary and landscape-scale human-induced stressors on park resources.	Minimize impacts of fire suppression activities on park resources.	- Provide routine training and briefings to ensure and improve internal park and external fire-related partner comprehension of the contents of the park Resource Advisory Guide. (High) - Annually review and revise the Resource Advisor Guide and GIS data. (High)

PRIORITY RESOURCE AND COMPONENT	LONG-TERM GOAL (10–20 YEARS)	SHORT-TERM GOAL (3–5 YEARS)	STEWARDSHIP ACTIVITIES (WITH PRIORITIES)
LANDSCAPE-SCALE AND CROSS-BOUNDARY RESOURCES AND COLLABORATION	Reduce adverse effects of cross-boundary and landscape-scale human-induced stressors on park resources.	Minimize off-highway (OHV) vehicle incursions originating from the parks southern and eastern boundaries.	- Construct barricades in strategically located areas to reduce OHV incursion into park. (High) - Increase law enforcement patrols to reduce OHV incursions. (High) - Increase education and outreach efforts to OHV communities to help reduce OHV incursions in partnership with neighboring landowners through route planning and recreation management efforts. (High) - Use active and passive restoration of resources damaged by OHV use in the park to camouflage areas and expedite recovery. (High)
LANDSCAPE-SCALE AND CROSS-BOUNDARY RESOURCES AND COLLABORATION	Reduce adverse effects of cross-boundary and landscape-scale human-induced stressors on park resources.	Minimize impacts from external land development and land uses adjacent to the park (urbanization, commercial/industrial, energy development, water development, etc.).	- Evaluate and comment on potential impacts to the park from external development (e.g., energy and urban); create tool to track projects and responses to be consistent over time and build on previously submitted comments. (High) - Complete a Unit Management Plan for Dingle Act lands. (High)
LANDSCAPE-SCALE AND CROSS-BOUNDARY RESOURCES AND COLLABORATION	Complete reconnaissance of newly acquired lands.	Understand and manage resources on newly acquired Dingell Act properties.	- Submit Unit Management Plan funding request for newly acquired land under the Dingell Act. (High)
LANDSCAPE-SCALE AND CROSS-BOUNDARY RESOURCES AND COLLABORATION	Foster ecological integrity and cultural authenticity as climate change alters park resources.	Integrate climate change science into resource management actions.	- Preserve and protect refugia for species most affected by climate change. (High) - Maintain temperature and precipitation time series from weather stations in the park. (High) - Study trends in lightning strike and monsoon precipitation patterns (check available sources, such as military base). (High) - Conduct climate change vulnerability assessments for cultural resources; use results to develop climate change adaptation strategies for cultural resources. (High) - Update and publish vulnerability assessments of natural resources. (Medium) - Identify and prioritize climate change refugia using the vulnerability assessments for species most affected by climate change. (Medium)

PRIORITY RESOURCE AND COMPONENT	LONG-TERM GOAL (10–20 YEARS)	SHORT-TERM GOAL (3–5 YEARS)	STEWARDSHIP ACTIVITIES (WITH PRIORITIES)
LANDSCAPE-SCALE AND CROSS-BOUNDARY RESOURCES AND COLLABORATION	Foster ecological integrity and cultural authenticity as climate change alters park resources.	Maintain and extend leadership in the park serving as an example for addressing climate change.	- Integrate climate change information into the Resource Stewardship Strategy. (High) - Create briefing statement and talking points for stakeholders on climate change management strategies. (High) - Improve public understanding of climate change and its effects via interpretation/education programming. (High) - Conduct presentations and training for park staff on climate change and its effects on park resources. (High) - Engage with tribes on climate change issues and effects on ethnographic resources, particularly traditional medicine species. (High)
LANDSCAPE-SCALE AND CROSS-BOUNDARY RESOURCES AND COLLABORATION	Foster ecological integrity and cultural authenticity as climate change alters park resources.	Reducing greenhouse gas emissions that cause climate change.	- Continue implementing the Joshua Tree National Park Climate Friendly Park action plan and Environmental Management System. (High) - Update the Joshua Tree National Park Climate Friendly Park action plan, including new goals from the updated greenhouse gas inventory. (High) - Develop park energy, waste, water, and lighting guidelines for park staff and volunteers. (Medium) - Update the greenhouse gas inventory to assess progress on the park goal to reduce emissions by 50% compared to the 2008 baseline level. (Medium)

CONTRIBUTORS

The following people contributed to the development of this Resource Stewardship Strategy.

REGIONS 8, 9, 10, AND 12

Marie Denn, Aquatic Ecologist (also part of the NRSS Water Resource Division)

Denise Louie, Chief of Natural Resources Program

David Louter, Chief of Cultural Resources Program

Bradley Phillips, Outdoor Recreation Planner

Lara Rozwzell, External Energy and Minerals Program Manager

NATURAL RESOURCE STEWARDSHIP & SCIENCE (NRSS) DIRECTORATE

Jennifer Bailard, Physical Scientist, Mojave Desert Network Inventory and Monitoring

Allen Calvert, Supervisory Ecologist, Mojave Desert Network Inventory and Monitoring

Jim Cheatham, Planning – Air and Visual Resource Strategies

Tim Connors, Geologist

Patrick Gonzalez, Principal Climate Change Scientist

Terri Hogan, Invasive Plant Program Lead

Nicole Hupp, Ecologist, Mojave Desert Network Inventory and Monitoring

Sara Melena, Communication Specialist

Ashley Pipkin, Biologist/Soundscape Specialist

Roger Semler, Division of Wilderness Stewardship Chief

DENVER SERVICE CENTER – PLANNING DIVISION

Julie Bell, Cultural Resource Specialist

Mindy Burke, Contract Editor

John Paul Jones, Visual Information Specialist

Alexa Miles, Environmental Protection Specialist

Rose Verbos, Visitor Use Specialist

Don Wojcik, Project Manager, Natural Resource Specialist

JOSHUA TREE NATIONAL PARK

Jennie Albrinck, Chief of Interpretation

Dani Dagan, Outdoor Recreation Planner

Neil Frakes, Supervisory Biologist

Johanna Lombard, Visual Information Specialist

Genna Mason, Historic Landscape Architect

Jane Rodgers, Chief of Science & Resource Stewardship

Luke Sabala, Branch Chief Physical Scientist

Anthony Sandrini, Assistant Fire Management Officer

Alison Shoup, Education and Outreach Branch Chief

Anna Tegarden Carroll, GIS Specialist

Jason Theuer, Cultural Resource Branch Chief

Kevin Turner, Interpretive Operations Branch Chief

Michael Vamstad, Wildlife Ecologist

UNITED STATES GEOLOGICAL SURVEY

Todd Esque, Research Ecologist

CONTACT INFORMATION

For more information about the Resource Stewardship Strategy for Joshua Tree National Park, contact the park superintendent and/or the park chief of science and resource stewardship at:

Joshua Tree National Park
74485 National Park Drive
Twentynine Palms, CA 92277-3597

Phone: 760-367-5500

As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historic places; and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under US administration.

JOTR 156/174978
January 2021

RSS

RESOURCE STEWARDSHIP STRATEGIES

NATIONAL PARK SERVICE

BRIDGING SCIENCE AND MANAGEMENT FOR TODAY AND TOMORROW