

# Sonoran Desert National Monument Livestock Grazing

## Final Resource Management Plan Amendment/Environmental Assessment

DOI-BLM-AZ-P040-2024-0001-RMP-EA

U.S. Department of the Interior  
Bureau of Land Management  
Sonoran Desert National Monument  
2020 E. Bell Road  
Phoenix, Arizona 85022  
602-867-5400

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It is the mission of the Bureau of Land Management to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.

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# **1.0 INTRODUCTION/PURPOSE AND NEED**

## **1.1 Introduction**

The Sonoran Desert National Monument (SDNM) was designated by Presidential Proclamation 7397 on January 17, 2001 (Proclamation), which stated that “[l]aws, regulations, and polices followed by the Bureau of Land Management in issuing and administering grazing permits or leases on all lands under its jurisdiction shall continue to apply with regard to the lands in the monument; provided, however, that grazing permits on Federal lands within the monument south of Interstate 8 shall not be renewed at the end of their current term; and provided further, that grazing on Federal lands north of Interstate 8 shall be allowed to continue only to the extent that the Bureau of Land Management determines that grazing is compatible with the paramount purpose of protecting the objects identified in this proclamation.”

In 2016, the U.S. District Court – District of Arizona issued a ruling concluding that the Bureau of Land Management (BLM) did not provide adequate explanations for determining livestock grazing compatibility on the SDNM for the 2012 SDNM, Resource Management Plan/Record of Decision (RMP/ROD) (BLM 2012a). The court found the administrative record did not support the analysis that led to the decisions in the ROD to make grazing available on five allotments north of Interstate-8 (I-8) and ordered the BLM to complete a new Land Health Evaluation (LHE) and Grazing Compatibility Analysis (GCA) to be incorporated into the SDNM RMP by September 30, 2020.

In 2020, a revised GCA, LHE, and an RMP Amendment/Environmental Assessment (RMPA/EA) were completed to address the Court remand. The 2020 RMPA/EA evaluated whether any allotments on the SDNM north of I-8 would be “available” or “unavailable” for livestock grazing, and whether any changes are needed to the available Animal Unit Months (AUMs). The selected alternative in the Draft RMPA/EA included all allotments as available for grazing with a range of use from ephemeral only to a maximum number of 4,232 AUMs authorized across the six allotments (BLM 2020).

In 2023, the U.S. District Court – District of Arizona issued another ruling concluding that the LHE and RMPA/EA included errors in the analysis and ordered the plaintiffs and the BLM to come to an agreement on a path forward (Western Watersheds Project, et al., v. United States Bureau of Land Management, Case No. 2:21-CV-01126-PHX-SRB (Dist. Ct. Ariz), Order dated August 9, 2023). The parties agreed to additional NEPA analysis followed by a Record of Decision or other appropriate decision document and, as necessary, revise the Land Health Evaluation, Compatibility Determination, and RMP Amendment to address the Court’s Order. This agreement was filed with and approved by the Court in October 2023 (Western Watersheds Project et al v. United States Bureau of Land Management (21cv01126-PHX-SRB, Dkt. 51).

The BLM has drafted a new Resource Management Plan Amendment for grazing in the Sonoran Desert National Monument. In May 2024, the BLM invited public comment on the Environmental Analysis and supporting analysis.

## **1.2 Planning Area**

The Planning Area for this Draft RMPA/EA is defined as approximately 252,460 acres of public land managed by the BLM within the SDNM north of I-8 (Figure 1).

## **1.3 Purpose and Need**

The purpose of this action is to consider the compatibility of livestock grazing with monument objects identified by the SDNM Proclamation and to amend the 2012 SDNM RMP/ROD. This EA only applies to the portions of the six allotments within SDNM boundary north of I-8 and excludes the portions of those allotments outside the SDNM. “Objects” identified in the Proclamation were not provided in a single table or list. Table 1 is a representative list of the objects and their associated elements.

Table 1 Objects and Elements of the Proclamation.

<b>Objects</b>	<b>Elements</b>
Functioning Desert Ecosystem	Saguaro cactus ( <i>Carnegiea gigantea</i> ) forests Habitat for a wide range of wildlife species
Diversity of Plant and Animal Species	Woodland assemblages Palo verde-mixed cacti vegetation community Tinajas
Saguaro Cactus Forest	Saguaro cactus and nurse plants
Scientific Analysis of Plant Species and Climates in Past Eras <sup>1</sup>	Packrat middens Kofa mountain barberry ( <i>Berberis harrisonianai</i> ) Juniper ( <i>Juniperus</i> spp.) Arizona rosewood ( <i>Vauquelinia californica</i> )
Vegetation Communities: Creosote-Bursage, Desert Grassland, and Washes	Creosote-bursage vegetation community Washes
Wildlife	Sonoran desert tortoise ( <i>Gopherus morafkai</i> ) Desert bighorn sheep ( <i>Ovis canadensis mexicana</i> ) Raptors Owls (including elf owl ( <i>Micrathene whitneyi</i> ) Cactus ferruginous pygmy owl ( <i>Glaucidium brasilianum cactorum</i> ) Western screech owl ( <i>Megascops kennicottii</i> ) Mule deer ( <i>Odocoileus hemionus</i> ) Javelina ( <i>Pecari tajacu</i> ) Lesser long-nosed bat ( <i>Leptonycteris yerbabuenae</i> ) California leaf-nosed bat ( <i>Macrotus californicus</i> ) Cave myotis bat ( <i>Myotis velifer</i> )
Archaeological and Historic Sites	Rock art sites Lithic quarries Scattered artifacts Vekol Wash Juan Bautista de Anza National Historic Trail Mormon Battalion Trail Butterfield Overland Stage Route

Sources: Adapted from Table E-2 in BLM 2012b and the Proclamation.

The need for this action is established in the Proclamation, Taylor Grazing Act of 1934, the Federal Land Policy and Management Act of 1976, Fundamentals of Rangeland Health (43 Code of Federal Regulation (CFR) 4180), the SDNM RMP, and the March 31, 2016 ruling by the U.S. District Court – District of Arizona concluding that the BLM did not provide adequate explanations for determining livestock grazing compatibility on the SDNM in the 2012 SDNM RMP/ROD (Western Watersheds Project, et al., v. United States Bureau of Land Management, Case No. CV-13-01028-PHX-PGR (Dist. Ct. Ariz), Order dated March 31, 2016). The SDNM RMPA EA also resolves the in adequate justification for the assumption in the 2020 RMPA that cattle do not have a significant impact to vegetation beyond 2 miles from water sources

<sup>1</sup> The Proclamation lists these elements under “Sand Tank Mountains,” which is not in the Analysis Area.

(Western Watersheds Project, et al., v. United States Bureau of Land Management, Case No. 2:21-CV-01126-PHX-SRB (Dist. Ct. Ariz) Order date October 19<sup>th</sup>, 2023).

#### 1.4 Scoping and Issue Identification

On January 12, 2020, the BLM sent Cooperating Agency invitations to 15 potential government organizations and tribal governments to participate in this RMPA/EA (BLM 2020). Under the National Environmental Policy Act (NEPA), State agencies, local governments, and tribal governments may serve as a Cooperating Agency for a planning effort. Criteria for being a Cooperating Agency is: a) jurisdiction by law or b) special expertise. Listed below in the Table 2 is their status.

Table 2 Cooperating Agencies.

<b>Government/Organization</b>	<b>Invited</b>	<b>Participated</b>
Arizona Game and Fish Department, Region 4	✓	✓
Arizona Game and Fish Department, Region 6	✓	
U.S. Fish and Wildlife Service, Arizona Ecological Services	✓	
Arizona State Land Department	✓	
Arizona Department of Transportation	✓	
Arizona Department of Agriculture	✓	
Ak-Chin Indian Community	✓	
Hopi Tribe	✓	
Tohono O’odham Nation	✓	
Pascua Yaqui Tribe	✓	
Salt River Pima-Maricopa Indian Community	✓	
Gila River Indian Community	✓	
Maricopa Department of Transportation	✓	
Maricopa County	✓	
Pinal County	✓	

On March 6, 2020, tribal governments with an affiliation with the Planning Area were notified and provided early information on this RMPA/EA under the provisions of Section 106 of the National Historic Preservation Act (BLM 2020). Affected tribes were notified of the current RMPA/EA effort on April 30, 2024. The Tohono O’odham Nation responded by email on May, 1<sup>st</sup>, 2024 and stated that they supported the no grazing alternative. On May 3<sup>rd</sup>, 2024, through official correspondence, the Salt River Pima-Maricopa Indian Community provided a request for further information and stated that the project area is within the ancestral lands of the Four Southern Tribes, comprised of the Ak-Chin Indian Community, Gila River Indian Community, Tohono O’odham Nation, and Salt River. In response, the BLM presented the project and different alternatives at a monthly Four Southern Tribes Cultural Resources Working Group meeting on May 17<sup>th</sup>, 2024. The only other tribe to provide comment was the Pascua Yaqui Tribe. On May 1<sup>st</sup>, 2024 they stated that the proposed alternative is a “step in the right direction”, but that grazing presents risks to heritage resources.

Public scoping for this RMPA/EA was initiated with the publication of a Notice of Intent in the *Federal Register* on March 26, 2020 (Vol. 89, No. 59, 17095). The BLM notified 57 individuals, organizations and



agencies by email and postcard of the scoping period on March 25, 2020. The BLM also published an updated LHE and draft GCA for public input. The 30-day public scoping period ended on April 27, 2020. Approximately 55 comment emails were of similar nature- opposed to livestock grazing within the SDNM. There were requests that the BLM complete an environmental impact statement and suggested that the review period for the Draft RMPA/EA should be 90-days in length. The BLM received approximately 62 comment letters and emails to consider (BLM 2020).

#### **1.4.1 Issues to be Addressed in this Draft RMPA/EA**

The BLM through internal scoping and in consideration of public comments, has identified the following issues to be considered in this RMPA/EA:

- Direct, indirect, and cumulative impacts from livestock grazing on monument objects and other resources; and
- Impacts to local economies and livestock operators if allotment(s) are made available or unavailable for livestock grazing.

Appendix 1 contains the justification of which issues were or were not selected for detailed analysis.

#### **1.4.2 Issues Outside the Scope of this Draft RMPA/EA**

The BLM also received comments on issues that are beyond or outside the scope of this Draft RMPA/EA. These comments included the following:

- Commenters stated general opposition to livestock grazing on public lands, in national monuments, and in deserts;
- Commenters stated general opposition to industry/commercial uses of public lands;
- Commenters expressed concern about BLM funding and staffing to effectively manage public lands;
- Commenters stated opposition to sheep grazing;
- Commenters stated concern about the low fees for livestock grazing on public lands;
- Commenter stated that impacts to livestock operators are not relevant to this RMPA/EA as they are not ‘objects’ described in the Proclamation;
- Commenter expressed support for voluntary relinquishment of grazing permits; and
- Commenter expressed support to turn management of national monuments from the BLM to the National Park Service.

#### **1.5 Planning Criteria**

The BLM planning regulations (43 CFR 1610.4-2) require the development of planning criteria to guide the preparation of an RMP Amendment. Planning criteria are the standards, rules, and other guidelines developed by BLM staff, with public input, for use in forming judgements about plan-level decision-making, analysis, and data collection. These criteria are used to establish the parameters for making planning decisions and simplifying RMP Amendment actions.

The BLM Identified the following planning criteria:

- The RMPA/EA covers BLM-administered public lands within the SDNM north of I-8;
- The RMPA/EA has considered a range of reasonable alternatives;
- The BLM has considered current scientific information, research, new technologies, monitoring, and coordination; and
- The RMPA/EA has complied as appropriate with all applicable law, regulations, policy, and guidance.

This Draft RMPA/EA is limited in focus, as it is intended to make planning-level decisions for grazing availability and management in response to the U.S. District Court's Order. No planning-level changes to non-grazing programs (e.g. recreation, travel management, etc.) are proposed in this Draft RMPA/EA. Valid existing rights will not be affected by any alternative analyzed in this Draft RMPA/EA. No proposed decision would have any effect on private, county, State, or other federal lands within the Planning Area.

## **1.6 Legislative Constraints**

The multiple-use mandates of the Federal Land Policy and Management Act (FLPMA), the Taylor Grazing Act of 1934 and other applicable laws, regulations and policies will be followed. This Draft RMPA/EA also recognizes the mandates in the Proclamation (Appendix 2).

## **1.7 Planning Process**

Below is the planning process being followed for a land use plan amendment (BLM 2005):

- As described in Section 1.4, the BLM provided a 30-day public scoping period in 2020 after publication of a Notice of Intent in the *Federal Register*. The BLM provided notification to approximately 57 individuals, organizations and agencies in addition to publication of a news release. The BLM received 62 comment letters or emails to consider (Appendix 2, BLM 2020). After also including internal scoping comments, issues were identified for detailed consideration or dismissed with justification (Appendix 3, BLM 2020);
- The BLM released the Draft RMPA/EA and unsigned Finding of No Significant Impact (FONSI) on May 8, 2020, for a 30-day public review and comment. The BLM provided notification to individuals, organizations and agencies on the mailing list. The BLM also published a news release and legal notice in the *Arizona Business Gazette* on May 14, 2020, announcing the comment period. There was also an article on the RMPA/EA in the *Arizona Republic* on May 27, 2020. The comment period ended on June 7, 2020. The BLM received approximately 137 comment emails and letters from individuals, seven comment letters from organizations, and approximately 8,945 form letters with substantially similar content from individuals, to consider (Appendix 4, BLM 2020). Comments received are responded to in Appendix 5 of the 2020 RMPA/EA (BLM 2020).
- The BLM has considered substantive and relevant comments received, revised the alternatives and/or impacts analysis as needed, and on July 9, 2020, published this RMPA/Final EA along with an approved FONSI;
- On July 9, 2020, a 30-day protest period and concurrent 60-day Governor's Consistency Review was initiated following the release of the RMPA/Final EA and approved FONSI; and after resolution of any protests and conclusion of the Governor's Consistency Review, the BLM will issue a Decision Record and RMP Amendment.
- On October 19, 2023, the BLM was ordered to comply with the stipulated remedy and court order in *Western Watersheds Project et al v. United States Bureau of Land Management* (21cv01126-PHX-SRB, Dkt. 51). Specifically, the court found that the BLM did not sufficiently justify its assertion that cattle impacts are minimal beyond 2 miles in the grazing compatibility analysis and land health evaluation.
- On May 10, 2024, the BLM opened the 30-day comment period on the proposed revisions to the Environmental Assessment. Changes were made to the Land Health Evaluation, Grazing Compatibility Analysis, and Appendices F and H of the Land Health Evaluation. An additional alternative has been added and analyzed in the Proposed RMPA EA. Citations and peer reviewed literature was updated in these documents as well, to incorporate recent publications to consider the best available science.

## **1.8 Relationships to Statutes, Regulations, Manuals and Other Plans**

Actions considered under this Draft RMPA/EA are consistent with all federal, State, and local laws, regulations, and policies deemed relevant to the Draft RMPA/EA. The following statutes, regulations, or plans apply to BLM-managed lands within the Planning Area:

- Arizona Wilderness Act of 1990.
- Maricopa County 2020, Eye to the Future Comprehensive Plan (2008).
- Pinal County Comprehensive Plan (2009).
- Presidential Proclamation 7397.
- Taylor Grazing Act of 1934.
- Federal Land Policy and Management Act of 1976 (43 U.S.C. 1701 et seq.).
- Public Rangelands Improvement Act of 1978.
- 43 CFR 4100 Grazing Administration– Exclusive of Alaska.
- Section 106 of the National Historic Preservation Act of 1966, as amended.
- National Environmental Policy Act of 1969.
- Migratory Bird Treaty Act of 1917, and Executive Order 13186 – Responsibilities of Federal Agencies to Protect Migratory Birds.
- Secretarial Order 3362: Improving Quality in Western Big-Game Winter Range and Migration Corridors.
- SDNM RMP/ROD (2012).
- Wilderness Act of 1964.
- Joint Secretarial Order 3403: Fulfilling the Trust Responsibility to Indian Tribes in the Stewardship of Federal Lands and Waters
- IB2024-035, Conservation and Landscape Health Rule (Public Lands Rule)

## **1.9 Decision to be Made**

The Arizona State Director is the Authorized Officer responsible for planning-level decisions within the SDNM. This Draft RMPA/EA will provide information for the Authorized Officer to make an informed decision whether livestock grazing is compatible with the SDNM objects in the SDNM north of I-8.

Decisions to be made include:

- Allotments available/unavailable for livestock grazing; and
- Range of AUM's available for livestock grazing across all SDNM allotments north of I-8.

The determination of each individual allotment's classification and/or perennial AUMs will be made at the implementation-level and not in this planning effort.

## **1.10 Types of Grazing Authorizations**

In Arizona, the BLM designates and authorizes grazing on allotments as Perennial, Ephemeral, or Perennial/Ephemeral. Authorizations have up to a 10-year term. Perennial grazing authorizations allow a set number of Animal Unit Months (AUMs) to be used within the season of use on the permit/lease. The number of AUMs is based on the amount of forage attached to the authorization's base property. Once perennial grazing is authorized, monitoring is required to justify any reduction in AUMs (43 CFR 4110.3-2) unless there is an emergency, such as a fire, that would justify a reduction (43 CFR 4110.3-3).

Ephemeral grazing authorizations do not guarantee AUMs for use each year. Prior to allowing cattle enter an allotment, BLM staff must conduct a forage assessment at each water source a permittee applies to use to estimate forage availability. As such, annual forage production is more responsive to interannual variation in precipitation and climate change than perennial grazing authorizations. The number of AUMs is determined only using annual plant production. This reduces the risk of overgrazing and helps ensure

forage remains available for wildlife, while reducing fine fuels created by annual growth which reduced wildfire risks.

Perennial/Ephemeral authorization are a combination of the two where a set number of AUMs are authorized to be consumed during the season of use of the permit/lease and additional ephemeral AUMs may be applied for and approved when forage conditions warrant.

## **2.0 ALTERNATIVES**

### **2.1 Description of Alternatives**

#### **2.1.1 Summary**

The Proposed RMPA EA analyzes five alternatives the: No Action, Maximum Acreage, No Grazing, Reduced Grazing, and Ephemeral Only Alternatives. The number of AUMs in the alternatives range from 0 AUMs to as much as 4232 AUMs divided among the portions of the six allotments within the SDNM boundary. Alternative E was not analyzed in the 2012 SDNM RMP or the 2020 RMPA.

#### **2.1.2 Alternative A: No Action Alternative**

Alternative A, the No Action Alternative, “provides a benchmark, enabling decision makers to compare the magnitude of environmental effects of the action alternatives” (CEQ 1981: question 3). This alternative provides the baseline environmental condition against which the other alternatives are compared. For RMP actions, the No Action Alternative is to continue to implement the management direction in the 2012 RMP. Under this alternative, the BLM would continue the livestock management on portions of five allotments (Arnold, Beloat, Big Horn, Hazen, and Lower Vekol) in the SDNM, north of I-8 (Figure 2). This alternative allows 3,318 AUMs across the Planning Area (ROD decision GR-2.1.4) (Table 3). The current management actions, best management practices (BMPs), and mitigation as approved in the 2012 ROD would continue to apply to the No Action Alternative.

Under the No Action Alternative, range improvements, such as allotment fencing and water developments, would continue to be maintained by permittees in allotments available for livestock grazing.

Alternative A was analyzed in the Lower Sonoran/SDNM Final Environmental Impact Statement (FEIS) as Alternative E (BLM 2012b).

#### **2.1.3 Alternative B: Maximum Acreage Alternative**

Under Alternative B, the Maximum Acreage Alternative, grazing would be available on all portions of the six allotments in the SDNM north of I-8 (Table 3) (Figure 3). Livestock grazing use would range from ephemeral use only to a maximum of 4,232<sup>2</sup> perennially authorized AUMs across the Planning Area (Table 3). Ephemeral grazing in Arizona is guided by regulations in 43 CFR 4100 and, where designated Sonoran desert tortoise habitat is present, the 2015 Sonoran desert tortoise Candidate Conservation Agreement (USFWS AIDTT 2015). When compared to the No Action Alternative, there would be a maximum increase of 914 AUMs across all six allotments within the SDNM.

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<sup>2</sup> Based on the average perennially authorized or documented actual use AUMs, prorated by acres, between 2007 and 2018 excluding AUMs authorized for ephemeral use and AUMs previously authorized on allotments and portions of allotments closed under the Proclamation within the SDNM south of I-8.

The Maximum Acreage Alternative would be a reduction in the potential maximum perennial AUMs, from historically authorized 8,703 AUMs under the 1985 Lower Gila South RMP to 4,232 AUMs, across the Planning Area.

The results of the new LHE (Appendix 3) and GCA (Appendix 4) suggest that livestock grazing, within this range of potential use, could remain available on the SDNM north of I-8. However, implementation-level adjustments in livestock grazing management, including the number of authorized perennial-AUMs

Table 3 Comparison of Potential AUMs Between the Alternatives. Allotments would be classified as perennial, ephemeral, or perennial-ephemeral at the implementation-level.

Planning Area	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
All SDNM allotments north of I-8	3,318 AUMs*	Ephemeral only to 4,232 AUMs**	0 AUMs	Ephemeral only to 3,293***	Ephemeral Only

\* Across five allotments (excluding the Conley and portions of the Big Horn and Lower Vekol Allotments).

\*\* Maximum perennially authorized AUMs across all six allotments (including the Conley Allotment).

\*\*\* Maximum perennially authorized AUMs across all six allotments (excluding portions of the Big Horn and Conley allotments).

Table 4 Comparison of Grazing Availability Between the Alternatives.

Allotment Name	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Arnold	Available	Available	Unavailable	Available	Available
Beloat	Available	Available	Unavailable	Available	Available
Big Horn	Available	Available	Unavailable	Available <sup>3</sup>	Available
Conley	Unavailable	Available	Unavailable	Available	Available
Hazen	Available	Available	Unavailable	Available	Available
Lower Vekol	Available	Available	Unavailable	Available	Available

Table 5 Comparison Among Alternatives of Acres Available for Grazing for the Portions of the Allotment within the SDNM.

Allotment Name	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Arnold	1,610	1,610	0	1,610	1,610
Beloat	33,600	33,600	0	33,600	33,600
Big Horn	75,230 <sup>4</sup>	92,200	0	61,590	92,200
Conley	0	77,710	0	36,230	77,710
Hazen	31,930	31,930	0	31,930	31,930
Lower Vekol	14,800	15,410	0	15,410	15,410
Total	157,170	252,460	0	180,370	252,460

<sup>3</sup> Although the Big Horn and Conley allotments under this alternative would be allocated as available, portions of these allotments would be unavailable for livestock grazing. See section 2.1.5 for more details.

<sup>4</sup> Although the Big Horn Allotment was allocated as 'available,' portions of the allotment, including where livestock waters occur, were made 'unavailable' in the 2012 ROD, thus making the majority of the acres unusable (Figure 2).

by allotment, would be required to maintain and achieve Standards for Rangeland Health (Standards) and be compatible with monument objects.

This alternative would allow grazing on 77,710 acres of the Conley Allotment, a portion of the Big Horn Allotment (16,970 acres), and a portion of the Lower Vekol Allotment (610 acres), that were made unavailable for grazing in the 2012 SNDM RMP (Table 5). The current management actions, BMPs, and mitigation as approved in the 2012 ROD would continue to apply to the Maximum Acreage Alternative. However, no livestock grazing will be permitted on the positions of the six allotments within the SDNM until the BLM first completes implementation-level NEPA analysis, on an allotment-by-allotment, or group of allotments, basis.

Under the Maximum Acreage Alternative, range improvements, such as allotment fencing and water developments, would be maintained by permittees in allotments available for livestock grazing.

In Arizona, allotments are classified as perennial, ephemeral, or perennial-ephemeral. These classifications are described below:

- Perennial – rangelands that produce perennial forage every year;
- Ephemeral – rangelands that do not consistently produce enough forage to sustain a year-round livestock operation but may briefly produce sufficient ephemeral (annual) forage to accommodate livestock grazing. Ephemeral rangelands are defined by the special ephemeral rule as defined in the *Federal Register* Vol. 33, No. 238, Page 18245, Saturday, December 7, 1968 and authorized in accordance with 43 CFR 4100; and
- Perennial-Ephemeral – rangelands that produce perennial forage every year and periodically provide additional ephemeral vegetation. In a year of abundant moisture and favorable climatic conditions, annual forbs and grasses add materially to the total grazing capacity.

Consistent with the Taylor Grazing Act and FLPMA, the BLM has the discretion to adjust grazing use based on range conditions, including cancelling a permit, and to regulate the occupancy and use of the range. The determination of each individual allotment's classification and/or perennial AUMs would be made at the implementation-level and not in this planning effort.

#### **2.1.4 Alternative C: No Grazing Alternative**

Under Alternative C, the No Grazing Alternative, livestock grazing would be unavailable on the portions of the six allotments within the SDNM boundary north of I-8 (Table 3) (Figure 4). Portions of the allotments outside the Monument boundary may be grazed, but would require an implementation level EA. The AUMs would be 0 (zero) across the portions of the six allotments within the SDNM boundary. The management actions in the 2012 SDNM ROD that specifically address grazing management would no longer apply if this alternative were approved. All other decisions in the 2012 SDNM ROD would continue to be implemented in the management of the SDNM.

Under the No Grazing Alternative permittees would be reimbursed in accordance with 43 CFR 4120, for their interest in the fair market value of the documented range improvements within the unavailable allotments. These range improvements would then be removed, maintained, or modified to achieve resource goals, such as wildlife and recreation, on a case-by-case basis. Range improvements on allotments outside the SDNM would be maintained for livestock and wildlife use by permittees in accordance with 43 CFR 4120.

Alternative C was analyzed in the Lower Sonoran/SDNM FEIS as Alternative D (BLM 2012b).

### **2.1.5 Alternative D: Reduced Grazing Alternative**

Under Alternative D, the Reduced Grazing Alternative, grazing would be allocated available on portions of all six allotments within the SDNM boundary north of I-8. Portions of the Big Horn and Conley allotments north of State Route 238 (SR-238) (Table 3) (Figure 5) would be unavailable to livestock grazing. Livestock grazing use would range from ephemeral use only to a maximum of 3,293<sup>5</sup> perennially authorized AUMs across the Planning Area (Table 3). When compared to the No Action Alternative, there would be a decrease of 25 AUMs across all six allotments within the SDNM.

The Reduced Grazing Alternative would be a reduction in the potential maximum perennial AUMs, from historically authorized 8,703 AUMs under the 1985 Lower Gila South RMP to 3,293 AUMs, across the Planning Area and the unavailability of grazing on portions of the Big Horn and Conley allotments north of SR-238.

The results of the new LHE (Appendix 2) and new GCA (Appendix 4) suggest that livestock grazing within this range of potential use, could remain available on portions of the SDNM north of I-8. However, implementation-level adjustments in livestock grazing management, including the number of authorized AUMs by allotment, would be required to maintain and achieve Standards and be compatible with monument objects.

This alternative would allow grazing on all allotments except for 30,610 acres of the Big Horn Allotment and 41,480 acres of the Conley Allotment north of SR-238. The proposed unavailable areas on the Big Horn and Conley allotments contain areas of recreational use and cultural significance, such as the Juan Bautista de Anza Recreational Management Zone (RMZ) and the Anza National Historic Trail Corridor and Management Area. The current management actions, BMPs, and mitigation as approved in the 2012 ROD would continue to apply to the Reduced Grazing Alternative.

However, no livestock grazing will be permitted on the portion of the six allotments that within the SDNM until the BLM first completes implementation-level NEPA analysis, on an allotment-by-allotment, or group of allotments, basis.

See the Maximum Acreage Alternative for a discussion on the differences between perennial, ephemeral, or perennial-ephemeral classifications.

### **2.1.6 Alternative E: Ephemeral Use Only (Preferred Alternative)**

Under Alternative E, the Ephemeral Use Only Alternative, grazing would be available on the portions of all six allotments in the SDNM north of I-8 (Table 3, Figure 6). Livestock grazing use would range from zero AUMs annually to ephemeral use only. Ephemeral grazing in Arizona is guided by regulations in 43 CFR 4100, 2023 Arizona Permanent Instruction Memorandum Processing Ephemeral Applications and Estimating Ephemeral Production, and, where designated Sonoran desert tortoise habitat is present, the 2015 Sonoran desert tortoise Candidate Conservation Agreement (USFWS 2015). When compared to the No Action Alternative, there would be a decrease of up 3,318 AUMs per year across all six allotments within the SDNM.

The Ephemeral Use Only Alternative would be a reduction in the potential maximum perennial AUMs, from historically authorized 8,703 AUMs under the 1985 Lower Gila South RMP to zero perennially authorized AUMs.

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<sup>5</sup> Based on the average perennially authorized or documented actual use AUMs, prorated by available acres (excluding proposed unavailable acres), between 2007 and 2018 excluding AUMs authorized for ephemeral use and AUMs previously authorized on allotments and portions of allotments closed under the Proclamation within the SDNM south of I-8.



The results of the new LHE (Appendix 2) and new GCA (Appendix 4) suggest that livestock grazing, within this range of potential use, could remain available on the SDNM north of I-8. However, implementation-level adjustments in livestock grazing management, including site specific criteria for approving ephemeral use, would be required to maintain and achieve Standards for Rangeland Health (Standards) and be compatible with monument objects.

This alternative would allow grazing on 77,710 acres of the Conley Allotment, a portion of the Big Horn Allotment (16,970 acres), and a portion of the Lower Vekol Allotment (610 acres), that were previously unavailable for grazing (Table 5). The current management actions, BMPs, and mitigation as approved in the 2012 ROD would continue to apply to this alternative. The Big Horn Reservoir is located within two miles of potentially suitable habitat for the federally listed, endangered acuña cactus (*Echinomastus erectocentrus* var. *acunensis*). Surveys have not yet been conducted to determine if acuña cactus are present. The Big Horn Reservoir will remain closed until surveys have determined that acuña cacti are not present where cattle may trample them. If cattle are likely to disturb or trample one or more populations the Big Horn Reservoir will remain closed. If populations are not present within the two-mile radius from the reservoir or one is located where terrain makes it inaccessible to cattle, the Big Horn Reservoir would be reopened to use as a serviceable water source for cattle.

However, no livestock grazing will be permitted on the portions of the six allotments that within the SDNM until the BLM first completes implementation-level NEPA analysis, on an allotment-by-allotment, or group of allotments, basis.

## **2.2 Alternatives Considered but Eliminated from Detailed Analysis**

This section describes alternatives considered but not further analyzed in this Draft RMPA/EA. These alternatives were recommended by resource specialists or members of the public during scoping. The alternatives along with the rationale for excluding them from further consideration are described below.

### ***Make Portions of Allotments not Meeting Standards for Rangeland Health due to Grazing, Unavailable to Grazing***

Allocating portions of allotments not meeting Standards due to livestock grazing unavailable to grazing would be impractical to implement in lieu of other management options. The selected alternative in the 2012 SDNM RMP/EIS made areas not achieving Standards in three allotments unavailable for grazing. These areas were primarily surrounding livestock waters which effectively prevented grazing in areas available for grazing within those allotments. The implementation of this alternative would segregate pastures and require ground-disturbing and intensive management of livestock to prevent cattle from drifting into areas not currently meeting Standards, primarily around livestock waters. Potential management actions that would be required include fencing around dirt reservoirs, the removal of livestock troughs fed by pipelines and wells, and additional pasture fencing. These measures are dismissed from further consideration because the additional ground disturbance involved in subdividing allotments is ineffective to meet the purpose and need of the RMPA/EA regarding the compatibility of grazing with monument objects and the effects of such subdivision are speculative. The RMPA/EA instead analyzes more technically feasible options such as reduction in AUMs, seasonal use (ephemeral grazing only), or making grazing unavailable, which are consistent with current policies and can improve progress towards achieving Standards and require less additional infrastructure and labor-intensive grazing management practices.

### ***Create a Forage Reserve on the Lower Vekol Grazing Allotment.***

A forage reserve is an area or allotment without a current permittee where temporary grazing may be authorized for permittees requiring forage for cattle due to extenuating circumstances such as fire, drought, public land sales/exchanges, or other variables causing temporary or permanent loss of forage within their

grazing allotments. The Lower Vekol Allotment would be impractical to manage as a forage reserve due to its limited livestock carrying capacity, remoteness from other parts of the SDNM, and the mixed land status consisting of private and State lands.

***Allowing Other Classes of Livestock to Graze (i.e. Sheep, Goats, and Horses).***

The 2012 RMP/ROD does not allow sheep or goat grazing on the SDNM (ROD decision GR-2.1.2). Allowing other classes of livestock to graze would have adverse impacts to wildlife. Sheep, goat, and horse grazing/browsing preferences can have more overlap than cattle with wildlife forage preferences. Domesticated sheep and goats can also transmit diseases to native bighorn sheep that occupy the SDNM.

***Making Sensitive Areas such as Cultural Sites and Saguaro Forests Unavailable to Livestock Grazing.***

The known cultural sites and many of the saguaro forest sites are shielded by natural barriers such as slope and rough terrain and are unlikely to receive substantial livestock grazing due to being far (often greater than two miles, see Appendix 4) from livestock waters. The new GCA shows that livestock grazing is unlikely to adversely impact cultural monument objects. The BLM also has the discretion at the implementation-level to adjust grazing use based on range conditions, including cancelling a permit, and to regulate the occupancy or use of the range. The sensitive areas that are not protected by natural barriers can be protected through implementation-level adjustments in livestock management such as short duration grazing and/or limiting the number of authorized AUMs. Excluding these areas through fencing would require extensive amounts of fencing materials and ground disturbing activities, which would conflict with other uses and resources within the SDNM such as recreation, visual resources, wilderness characteristics, and wildlife movement.

***Authorize AUMs at Historical Use***

Under this alternative, all allotments would have been allocated as available for livestock grazing and the maximum AUMs would be 8,703. This number is based on the 1985 Lower Gila South Resource Management Plan (BLM 1985), prorated by acres, and deduction of AUMs for unavailable allotments under the Proclamation within the SDNM south of I-8 (BLM 2012b). According to the GCA (Table 4 in Appendix 4), livestock grazing at 8,703 AUMs is incompatible with monument objects. There would be no practical means at the implementation-level for livestock grazing at this level to be authorized and be compatible with monument objects. This alternative which authorized 8,703 AUMs was previously analyzed in detail as the No Action Alternative in the 2012 FEIS (see Table 2-24) and is dismissed from further consideration because it does not serve the purpose and need of this RMPA/EA.

### 3.0 AFFECTED ENVIRONMENT & ENVIRONMENTAL CONSEQUENCES

This chapter identifies and describes the current condition and trend of elements or resources in the human environment which may be affected by the Maximum Acreage Alternative or alternatives. The Affected Environment is the same for all alternatives.

#### 3.1 General Setting

The Planning Area is the Analysis Area, encompassing the entire SDNM north of I-8 which includes portions of six grazing allotments (Arnold, Beloat, Big Horn, Conley, Hazen, and Lower Vekol allotments) and is south of the City of Goodyear, northeast of Gila Bend, and north of Mobile, Arizona (Figure 1). The Analysis Area is approximately 252,460 acres of public land. Both the North Maricopa Mountains and South Maricopa Mountains wilderness areas are within the Analysis Area (Figure 1). The predominant vegetation communities in the Analysis Area include creosote-bursage scrub, palo verde mixed cactus, and ephemeral washes. The Analysis Area for socioeconomics is Maricopa County, Arizona covering approximately 9,199 square miles (not shown). Maricopa County is the fourth most populous county in the U.S.

#### Resources Considered for Analysis

The BLM's interdisciplinary team met on March 19, 2024, to discuss the RMPA/EA, and were tasked with reviewing and updating the 2020 RMPA/EA Resource and Issues Identification form within the Planning Area. Based on those discussions, and in consideration of relevant comments received during public scoping in 2020, the BLM determined which resource or issues are present and warrant detailed analysis in this RMPA/Final EA (BLM 2020). See Appendix 1 for a list and description of those resources or issues not present in the Planning Area, and those resources or issues that are present in the Planning Area that do not warrant detailed analysis.

#### 3.2 Types of Effects

In this document, the terms "effect" and "impact" are used synonymously. Effects fall into two categories:

- **Direct:** caused by the action and occur at the same time and place.
- **Indirect:** caused by the action, but occur later in time or further in distance, but are still reasonably foreseeable.

For the purpose of this analysis, direct or indirect impacts are referred to as "impacts."

For the purpose of this analysis, the duration of the impacts are defined as follows:

- **Long-term:** impacts that would occur over the life of this RMPA/EA. Typically, land use plans remain in effect at least 10-years.
- **Short-term:** impacts of limited duration from implementation-level actions such as modifications to range improvements.

For the purpose of this analysis, intensity of the impact is defined as follows:

- **Negligible:** effects are undetectable and immeasurable.
- **Minor:** effects are apparent, measurable, small, localized, and contained within the footprint of the action.
- **Moderate:** effects are readily apparent and measurable over a larger area but are still mainly within the footprint of the action.

Table 6 Monument Objects Analyzed in this Draft RMPA/EA.

Object Name	Applicable Resources	RMPA/EA Section(s)
Functioning desert ecosystems	Vegetation, General Wildlife, BLM Sensitive Species (Animals), Migratory Birds, Soil Resources	3.6, 3.7, 3.8
Diversity of plant and animal species	Vegetation, General Wildlife, BLM Sensitive Species (Animals), Migratory Birds	3.6, 3.7
Saguaro cactus forest	Vegetation	3.6
Scientific analysis of plant species and climates in past eras	Vegetation	3.6
Vegetation communities	Vegetation	3.6
Wildlife	General Wildlife, BLM Sensitive Species (Animals), Migratory Birds	3.7
Archeological and historic sites	Cultural and Heritage Resources	3.9

For the purpose of this analysis, the type of impact is defined as follows:

- **Adverse:** impacts that would have a detrimental effect to a resource.
- **Beneficial:** impacts that would have a positive effect to a resource.

The Proclamation identified monument “objects.” Table 6 lists the object and applicable section(s) in this Draft RMPA/EA that considered the potential effects from the alternatives.

Within all or portions of the Analysis Area, there are also the following additional Special Designations:

- Sonoran Desert National Monument – portions of the six allotments fall within the SDNM, a unit of the National Conservation System;
- Juan Bautista de Anza National Historic Trail Corridor, Butterfield Overland National Historic Trail, and Sonoran Desert Trails Special Cultural Resource Management Area – for a discussion, see Section 3.9; and
- North and South Maricopa Mountains wilderness areas – for a discussion, see Section 3.12.

### 3.3 Livestock Grazing

#### 3.3.1 Affected Environment

The Analysis Area includes the SDNM north of I-8 where “...grazing on federal lands north of Interstate 8 shall be allowed to continue only to the extent that the BLM determines that grazing is compatible with the paramount purpose of protecting the objects identified in this proclamation.” This Analysis Area consists of only those portions of six grazing allotments that are within the SDNM (Arnold, Beloit, Big Horn, Conley, Hazen, and Lower Vekol) (Figure 1). Grazing levels on the portion of those allotments outside the SDNM are not considered in this Draft RMPA/EA.

The six allotments currently within the SDNM contain a variety of range improvements including wells, pipelines, earthen reservoirs, fence lines, and corrals. See the LHE maps for locations of range improvements by allotment. As of 2015, four of the six grazing allotment permits (Big Horn, Conley,

Hazen, and Lower Vekol) within the Analysis Area are expired and have not been renewed due to pending litigation of the livestock grazing decisions in the 2012 SDNM ROD. Livestock last grazed the Conley Allotment portion of the SDNM up until the permit expired in 2015. The Arnold and Beloit allotments have current permits which both expire in February 2025. Livestock grazing has not occurred on the SDNM portions of these allotments since 2015. The Arnold Allotment has an ephemeral grazing authorization. Ephemeral grazing has not been authorized on the portions of any allotment with a perennial/ephemeral authorization within the SDNM since 2015, excluding Hazen and Lower Vekol. The only ephemeral grazing that has occurred on or near the SDNM was on the Arnold, an ephemeral only allotment, in 2014 and 2015 where a total of 852 AUMs were authorized between the two years. Under the 2012 ROD, up to 3,318 perennial AUMs are allowed across the five livestock grazing allotments available for use.

Compatibility of livestock grazing with monument objects was assessed through the new LHE (Appendix 3) and new GCA (Appendix 4). In the LHE, each allotment was evaluated to determine if Standards are being achieved and whether livestock grazing is the causal factor for any non-achievement. The compatibility of grazing was tied to monument objects which were assessed in the GCA (Table 1 in the Appendix 4). The results of these studies showed some areas with and without expected historical livestock use are meeting Standards and are therefore compatible with monument objects. This indicates that livestock grazing could continue the SDNM north of Interstate 8 with adjustments in grazing management.

Livestock grazing will continue to be excluded from four of the six allotments (Big Horn, Conley, Hazen, and Lower Vekol) and, after 2025, the remaining two allotments (Arnold and Beloit), will be closed to grazing until the BLM first completes implementation-level NEPA analysis, on an allotment-by-allotment, or group of allotments, basis. Upon conclusion of implementation-level analysis, the BLM would proceed to authorize potential new range improvements and issue grazing permit(s) with terms and conditions ensuring compatibility with monument objects.

At the implementation-level, adjustments to grazing management could include the following:

- Exclusion of sensitive areas and/or areas failing to achieve Standards in proximity to livestock waters by restricting livestock access to waters (fencing<sup>6</sup>) and/or redistributing livestock around additional (new) livestock water sources in less sensitive areas;
- Adjustments in number of authorized AUMs;
- Adjustments to ephemeral use requirements; and/or
- Adjustments in season of use.

In addition to implementation-level adjustments, all regulations, and guidelines as described in the Arizona Standards for Rangeland Health and Guidelines for Grazing Administration, the 2013 Instruction Memorandum for Resource Management During Drought, 2023 Arizona Permanent Instruction Memorandum Processing Ephemeral Applications and Estimating Ephemeral Production, and the 2015 Candidate Conservation Agreement for the Sonoran desert tortoise in Arizona applicable to livestock grazing on BLM lands will continue to apply. For more information on livestock grazing within the Analysis Area, see Section 3.3.2 of the Lower Sonoran/SDNM PRMP/FEIS (BLM 2012b). Permanent Instruction Memorandum AZ-PIM-2023-008 will also be followed, if applicable. The PIM directs constraints on the number of months ephemeral grazing can occur and under what conditions.

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<sup>6</sup> At the implementation-level, new proposed fencing would be wildlife-friendly and would meet the Arizona Game and Fish Department standards contained in the *Guidelines for Wildlife Compatible Fencing* (AGFD 2011).

### **3.3.2 Environmental Consequences**

#### ***No Action Alternative (Current Management)***

Under the No Action Alternative, the current livestock management would continue on portions of five of the six allotments available for grazing on the SDNM north of I-8. Livestock grazing would be unavailable within the SDNM on 16,970 acres of the Big Horn Allotment, 610 acres of the Lower Vekol, and the entire 77,710 acres of the Conley Allotment. Across the five allotments available for grazing, 3,318 AUMs would remain available.

Livestock grazing on the Big Horn Allotment would be moderately impacted due to the areas surrounding livestock waters being unavailable for grazing. By making these areas unavailable for grazing, livestock would not have access to waters that could potentially service other available portions of the Big Horn Allotment. Livestock grazing on the Conley Allotment would be severely impacted by decreasing the preference inside the SDNM portion of the allotment to zero AUMs within the monument and proportionally decreasing the remaining AUMs allocated for portions outside the SDNM boundary. Livestock grazing on the Lower Vekol Allotment would be minorly impacted due to the area around one livestock water being made unavailable for grazing. Impacts to livestock grazing would be beneficial, minor, and long-term for the Arnold, Beloit, and Hazen allotments.

Impacts could be mitigated through implementation-level management actions, such as the addition of range improvements to increase the service areas of livestock waters and fencing to prevent livestock from drifting into unavailable areas yet allowing available areas to be grazed.

#### ***Maximum Acreage Alternative***

Under the Maximum Acreage Alternative, all six allotments (252,460 acres) within the SDNM would be available for livestock grazing, including 77,710 acres of the Conley Allotment, 16,970 acres of the Big Horn Allotment and 610 acres of the Lower Vekol Allotment which were made unavailable to grazing in the 2012 ROD. The level of use would change from 3,318 AUMs across five allotments (Conley Allotment excluded), to a range from ephemeral use only to a maximum of 4,232 perennial AUMs across all six allotments. Fencing would no longer be required to prevent livestock from accessing areas formerly unavailable for grazing which would lower operational costs of maintenance and labor hours. However, the overall impacts to livestock grazing would largely depend on the level and management of grazing authorized under implementation-level decisions.

The level of authorized grazing use within each allotment will be subject to separate environmental review and authorized under implementation-level decisions. This level could range from ephemeral use only to a maximum of 4,232 perennial AUMs and require adjustments in grazing management such as the modification of range improvements, adjustments in number of authorized AUMs by allotment, adjustments in season of use, and the exclusion of sensitive areas.

Impacts would vary depending on the classification of each allotment as follows: there would be a minor beneficial impact to permittees if a low number of perennial AUMs are allocated without the option of ephemeral increases; there would be a negligible beneficial impact to permittees if ephemeral grazing only is authorized; and there would be a moderate beneficial impact to permittees if the maximum number of perennial AUMs are allocated with the option of ephemeral increases. Overall, impacts to livestock grazing would be beneficial, negligible to moderate, and long-term.

#### ***No Grazing Alternative***

Under the No Grazing Alternative, livestock grazing would be unavailable on all six allotments in the SDNM north of I-8. Livestock grazing would be eliminated as permits expire on the Arnold and Beloit allotments. The impacts to livestock grazing would be adverse, severe, and long-term since permittees as permits expire requiring the permittees to find other means to sustain their herds or leave the livestock industry entirely. Livestock grazing could continue on those portions of the existing allotments outside the

SDNM. These authorizations would be subject to separate environmental review during implementation. The permittees would be reimbursed in accordance with 43 CFR 4120 for their interest in the fair market value of the documented range improvements within the unavailable portions of the allotments. These range improvements could then be removed, maintained, or modified to achieve goals for resources such as wildlife and recreation on a case-by-case basis. The towns and communities that are dependent on the ranching industry could see minor economic impacts. Implementation-level decisions could include additional boundary fencing and/or range improvements to ensure cattle stay in the portions of allotments outside the SDNM.

### ***Reduced Grazing Alternative***

Under the Reduced Grazing Alternative, all six allotments within the SDNM would be allocated available for livestock grazing, except for 30,610 acres of the Big Horn Allotment and 41,480 acres of the Conley Allotment north of SR-238. The level of use would change from 3,318 AUMs across five allotments (Conley Allotment excluded), to a range from ephemeral use only to a maximum of 3,293 perennial AUMs across portions of six allotments. The permittees would be reimbursed, in accordance with 43 CFR 4120, for their interest in the fair market value of the documented range improvements within the unavailable portions of the Big Horn and Conley allotments. These range improvements could then be removed, maintained, or modified to achieve resource goals, such as wildlife and recreation, on a case-by-case basis. The towns and communities that are dependent on the ranching industry could see minor economic impacts. Implementation-level decisions could include additional boundary fencing and/or range improvements, and adjustments in the level of use for the portions of allotments outside the SDNM. Additional fencing would be required to prevent livestock from entering the unavailable portions of the Big Horn and Conley allotments from other portions of the allotments allocated available for grazing. However, the overall impacts to livestock grazing would largely depend on the level and management of grazing authorized under implementation-level decisions.

The level of authorized grazing use within each allotment will be subject to separate environmental review and authorized under implementation-level decisions. This level could range from ephemeral use only to a maximum of 3,293 perennial AUMs and require adjustments in grazing management such as the addition or removal of range improvements, adjustments in number of authorized AUMs by allotment, adjustments in season of use, and the exclusion of sensitive areas.

Under the range of potential use, there would be a negligible beneficial impact to permittees if a low number of perennial AUMs are allocated without the option of ephemeral increases; there would be a negligible beneficial impact to permittees if ephemeral grazing only is authorized; and there would be a minor beneficial impact to permittees if the maximum number of perennial AUMs are allocated with the option of ephemeral increases. Overall, impacts to livestock grazing would be beneficial, negligible to minor, and long-term.

### ***Ephemeral Use Only Alternative***

Under the Ephemeral Use Only Alternative, all six allotments (252,460 acres) within the SDNM would be available for livestock grazing, including 77,710 acres of the Conley Allotment, 16,970 acres of the Big Horn Allotment and 610 acres of the Lower Vekol Allotment which were formerly unavailable to grazing. The level of use would change from 3,318 AUMs across five allotments (Conley Allotment excluded), to zero AUMs or ephemeral use only. Fencing would no longer be required to prevent livestock from accessing areas formerly unavailable for grazing which would lower operational costs of maintenance and labor hours. Impacts to livestock grazing would include the loss of ability to graze perennially.

Under the Ephemeral Only Alternative, there would be no guaranteed number of AUMs for the portions of the Allotments within the SDNM. Instead, the number of AUMs would be set following site visits to estimate the level of forage available based solely on annual plant production. The calculation for AUMs would leave suitable forage available for wildlife. Wildlife forage needs, potential limits on ephemeral

grazing, and any potential annual production threshold needed to ensure suitable forage for wildlife will be established on an allotment-by-allotment basis during implementation. The Big Horn Reservoir closure would temporarily or permanently reduce the number of serviceable waters that could be used for cattle. This would reduce the number of potential AUMs available for cattle on the Big Horn Allotment. There would be a negligible to moderate beneficial impact to permittees if ephemeral grazing only is authorized. Overall, impacts to livestock grazing would be beneficial, negligible, and long-term.

### **3.4 Recreation Management**

#### **3.4.1 Affected Environment – Recreation Management**

The Analysis Area includes two recreation management areas: a portion (approximately 199,660 acres) of the Sonoran Desert Extensive Recreation Management Area (ERMA), and (approximately 52,800 acres) of the Juan Bautista de Anza Recreation Management Zone (RMZ). The ERMA was allocated to provide facilities, educational opportunities, and visitor information on the SDNM. The RMZ was allocated to provide recreation and educational opportunities directed at visitors seeking to discover, tour, and learn about the Juan Bautista de Anza and Butterfield National Historic Trails (NHT), Arizona history, and natural history of the Sonoran Desert. There are no developed recreation facilities such as campgrounds or picnic areas within the Analysis Area. Two Special Recreation Permits have been issued for activities in the Analysis Area. Recreational uses within the Analysis Area consist of dispersed recreational activities such as birdwatching, motorized-use, horseback riding, hiking, backcountry camping, and hunting. In Fiscal Year 2019 the number of visits to the Analysis Area based on available traffic counts was 20,503. Approximately 71 percent of the Analysis Area is closed to motorized vehicles (wilderness areas and temporary closure of the RMZ).

#### **3.4.2 Environmental Consequences – Recreation Management**

##### ***No Action Alternative (Current Management)***

Under the No Action Alternative, five of six allotments would be available for livestock grazing (approximately 60 percent of the Analysis Area). In the portions of the Analysis Area where livestock grazing would be available, recreational activities including motor vehicle use, recreational shooting sports, noise, and backcountry camping could adversely impact grazing operations by increasing the likelihood of harassment, injury, or displacement of livestock. Concentrated livestock use areas around water developments and trailing along fencing would result in loss of vegetative cover, affecting the aesthetics of the recreation experience. Overall, under the No Action Alternative, impacts to recreation management would be adverse, negligible, and long-term.

##### ***Maximum Acreage Alternative***

Under the Maximum Acreage Alternative, all six allotments within the Analysis Area would be available for livestock grazing. Impacts would be like the No Action Alternative, except that a larger area (40 percent more) would be available for livestock grazing, increasing the potential for recreation-related conflicts with livestock grazing. Overall, under the Maximum Acreage Alternative, impacts to recreation management would be adverse, negligible to minor, and long-term.

##### ***No Grazing Alternative***

Under the No Grazing Alternative, all six allotments within the Analysis Area would be unavailable for livestock grazing. There would be no potential conflict from and on recreational activities because no livestock grazing would occur in the Analysis Area. There would be no impacts to the aesthetics of recreation from loss of vegetative cover around water developments and trailing along fencing. Overall, under the No Grazing Alternative, impacts to recreation management would be beneficial, moderate, and long-term.



### ***Reduced Grazing Alternative***

Under the Reduced Grazing Alternative, all six allotments would be available for livestock grazing except for portions of the Conley and Big Horn allotments. This represents approximately 71 percent of the Analysis Area. Impacts would be like the Maximum Acreage Alternative, except that a smaller area (30 percent less) would be available for livestock grazing, decreasing the potential for recreation-related conflicts with livestock grazing. Overall, under the Reduced Grazing Alternative, impacts to recreation management would be adverse, negligible, and long-term.

### ***Ephemeral Use Only Alternative***

Under the Ephemeral Use Only Alternative, all six allotments within the Analysis Area would be available for livestock grazing. The level of use would range from zero AUMs (no use) or ephemeral use only. Impacts would be like the No Action Alternative, except that a larger area (40 percent more) would be available for livestock grazing, increasing the potential for recreation-related conflicts with livestock grazing, when ephemeral grazing is approved. However, generally grazing is only approved for short periods of time where livestock/recreation-related conflicts would be absent for most of the year. Overall, under the Ephemeral Use Only Alternative, impacts to recreation management would be adverse, negligible, and long-term.

## **3.5 Socioeconomics and Environmental Justice**

### **3.5.1 Affected Environment - Socioeconomics**

Grazing land makes up approximately 75 percent of Arizona's total land area. According to a 2014 University of Arizona study, many Arizona ranches rely on a combination of private, Arizona State Land Department, and BLM-administered lands for their operations (UofA 2014).

The Analysis Area for socioeconomics is Maricopa County, Arizona which includes the six allotments. Maricopa County covers approximately 9,199 square miles and had an estimated population of 4,410,824 people in 2018 (the fourth most populous county in the U.S.). Maricopa County covers approximately eight percent of Arizona, and BLM-administered lands make up approximately 2,688 square miles (29 percent) of the county of Maricopa. According to the 2010 U.S. Census, the median income for a household was \$55,054 and median income for a family was \$65,438. In 2018 agriculture, including farming and ranching, represented approximately 0.2 percent of all employment in Maricopa County (Headwaters 2020). There are portions of 75 BLM-administered grazing allotments within Maricopa County, six of which are partially within the SDNM.

The BLM collects annual grazing fees from permittees based on the number of permitted AUMs. An AUM represents the amount of forage required to sustain one cow and one calf for one month. The 2012 ROD provided for 3,318 AUMs on five allotments within the SDNM. At the current rate of \$1.35 per AUM, the allotments can generate as much as \$4,479 per year from active use AUMs. The BLM distributes 50 percent of the grazing revenues to range betterment projects, 37.5 percent to the U.S. Treasury, and 12.5 percent is returned to the State the allotment is located within (43 U.S.C. Chapter 8A 1934).

Permittees also add money to the local economy. Supplies, materials, and services are often purchased for the following activities on public lands: fence/corral construction and maintenance; salt and supplements; shoeing, wages for hired herder/rider(s); veterinary expenses; vehicle purchases; repair and fuel. Open space associated with grazing promotes other activities such as recreation, hunting, and wildlife watching. For more information on Social and Economic Conditions within the Analysis Area, see Section 3.5.3 of the Lower Sonoran/SDNM FEIS (BLM 2012b).

### **3.5.2 Environmental Consequences - Socioeconomics**

#### ***No Action Alternative (Current Management)***

Under the No Action Alternative, five allotments would continue to be available for livestock grazing in the SDNM. Authorized grazing would continue at existing levels (3,318 AUMs). Livestock grazing in the Analysis Area would result in corresponding benefits to the regional economic activity from the permittee's spending in the local economy. Livestock grazing would benefit the permittee, any employees, the businesses where the permittee purchases supplies, and the communities that are supported by livestock operations. Grazing would benefit tax revenues for the local economy. One allotment would continue to be unavailable, and the portions of two other allotments would not be available for livestock grazing. These impacts could be partially mitigated if grazing is allowed on the non-SDNM portion of the one unavailable allotment. Overall, impacts to socioeconomics under the No Action Alternative would be beneficial, negligible to minor, and long-term.

#### ***Maximum Acreage Alternative***

Under the Maximum Acreage Alternative, six allotments would be available for grazing within the Analysis Area in the SDNM. The level of authorized use would range from ephemeral use only to a maximum of 4,232 AUMs. Based on the current rate of \$1.35 per AUM, the allotments would generate as much as \$5,701 per year from active use AUMs. Compared to the No Action Alternative, this would potentially represent an increase of 914 AUMs (\$1,134). Overall availability of BLM-administered lands for livestock grazing would decrease or increase depending on the level of grazing authorized under implementation-level decisions. Regardless of the level of livestock grazing authorized, the availability of a larger area for livestock grazing compared to the No Action Alternative would result in increased benefits to the regional economic activity from the permittee's spending in the local economy. Livestock grazing would benefit the permittee, any employees, the businesses where the permittee purchases supplies, and the communities that are supported by livestock operations. Grazing would benefit tax revenues for the local economy. Permittees would be reimbursed, in accordance with 43 CFR 4120, for their interest in the fair market value of the documented range improvements within allotments made unavailable.

Under the range of potential use, there would be a negligible beneficial impact to socioeconomics if a low number of perennial AUMs are allocated without the option of ephemeral increases; there would be a negligible beneficial impact to socioeconomics if ephemeral grazing only is authorized; and there would be a minor beneficial impact to socioeconomics if the maximum number of perennial AUMs are allocated with the option of ephemeral increases. Overall, impacts to socioeconomics under the Maximum Acreage Alternative would be beneficial, negligible to minor, and long-term.

#### ***No Grazing Alternative***

Under the No Grazing Alternative, no allotments would be available for livestock grazing in the SDNM. The social and economic benefits associated with grazing operations would be lost in the SDNM. The elimination of AUMs could have a multiplier effect on aspects of the local economy that are associated with the ranching community. Elimination of grazing could result in corresponding reduction in regional economic activity and would adversely impact the permittees, any employees, the businesses where the permittees purchase supplies, and the communities that are supported by livestock operations. The permittees may have to relocate their livestock to private land or a different public land allotment available for grazing. If the permittee's use of BLM-administered land is critical to their operation, the permittee could be forced to sell livestock and/or close their grazing operation entirely. This could result in decreased tax revenues for the local economy. These impacts could be partially mitigated if grazing is authorized on the non-SDNM portions of the six unavailable allotments. Permittees would be reimbursed, in accordance with 43 CFR 4120, for their interest in the fair market value of the documented range improvements within the unavailable allotments. Overall, impacts to socioeconomics under the No Grazing Alternative would be adverse, negligible to minor, and long-term.

### ***Reduced Grazing Alternative***

Under the Reduced Grazing Alternative, five allotments would continue to be allocated available for livestock grazing in the SDNM. The Conley Allotment would be changed to allocated available, however, portions of the Big Horn and Conley allotments north of SR-238 would be unavailable to livestock grazing. Grazing could be authorized up to 3,293 AUMs within the available portions of the SDNM. Livestock grazing in the Analysis Area would result in corresponding benefits to the regional economic activity from the permittee's spending in the local economy. Livestock grazing would benefit the permittee, any employees, the businesses where the permittee purchases supplies, and the communities that are supported by livestock operations. Grazing would benefit tax revenues for the local economy.

Under the range of potential use, there would be a negligible beneficial impact to socioeconomics if a low number of perennial AUMs are allocated without the option of ephemeral increases; there would be a negligible beneficial impact to socioeconomics if ephemeral grazing only is authorized; and there would be a negligible beneficial impact to socioeconomics if the maximum number of perennial AUMs are allocated with the option of ephemeral increases. Overall, impacts to socioeconomics under the Maximum Acreage Alternative would be beneficial, negligible, and long-term.

### ***Ephemeral Use Only Alternative***

Under the Ephemeral Use Only Alternative, six allotments would be available for grazing within the Analysis Area in the SDNM. The level of use would range from zero AUMs (no use) or ephemeral use only. The allotments are not expected to generate funds through grazing fees every year. The amount of use approved under an ephemeral authorization is dependent on the annual production of ephemeral plants which is largely dependent on the amount and timing of precipitation. Compared to the No Action Alternative, this would potentially represent a decrease of 914 AUMs (\$1,134). The allowable level of livestock grazing would decrease or increase depending on how grazing is authorized under implementation-level decisions. Regardless of the level of livestock grazing authorized, the availability of a larger area for livestock grazing compared to the No Action Alternative would result in increased benefits to the regional economic activity from the permittee's spending in the local economy. Livestock grazing would benefit the permittee, any employees, the businesses where the permittee purchases supplies, and the communities that are supported by livestock operations. Grazing would benefit tax revenues for the local economy. Permittees would be reimbursed, in accordance with 43 CFR 4120, for their interest in the fair market value of the documented range improvements within allotments made unavailable.

There would be a negligible beneficial impact to socioeconomics if ephemeral grazing only is authorized. Overall, impacts to socioeconomics under the Ephemeral Use Only Alternative would be beneficial, negligible, and long-term.

### **3.5.3 Environmental Justice**

The Executive Order 12898 (1994) entitled Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (1994) requires that "each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States and its territories and possessions, the District of Columbia, the Commonwealth of Puerto Rico, and the Commonwealth of the Mariana Islands."

In September 2022, the BLM published an Instruction Memorandum on Environmental Justice Implementation (<https://www.blm.gov/policy/im2022-059>) which reflects the following five criteria for determining whether a community is an environmental justice community:

- EJ community criterion 1: minority population higher than 50%
- EJ community criterion 2: minority population higher than 110% of reference area

- EJ community criterion 3: low-income population higher than 50%
- EJ community criterion 4: low-income population higher than 100% of reference area
- EJ community criterion 5: tribal communities

If at least one answer to the above 5 criteria is yes, then overall the community is an EJ community.

The following six communities in the State of Arizona in or near the five grazing allotments are identified.

- (1) Buckeye city, Maricopa County
- (2) Goodyear city, Maricopa County
- (3) Avondale city, Maricopa County
- (4) Gila Bend town, Maricopa County
- (5) Santa Cruz census designated place (CDP), Pinal County
- (6) Maricopa city, Pinal County

The data compiled, analyzed, and presented in Maps 1 and 2, Tables 1 to 5, and Figures 1 and 2 (Appendix 6) indicate that, for the recent year 2022, three of the five communities within or overlapping the five grazing allotments in the State of Arizona should be considered as an environmental justice community of concern (Table 2 in Appendix 6).

- (1) Buckeye city and (6) Maricopa city based on EJ community criteria 1 and 2
- (3) Avondale city and (4) Gila Bend town based on EJ community criteria 1, 2 and 4
- (5) Santa Cruz CDP based on EJ community criteria 1, 2, 3, 4 and 5

Key socioeconomic characteristics of the analysis area include the following.

- In terms of the size of community, (1) Buckeye city, (2) Goodyear city, and (3) Avondale city had populations more than 50,000 people in 2022 and two communities had population less than 5,000 persons in 2022, including (4) Gila Bend Town and (5) Santa Cruz CDP.
- In terms of poverty, (5) Santa Cruz CDP had a remarkably high rate (more than 200% of county and state levels).
- In terms of education limitation (that is percentage of individuals aged 25 and over with less than high school degree), and language limitation (that is percentage of households in which no member 14 years old and over (a) speaks only English or (b) speaks a non-English language and speaks English “very well”), (4) Gila Bend town had remarkably high rates in 2022 (more than 200% of county and state levels).
- In terms of employed labor forces by sectors, the four communities overall had major employment in two sectors in 2022: (A) educational services, health care and social assistance, and (B) wholesale trade and retail trade.
- In terms of changes from 2016 to 2022, (1) Buckeye city had a noticeable increased population (more than 50%).
- There are no disproportionately high and adverse human, environmental, and economic impacts on the identified EJ communities.

These combinations of socioeconomic characteristics suggest that the following communities could be identified with priority concerns for benefiting from such programs that have the potential to enhance specific aspects of socioeconomic well-being.

- The community in (4) Gila Bend town could be identified as having priority concerns that would benefit from programs that have the potential to improve education attainment level and language proficiency and
- The community in (5) Santa Cruz CDP could be identified as having priority concerns that would benefit from programs that have the potential to reduce poverty level; and

### 3.6 Vegetation, Noxious and Invasive Weed Species<sup>7</sup>

#### 3.6.1 Affected Environment - Vegetation

The vegetation of the Analysis Area is considered Sonoran desert scrub and includes three predominant vegetation communities (Figure 7). The creosote bush-bursage community is the most prevalent and most arid consisting primarily of creosote bush (*Larrea tridentata*) and white (*Ambrosia dumosa*) or triangle leaf bursage (*Ambrosia deltoidea*). This community exists primarily on broad alluvial valleys and terraces. The palo verde-mixed cacti is the second most prevalent community and is found in areas with different soil types, higher rainfall, and higher elevation gradients and contains a greater diversity of plant and wildlife species. This community consists of extensive stands of saguaro cactus interspersed with cholla (*Cylindropuntia* spp.), barrel cacti (*Ferocactus* spp.), palo verde (*Parkinsonia* spp.), brittlebush (*Encelia farinosa*), creosote bush, ocotillo (*Fouquieria splendens*), mesquite (*Prosopis* spp.), cat claw acacia (*Senegalia greggii*), and ironwood (*Olneya tesota*). The desert wash community occurs as small inclusions in large areas of upland sites and is valuable habitat for a variety of wildlife species. The vegetation of desert washes is quite variable, ranging from sparse to patchy to moderately dense, and usually occurs along the banks but may occur within the channel. The woody layer typically is intermittent to open and may be dominated by shrubs and small trees. Common species of the desert wash community include mesquite, catclaw acacia, blue palo verde (*Parkinsonia florida*), and desert ironwood. No BLM sensitive plant species exist within the Analysis Area. All these vegetation communities have the potential to produce up to 1,000 pounds of dry matter per acre of annual vegetation which can be an important source of forage for livestock and wildlife, including the Sonoran desert tortoise. Annual (ephemeral) vegetation production is highly variable and dependent on the amount and timing of precipitation, soil type, and seedbank load and diversity.

There are several plant communities listed in the Proclamation. These include the saguaro forests, palo verde - mixed cacti, creosote-bursage, and desert grasslands. In the analysis area, native grasses are found within palo verde - mixed cacti communities on rocky slopes, mountain uplands, xeroriparian communities and to a lesser extent creosote-bursage communities (Snetsinger and Morrison 2004), but true grasslands are found primarily south of I-8, outside the Analysis Area (Gori and Enquist 2003). The impact and compatibility of plant-related Monument Objects are evaluated in the Land Health Evaluation, LHE (Appendix 3) and Grazing Compatibility Analysis, GCA, (Appendix 4). The creosote-bursage community is the most extensive plant community in the Analysis Area (Table 7). In the LHE (EA, Appendix 3) creosote-bursage and palo verde - mixed cactus communities are addressed directly while saguaro forests are considered part of the palo verde - mixed cactus community.

Fire in the Sonoran Desert is rare, historically, and the vegetation communities present within the Analysis Area are not fire adapted. Since 2000, fires become increasingly common in and near the SDNM. Since 2000, 2 fires have occurred within two miles of the monument since 2005 with another 5 have occurred within 10 miles since 2007. Two wildfires occurred within the Monument in 2024 and another four occurred within 3 miles of the monument boundary. Invasive plant species that contribute to fine fuels loads in the Analysis Area include buffelgrass (*Pennisetum ciliaris*), Sahara mustard (*Brassica tournefortii*), and Mediterranean grass (*Schismus barbatus*). Though stinknet (*Oncosiphon piluliferum*) has been seen on land near the SDNM, it is not known in the monument. Long-distance dispersal of those species may be assisted by livestock, hikers, and/or vehicular travel through the area. Large infestations of Mediterranean grass and small infestations of buffelgrass and Sahara mustard have been documented within the Analysis Area. Buffelgrass was in only 1 monitoring plot out of 124 plots across the six allotments. Buffelgrass poses a small threat of wildfire. Though buffelgrass and Mediterranean grass have been shown to increase the

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<sup>7</sup> See Appendix 1 for a discussion on threatened or endangered species.

likelihood of wildfires in the desert southwest, wildfires fueled by those species tend to be smaller than in the similar, intact native plant communities (Fusco et al. 2019). For more information on vegetation communities within the Analysis Area, see Section 3.2.7 of the Lower Sonoran/SDNM FEIS (BLM 2012b) and the LHE (Appendix 3). *Schismus* species and Sahara Mustard were not documented on any of the monitoring locations, but this may be an artifact of the focus on perennial species.

Table 7 Plant community area within the Analysis Area and the area not meeting Standard 3 because of historic grazing levels. Standard 3 is maintain productive and diverse upland and riparian-wetland communities of native species. Data summarized from Appendix 4.

<b>Plant Community</b>	<b>Monument Area (Acres)</b>	<b>Area Not Meeting Standard Cattle (Acreage)</b>	<b>Area Not Meeting Standard Cattle (%)</b>	<b>Area Not Meeting Standard All (Acreage)</b>	<b>Area Not Meeting Standard All (%)</b>
Creosote-Bursage	133748	16220	12.13%	42747	31.96%
Ephemeral Wash	647.3	46	7.13%	86	13.23%
Palo Verde Mixed Cactus	64896	2297	3.54%	14252	21.96%
Saguaro Forest	8933	257	2.88%	1360	15.22%

Acuña cactus (*Echinomastus erectocentrus* var. *acunensis*) was listed as endangered under the Endangered Species Act in 2013 and has 7501 hectares of designated critical habitat, some of which is in the SDNM south of the analysis area. It is found in soil derived from various bedrock in valleys, small knolls, and gravel ridges of up to 30% slope. The acuña cactus is often noted growing under the protective canopy of associated native plant species, which may act as nurse plants, thereby sheltering seedlings from extreme temperatures and providing some protection from mechanical disturbance. Though there are no known populations of acuña cactus in the project area, the USFWS indicates that there are 17,373 acres of potentially suitable habitat within the project area; 3979 acres exist within two miles of three livestock water sources. The remaining 13,394 acres of potential habitat are more than two miles from livestock waters or on inaccessible plateaus or slopes. Threats to the acuña cactus include drought and climate change, predation by native insect and small mammal predators, nonnative, invasive plants, and habitat destruction, modification, and degradation from United States-Mexico border activities (USFWS 2013).

### 3.6.2 Environmental Consequences – Vegetation

The GCA (EA, Appendix 4) determined livestock grazing at historically authorized levels (8,703 AUMs) was incompatible with protecting Saguaro Forests on three allotments and incompatible with protecting palo verde mixed cactus and creosote-bursage communities on four allotments at historic levels. Based on the landscape level analysis, 54% of the monument is unlikely to be grazed. Sustained heavy livestock use can reduce plant vigor, alter vegetation community composition or structure, reduce vegetation cover and density, and introduce or spread invasive weeds in arid systems (Waser and Price 1981, Enright & Miller 2007, Brooks et al. 2006, Mata-González et al. 2007, Gamoun 2014, Pelliza et al. 2021). However, light to moderate use of most forage species may have little to no impact on cover and plant community composition (Navarro et al. 2002, Martin and Severson 1988, Enright and Miller 2007, Molinar et al. 2011, Gamoun 2014) and can improve range conditions (Holechek et al. 1999, Holechek et al. 2006). Implementation level analysis conducted at the allotment level would determine whether and how much of any single allotment would be made available to grazing and whether portions would be made available once DPC are met.

The alternatives range from 0 perennial AUMs to 4232 perennial AUMs. Two alternatives, No Grazing and Ephemeral Only, would eliminate the option of perennial grazing cattle year-round. All the alternatives

except the No Grazing Alternative consider ephemeral grazing as an option for any or all the allotments. Ephemeral grazing allows for flexible stocking rates, based on annual forage availability, and the ability to remove livestock quickly in response to changing conditions and could be an appropriate form of livestock management in the Sonoran Desert (Hall 2005). Adjustments in season of use, such as authorizing ephemeral grazing only, can allow forage plants to tolerate grazing by focusing it during times of the year plants are more resilient to herbivory (Caldwell 1984).

Though denser south of I-8, saguaro forests make up approximately 8933 acres of the Analysis Area with 1339 acres (15%) existing within 2 miles of cattle water source (EA, Appendix 4). The relationship between grazing and saguaro populations is somewhat unclear. Though cattle may contribute to saguaro population declines in some locations, weather (drought or freeze), insect damage, and frugivory by rodents also play significant roles in the survival and decline of saguaro (Niering et al 1963, Parker 1993). Two of five grazed sites had steady increases in population while being grazed until after the early 1990s and the one population without a history of grazing has slowly, but steadily decreased since the 1960s (Pierson et al. 2013). In the absence of grazing since 1958, the population at Saguaro National Park East has declined since its peak in 1994. In more recent years, plant density has decreased from 61 plants/ha in 2001 (Pierson et al. 2013) to 25 plants/ha in 2015 (Orum et al. 2016). One reason for the decline seems to be little recruitment activity since 1992 (Conver et al. 2017) that is likely the result of climate change (Parker 1993, Conver et al. 2017, Felix-Burrueal et al. 2024).

Much of the Monument vegetation is meeting desirable plant conditions, however historic cattle grazing contributed to some plant communities in certain allotments not meeting standard 3 (Table 7). Rangeland Standard 3, which maintains productive and diverse native upland and riparian-wetland plant communities, was achieved over most of the Monument (Table 7). For example, palo verde - mixed cactus communities did not achieve standard 3 because of grazing less than 4% because of grazing on the monument but cattle contributed to up to 40% of palo verde - mixed cactus communities not meeting standard on the Lower Vekol allotment (EA, Appendix 4). The data for other communities are noted in Table 7.

Though cattle can contribute to plant species invasions in some systems (McGranahan et al. 2012, Reisner et al 2013, Williamson et al. 2020), the relationship between invasive plant species and cattle grazing is more nuanced. For instance, though grazing may contribute to higher cheatgrass prevalence and occurrence, cheatgrass (*Bromus tectorum*) decreased with increasing proportions of years where burned sites were grazed prior to fire (Williamson et al. 2020). Cattle grazing can reduce invasive cheatgrass dominance (Diamond et al. 2012, Porensky et al. 2020) and the number of cheatgrass seed that enters the soil seed bank (Perryman et al. 2020). Reintroducing cattle to land absent from grazing for 60 years can increase native species cover while reducing invasive species cover (Gornish et al. 2018). In sagebrush steppe, 49 years of grazing exclusion 72% less perennial grass cover, fewer native species and approximately 3 times as much annual *Bromus tectorum* and *B. arvensis* cover (Porensky et al. 2020). In the Mojave Desert, red brome (*Bromus rubens*) cover was significantly lower within 50 m of cattle water sources but cover of the Mediterranean annual grass (*Schismus* species) was higher at water troughs (Brooks et al. 2006). Cattle and mule deer consume *Schismus* before the grass flowers (Krausman et al. 1997, Sassie et al. 2009), but the impact of cattle grazing on *Schismus* can be site dependent. *Schismus barbatus* density was higher in ungrazed plots in sandy soils, higher in grazed plots in creosote stands, and unaffected in mesquite ecosystems in Argentina (Sassie et al. 2009). Soil texture was not reported for creosote or mesquite systems making it unclear if sandy soils made it easier to consume or damage *S. barbatus* relative to a soil with more silt or clay content or if there is a different mechanism. Grazing may increase buffelgrass in systems with >18 inches of rain per year (Fensham et al. 2013), but light grazing may have no impact on native plant communities when buffelgrass cover is low (Fensham et al. 2015). Cattle grazing when native plants are dormant or after summer rains can control buffelgrass cover and increase plant diversity in Texas even when annual precipitation was > 18 inches (Rhodes et al. 2021). It is unclear what impact grazing will have on buffelgrass in the monument where precipitation is typically < 7 inches per year (Maricopa 2024).

Livestock grazing has the potential to reduce fine fuels load and continuity (Davies et al. 2010, Davies et al. 2015) contributing to smaller burned areas when fires occur. Winter grazing lowered the maximum fire temperature decreasing the risk of fire induced plant mortality in the sagebrush steppe (Davies et al. 2015). Cattle remove fine fuel biomass and reduce herbaceous litter resulting in shorter flame lengths and slower rates of spread (Diamond et al. 2012, Bruegger et al. 2016, Schachtschneider et al. 2024) even when utilization is as low as 26% (Bruegger et al. 2016). Moderate grazing prior to a fire can result in significantly lower cheatgrass cover relative to ungrazed sites (Davies et al. 2016). Site grazed prior to fire had significantly greater native grass biomass, cover, and density and greater biotic crust cover than ungrazed sites 20 years after a fire (Davies et al. 2016).

The restriction of access by fencing off or nonoperation of livestock waters would also be implemented in areas failing to achieve Standards due to livestock grazing. Fencing would not be required around livestock waters greater than two miles from saguaro forest area because cattle generally do not travel more than two miles from water on flat terrain (Appendix 5). These actions together would result in the overall compatibility of grazing with monument objects tied to vegetation. Any new fencing would be considered during allotment specific implementation NEPA analysis.

Acuña cacti and cattle both prefer flat areas with slope < 30%, so there is the potential for overlapping use. Some suggest that cattle grazing and vegetation conversion for cattle grazing may have contributed to habitat degradation or trampling in populations near Ajo and in Organ Pipe Cactus National Monument. These two facts suggest that cattle may contribute to acuña cactus mortality within the 3979 acres of potential habitat in the action area. Closing the Big Horn Reservoir until surveys for acuña cactus are completed will mitigate this risk.

#### ***No Action Alternative (Current Management)***

Under the No Action Alternative, the current livestock management would continue on portions of five of the six allotments available for grazing on the SDNM north of I-8. Portions of the Big Horn Allotment, the Lower Vekol Allotment, and the entire Conley Allotment would remain unavailable inside the SDNM and 3,318 AUMs would remain available across the five allotments available for grazing. The No Action Alternative includes a 61.87% reduction in the potential maximum perennial AUMs, from historically levels (8,703 AUMs) under the 1985 Lower Gila South RMP and is 21.6% lower than the Maximum Acreage Alternative. Areas of livestock concentration, such as troughs, wells, and dirt tanks installed for cattle use, would experience prolonged trampling and higher forage consumption rates by livestock and wildlife. The impacts from livestock and wildlife on vegetation in the immediate vicinity of water sources (1/4 mile) would continue to be adverse but would decrease with distance from the water source and be sparse beyond two miles (Fusco et al. 1995, Brooks et al. 2006, Blanco et al. 2009, for an expanded discussion see Appendix 5).

The consequences described above would be expected in areas available for grazing. However, in the absence of invasive plants, vegetation resources would be beneficially impacted in the areas unavailable for grazing where there would be an expected no change or increase in vegetative cover, vigor, diversity, and reproductive capability of native plants. If invasive plants are present, the areas closed to grazing would be expected to slowly convert to nonnative vegetation. If utilization is kept to 30%, noxious and invasive plant species may decrease with cattle grazing and the reduced fuel load would benefit native plants by reducing the likelihood of ignition and spread of wildfire. Overall, the impacts to vegetation and noxious and invasive weed species would be adverse to beneficial, negligible, and long-term. Impacts can be mitigated through implementation-level adjustments in livestock grazing management such as alteration of authorized AUMs, changes in season of use and modifications to range improvements use.

#### ***Maximum Acreage Alternative***

Under the Maximum Acreage Alternative, all six allotments within the SDNM would be available for livestock grazing; 77,710 acres of the Conley Allotment, 16,970 acres of the Big Horn Allotment, and 610



acres of the Lower Vekol Allotment which were formerly unavailable for grazing would become available for grazing. The level of use would range from ephemeral use only to a maximum of 4,232 perennial AUMs. The Maximum Acreage Alternative includes a 51.37% reduction in the potential maximum perennial AUMs, from historically levels (8,703 AUMs) under the 1985 Lower Gila South RMP.

Impacts to vegetation, including annuals, would be like areas available for grazing under the No Action Alternative, but expanded across the entirety of the six allotments available for grazing. The likelihood of vegetation disturbance and spread of noxious and invasive weed species around cattle watering facilities and throughout the allotments would be like those described in the No Action Alternative, but would increase on the Big Horn, Conley, and Lower Vekol allotments. The overall impacts to vegetative resources would largely depend on the level and management of grazing authorized under implementation-level decisions. At the implementation-level, compatibility of livestock grazing with vegetation communities would be achieved through adjustments to grazing management through the modification of range improvements, adjustments in number of authorized AUMs, adjustments in season of use, and/or exclusion of sensitive areas.

Impacts would vary depending on the classification of each allotment as follows: there would be a minor adverse impact to vegetation if a low number of perennial AUMs are allocated without the option of ephemeral increases; there would be a negligible adverse impact to vegetation if ephemeral grazing only is authorized. There would be a moderate adverse impact to vegetation if the maximum number of perennial AUMs are allocated with the option of ephemeral increases. Overall, under the Maximum Acreage Alternative, impacts to vegetation resources would be adverse, negligible to moderate, and long-term. These adverse impacts could be avoided or reduced at the implementation-level by redistributing livestock through the potential addition of new water sources, excluding livestock from sensitive areas, reducing AUMs, and/or authorizing grazing seasonally/ephemerally.

### ***No Grazing Alternative***

Under the No Grazing Alternative, livestock grazing would be unavailable on all six allotments in the SDNM north of I-8. Livestock grazing would be eliminated as permits expire (in the case of the Arnold and Beloit allotments). There would likely be an increase in vegetative cover, vigor, diversity, and reproductive capability. The removal of herbivory can result in one species out reproducing or competing which could result in reduced species diversity or evenness over the long-term. This is particularly a problem if invasive species are present that may out compete native species. Removing cattle from an area with a long grazing history resulted in greater invasive grass cover resulting in reduced native grass cover (Porensky et al. 2020). Removing cattle grazing may lead to an increase in red brome cover (Brooks et al. 2006) and other *Bromus* species (Brooks et al. 2016). Since the impact of grazing on *Schismus* is dependent on soils, *Schismus* may increase or decrease locally (Sassie et al. 2009). Defoliation and grazing can significantly reduce buffelgrass cover (Rhodes et al. 2021 and 2023); removing herbivory stress from buffelgrass would likely increase buffelgrass cover.

Though grazing has been documented to contribute to the spread of some invasive species systems (McGranahan et al. 2012, Reisner et al 2013, Williamson et al. 2020), removing grazing also removes a control on the fine fuels from invasive annual grasses (Davies et al. 2010, Davies et al. 2015). Fine fuel biomass and herbaceous litter will likely build until an ignition event leads to a fast-moving fire (Diamond et al. 2012, Bruegger et al. 2016, Schachtschneider et al. 2024). The buildup of fine fuels can increase wildfire ignition (Davies et al. 2017, Orr et al. 2023) and wildfire size (Davies et al. 2015, Davies et al. 2017). It has been long known that invasive annual grasses contribute to a cycle of fire and increased annual grass dominance (D'Antonio and Vitousek 1992) which may increase in deserts with climate change (Abatzoglou and Kolden 2011) making control of invasive species a particular concern.

Overall impacts of the No Grazing Alternative to vegetative resources and monument objects could be beneficial or detrimental, moderate, and long-term.

### ***Reduced Grazing Alternative***

Under the Reduced Grazing Alternative, all six allotments within the SDNM would be allocated available for livestock grazing, except for 30,610 acres of the Big Horn Allotment and 41,480 acres of the Conley Allotment north of SR-238. The level of use would change from 3,318 AUMs across five allotments (Conley Allotment excluded), to a range from ephemeral use only to a maximum of 3,293 perennial AUMs across portions of six allotments. Impacts to vegetation would be like the areas available for grazing under the No Action Alternative. The likelihood of vegetation disturbance and spread of noxious and invasive weed species around watering facilities and congregation areas, as described in the No Action Alternative. Portions of the Big Horn, Conley, and Lower Vekol allotments would be closed to grazing and the impact to vegetation in those areas would be like those described in the No Grazing Alternative. However, the overall impacts to vegetative resources would largely depend on the level and management of grazing authorized under implementation-level decisions.

Under the range of potential use on allotments and portions of allotments available for grazing; there would be a minor adverse impact to vegetation if a low number of perennial AUMs are allocated without the option of ephemeral increases; there would be a negligible adverse impact to vegetation if ephemeral grazing only is authorized; and there would be a moderate adverse impact to vegetation if the maximum number of perennial AUMs are allocated with the option of ephemeral increases.

Overall, under the Reduced Grazing Alternative, impacts to vegetation resources would be adverse, negligible to moderate, and long-term on the Arnold, Beloat, Hazen, and Lower Vekol allotments. The same is true for the portions of the Big Horn and Conley allotments south of 238. On 36,231 acres of the Conley and 61,586 acres of the Big Horn allotments north of SR-238 there would be beneficial or adverse, moderate, long-term impacts to vegetation resources depending on invasive species concentration. Adverse impacts could be avoided or reduced at the implementation-level by redistributing livestock through the potential addition of new water sources, excluding livestock from sensitive areas, reducing AUMs, and/or authorizing grazing seasonally/ephemerally.

### ***Ephemeral Grazing Only***

Under the Ephemeral Grazing Only Alternative, all six allotments within the SDNM would be available for livestock grazing; 77,710 acres of the Conley Allotment, 16,970 acres of the Big Horn Allotment, and 610 acres of the Lower Vekol Allotment which were formerly unavailable for grazing would become available for grazing. The level of use would range from zero AUMs (no use) or ephemeral use only. Impacts to vegetation, including annuals, would be similar but less, shorter duration, to areas available for grazing under the No Action Alternative, but expanded across the entirety of the six allotments available for grazing. The likelihood of vegetation disturbance and spread of noxious and invasive weed species around watering facilities and congregation areas, as described in the No Action Alternative, would increase on the Big Horn, Conley, and Lower Vekol allotments. However, the overall impacts to vegetative resources would largely depend on the management of ephemeral grazing authorized under implementation-level decisions.

Ephemeral only grazing would be compatible with monument objects tied to vegetation due to the smaller portion of vegetation being consumed by livestock and most of the forage consumed, when ephemeral grazing is approved, is comprised of annual/ephemeral species. Compatibility of saguaro cactus forests can be achieved through restricting access by fencing of livestock waters within two miles of saguaro forest areas. The shorter duration of ephemeral grazing, if approved, would result in fewer impacts to saguaro and nurse plants. The restriction of access by fencing of livestock waters would also be implemented in areas failing to achieve Standards due to livestock grazing. Fencing would not be required around livestock waters greater than two miles from saguaro forest area because cattle generally do not travel more than two miles from water on flat terrain and no more than one mile in rough terrain (Appendix 5). These actions together would result in the overall compatibility of grazing with monument objects tied to vegetation.

There would be a moderate, beneficial, or adverse impact to vegetation if ephemeral grazing only is authorized. The potential moderate, adverse impact to acuña cacti will be mitigated by closing the Big Horn Reservoir until surveys can be completed. If acuña cacti are found in areas where cattle may contribute to the threats to the population, the Big Horn Reservoir will remain closed. If no acuña populations are discovered, or if they are found in areas inaccessible to livestock, the water source may be reopened for grazing use. The benefits derive from expected control of invasive species and decreased risk of wildfire after significant rain. Overall, under the Ephemeral Grazing Only Alternative, impacts to vegetation resources would be adverse, negligible, and long-term. These adverse impacts could be avoided or reduced at the implementation-level by redistributing livestock through the potential addition of new water sources, excluding livestock from sensitive areas, and/or modifying how ephemeral grazing is approved.

### **3.7 General Wildlife, Special Status Species (Animals), Migratory Birds**

#### **3.7.1 Affected Environment**

The Analysis Area contains many species of animals that are commonly associated with a Sonoran desert scrub community. Typical general wildlife species include the following: desert mule deer (*Odocoileus hemionus*), javelina (*Pecari tajacu*), mountain lion (*Puma concolor*), and bighorn sheep (*Ovis canadensis*). Small mammal species present include the black-tailed jackrabbit (*Lepus californicus*), desert cottontail (*Sylvilagus auduboni*), skunks (*Mephitis* spp.), coyote (*Canis latrans*), American Badger (*Taxidea taxus*), and raccoons (*Procyon lotor*). Additional wildlife species present within the monument include bats, small mammals, reptiles, amphibians, and various migratory birds such as California leaf-nosed bat (*Macrotus californicus*), cave myotis (*Myotis velifer*), gray fox (*Urocyon cinereoargenteus*), bobcat (*Lynx rufus*), Western Diamondback rattlesnake (*Crotalus atrox*), Sonoran gopher snake (*Pituophis catenifer affinis*), red backed whiptail and other whiptail lizards (*Aspidoscelis xanthonata*, *Aspidocelis* spp.), horned lizard (*Phrynosoma* spp.), zebra-tailed lizard (*Callisaurus draconoides*), side blotched lizard (*Uta stansburiana*), Sonoran green toad (*Anaxyrus retiformis*), elf owl (*Micrathene whitneyi*), Western screech owl (*Megascops kennicottii*), Bald Eagle (*Haliaeetus leucocephalus*), and Peregrine Falcon (*Falco peregrinus anatum*). Source material used in this assessment includes information from the FWS, AZGFD and information on file with the Lower Sonoran Field Office and site visits conducted by staff biologists. Many wildlife species have varied habitat requirements, however, the potential impacts from the proposed action will affect many species in a similar manner and those effects will be analyzed together. The BLM Phoenix District sensitive species list (USDI 2017) was reviewed and cross-referenced by county with the AZGFD Environmental Review Tool and Heritage Data Management System to narrow the list to potential sensitive species that occur within the monument. For more information on General Wildlife within the Analysis Area, see Section 3.2.13 of the Lower Sonoran/SDNM FEIS (BLM 2012b). BLM does not authorize or undertake predator control. Any predator control measures would be authorized under AZGFD 17-302 in the Arizona Game and Fish Laws and Rules August 2024 edition (AGFD 2024).

Large game species such as the desert bighorn sheep and deer occur within the SDNM. Desert bighorn sheep habitat could potentially be affected by livestock grazing. However, bighorn sheep prefer steep slopes and are most likely to occur within the Maricopa Mountains and have access to approximately 11 water catchments maintained by AZGFD, which were developed for desert bighorn sheep and mule deer. The positions of these water catchments in steep rugged mountains and the comparatively flat terrain associated with the potential livestock water locations, is expected to reduce the possibility of wildlife-livestock interaction at waters and reduce the potential for the spread of disease. Certain diseases of possible concern regarding transmission at the livestock-wildlife interface include bovine tuberculosis (i.e. bTB or *Mycobacterium bovis*), cervid tuberculosis (cTB), brucellosis, epizootic hemorrhagic disease (HD), and bluetongue (BT). For these diseases, there is limited evidence of their presence within Arizona. Livestock waters, livestock feeds, grazing and other factors pose the risk of disease between cattle and wildlife in southern U.S. regions (e.g. Arizona), but various studies have shown that bTB infected cattle to be

continuously sourced from dairy or slaughter operations in Mexico (USAHA 2005; USAHA 2023; Portacci et al. 2010) as well as the probable presence of it "in free-ranging deer in northern Mexico (Miller et al. 2013). Both tuberculosis and brucellosis have an insignificant presence in Arizona, including the monument area. As closely related viruses, HD and BT also aren't of a significant concern for cattle in Arizona since they don't have significant prevalence in Arizona ungulates. This is due to the arid Sonoran Desert habitat, which is not commonly "expected to harbor breeding sites for *Culicoides* spp. [the main vector of BT viruses] since the larvae need moisture to develop" (Noon et al. 2002). The naturally arid climate of the Sonoran Desert contributes to the lowered transmission viability of other concerning diseases as well. Specifically for interactions between Sonoran pronghorn and livestock, "Many of the potential conflicts... are not well known or understood. Livestock may compete with Sonoran pronghorn for preferred thermal cover. In other areas, livestock have been reported to displace pronghorn does from fawning areas. There is the possibility of disease (e.g., epizootic hemorrhagic disease, bluetongue) transmission from livestock to Sonoran pronghorn" (Ajo Sentinel EA 2022). Since the possibility of wildlife-related disease transmission to livestock remains, there are prevention and mitigation measures that have been and can be implemented, with the "...most successful tools...[involving] fencing technology...that reduces contact between wildlife and livestock feed..." (Miller et al. 2013). Livestock grazing may deplete available forage on lower slopes and restrict bighorn sheep foraging to less easily accessible areas with suitable forage. One study found that in areas of sympatric cattle use, bighorn sheep adjusted their foraging behavior by increasing travel time in search of areas with adequate forage to increase feeding efficiency (Garrison 2015). At least one study has shown that bighorn sheep movement increased as cattle moved towards them, indicating at least some level of avoidance (Bissonette 1996) and another showed increased vigilance in male bighorns in the presence of livestock (Brown et al. 2010). Several studies support the idea that deer will shift their diets and habitat selection to forage and habitats less preferentially selected by livestock (Austin and Urness 1986, Loft et al. 1991). Increased competition for resources over time has been documented to decrease the selectivity of deer for preferred habitat and forage (Loft et al. 1991, Ortega et al. 1997). Although the migratory behavior of many wildlife species has been studied, the effects that the presence of livestock may have on wildlife movement are not well documented (Poza et al. 2021). There are several BLM sensitive species that potentially occur within the Analysis Area including the Sonoran desert tortoise (*Gopherus morafkai*) and the lesser long-nosed bat (*Leptonycteris curasoae yerbabuena*). To address its management responsibilities, the BLM has developed a management plan for desert tortoise on public lands and a strategy for carrying out the plan in Arizona, Strategy for Desert Tortoise Habitat Management on Public Lands in Arizona: A Range wide Plan (USDI 1990). The Analysis Area contains habitat that the BLM characterizes as tortoise habitat. Category I desert tortoise habitat includes habitat that is necessary to maintain populations with the highest densities, which are stable or increasing, and experiences the fewest conflicts with current land uses. Category II habitats may support stable populations and/or are contiguous with medium to high-density habitat. Category III habitats are the least manageable and contain medium to subpar habitats; however, these areas do exist between Category I and II habitats and should be managed for dispersal between Category I and II habitats. The goal of the BLM is to maintain stable and viable populations with no net loss of habitat in Category I and II habitats and to limit population declines to the extent possible in Category III habitats by mitigating impacts. There are approximately 154,200 acres of Category I tortoise habitat, 22,340 acres of Category II tortoise habitat and 3,450 acres of Category III tortoise habitat within the Analysis Area (Figure 8). For more information on BLM Sensitive Species within the Analysis Area, see Section 3.2.13 of the Lower Sonoran/SDNM FEIS (BLM 2012b). Decisions to allow livestock use of ephemeral vegetation will be guided by IM AZ-94-018. In desert tortoise habitat, decisions to allow ephemeral grazing would also be guided by recommendations by the Arizona Interagency Desert Tortoise Team (AIDTT). The AIDTT recommends that ephemeral grazing should not be authorized unless the pasture reaches at least 280 lbs./acre of ephemeral forage and utilization of annual forage should not exceed 50%. In years of abundant ephemeral bloom, wildlife takes advantage of the plentiful nutritious ephemeral forage.

The Candidate Conservation Agreement (CCA) for Sonoran desert tortoise states: “The primary threats to SDT in Arizona are habitat destruction, fragmentation, and degradation. Causes of these threats include but are not limited to: invasive nonnative plant establishment; an altered fire regime; urbanization and development; human-constructed barriers to movement; off-road vehicle use; and livestock grazing. Because there is little overlap in the habitat shared by livestock and SDT in most areas in Arizona, and because livestock grazing in Arizona is actively managed by land management agencies, livestock grazing is not currently thought to affect populations in Arizona (USFWS 2015).” However, other studies suggest that threats which may cause habitat degradation and increased mortality over broad areas, such as livestock grazing, have the potential to be large contributors to tortoise population declines as compared to patchily distributed threats with higher mortality rates (Tuma et al. 2016). Recent studies have shown that tortoises use intermountain valleys as part of their home ranges and for dispersal (Averill-Murray et al. 2020) and have recorded differences in habitat usage between juveniles and adult tortoises and seasonal variations (Sullivan et al. 2016), which may indicate increased areas of overlap between livestock grazing and desert tortoise habitat than what has been stated in the CCA. While studies on the effects of livestock grazing on desert tortoise habitat have been conducted (Berry 1978, Avery 1998, Kazmaier 2002), the effects on tortoise behavior are not well documented.

There are several federally listed endangered, threatened, or candidate species that may occur within the Analysis Area or within 5-miles. Sonoran pronghorn (*Antilocapra americana sonoriensis*), Cactus Ferruginous Pygmy Owl (*Glaucidium brasilianum cactorum*), Yellow-billed Cuckoo (*Coccyzus americanus*), Yuma Ridgway’s Rail (*Rallus obsoletus yumanensis*), Southwestern Willow Flycatcher (*Empidonax traillii extimus*), California Least Tern (*Sternula antillarum browni*), Desert Pupfish (*Cyprinodon macularius*), Gila Topminnow (*Poeciliopsis occidentalis*), Monarch Butterfly (*Danus plexippus*), and Acuña Cactus (*Echinomastus erectocentrus acunensis*) have potential to occur within the Analysis Area. No designated critical habitat falls within Analysis Area.

Of these species with the potential to occur within the Analysis Area, none have been observed within a 5-mile buffer of the Analysis Area except for Sonoran Pronghorn and Monarch Butterfly. Appropriate habitat exists within the Analysis Area for Cactus Ferruginous Pygmy Owl; however, the species has not been observed within 50-miles of the Analysis Area in the last 30 years (AGFD 2022). There is no mapped habitat for Yellow-billed Cuckoo within the Analysis Area. The closest observation in the last 10 years is approximately 8-miles north of Analysis Area. There are approximately 196-acres of predicted suitable habitat for Yuma Ridgway’s Rail within the Analysis Area, located on the northeastern edge. The closest observation in the last 10 years is approximately 8.5-miles northwest of the Analysis Area. There is no mapped suitable habitat for the Southwestern Willow Flycatcher within the Analysis Area. The closest observation from the last 10 years is approximately 8-miles northwest of Analysis Area. There is no mapped suitable habitat for the California Least Tern within the Analysis Area. The closest observation is approximately 25-miles northeast of Analysis Area. There is suitable habitat for the Acuña Cactus within the Analysis area. The closest observation from the last 5 years is approximately 8.5-miles south of the Analysis Area. There is no mapped suitable habitat for the Desert pupfish within the Analysis Area and information on any recorded observations within 5-miles of the Analysis Area could not be found. There is no mapped suitable habitat for the Gila topminnow within the Analysis Area and information on any recorded observations within 5-miles of the Analysis Area could not be found. The proposed changes will not affect these species to the extent that warrants analysis.

Sonoran pronghorns have been observed within the far southern edge of the Analysis Area but are not known to occupy it. The entire Analysis Area has been designated as a ‘Non-Essential Experimental Population’ under section 10(j) of the Endangered Species Act for Sonoran pronghorn (Vol. 76, No. 87, 25593) (see Figure 3-15 of the Lower Sonoran/SDNM FEIS, BLM 2012b). Appropriate habitat exists within the Analysis Area for Monarch Butterfly within the Analysis Area. There has been one recorded observation within the Analysis Area in the last 5 years. Informal consultation was initiated with USFWS on April 8, 2024, and is ongoing.

The Analysis Area contains suitable habitat for many migratory birds. Typical migratory bird species including the following: mourning dove (*Zenaida macroura*), Gambel's quail (*Callipepla gambelii*), phainopepla (*Phainopepla nitens*), and cactus wren (*Campylorhynchus brunneicapillus*). Migratory birds are protected under the 1918 Migratory Bird Treaty Act (16 USC 703), which prohibits the taking of any migratory birds, their parts, nests, or eggs unless specifically permitted by regulation. Additional protections are provided for migratory birds by the Neotropical Migratory Bird Conservation Act of 2000 (16 USC Chapter 80), and Executive Order 13186, which requires the BLM and other federal agencies to work with FWS to provide protection for migratory birds, primarily in the form of habitat protection to avoid migratory pattern disruption. Birds found within the monument are typical of desert scrub habitat. For more information on migratory birds within the Analysis Area see Section 3.2.13 of the Lower Sonoran/SDNM FEIS (BLM 2012b).

### **3.7.2 Environmental Consequences**

#### ***No Action Alternative (current management)***

Both livestock and wildlife utilize vegetation. Various wildlife species (e.g., bighorn sheep, mule deer, reptiles, some migratory birds) depend on forbs and shrubs for forage and concealment. Insectivore species such as bats, and some migratory birds, are indirectly dependent on herbaceous vegetation to support their insect population diet or to provide a substrate for nesting, roosting, or concealment. Some bird species are further dependent on herbaceous vegetation for nesting materials and habitat and roosting. Larger predator species are also indirectly dependent on herbaceous vegetation to provide forage and cover for prey species such as small mammals and birds. The presence and movement of livestock between areas can result in the direct disturbance or displacement of individual wildlife species from areas providing cover and forage. Fencing associated with livestock may affect the ability of wildlife species to move between and within allotments. To mitigate potential adverse effects of fencing on wildlife species, any new fencing would be required to be constructed in a wildlife-friendly manner, including smooth strand top and bottom wires and for the bottom wire to be at least 18 inches from the ground. Competition between livestock and a variety of wildlife species can occur in areas with low perennial grass composition where livestock and wildlife are more likely to utilize the same browse forage species. According to the 2020 LHE, there are areas that are not achieving Standards because of historical livestock grazing. One of the three ecological sites on the Arnold Allotment, two of the seven ecological sites on the Beloat Allotment, one of the four ecological sites on the Big Horn Allotment, two of the six ecological sites on the Conley Allotment, and two of the five ecological sites on the Lower Vekol Allotment are not achieving Standards because of livestock grazing.

Under the No Action Alternative, range improvements such as water developments, would continue to be maintained by permittees in allotments available for livestock grazing.

Under the No Action Alternative, impacts to general wildlife, special status species and migratory birds would be adverse, moderate, and long-term on the Arnold, Beloat, Big Horn, Hazen, and Lower Vekol allotments and would be adverse, minor, and long-term on the Conley Allotment.

#### ***Maximum Acreage Alternative***

Under the Maximum Acreage Alternative, livestock grazing would be available on all allotments including an additional 77,170 acres of the Conley Allotment, 16,970 acres of the Big Horn Allotment, and 610 acres of the Lower Vekol Allotment. The level of grazing authorized across the SDNM would range from ephemeral use only to a maximum of 4,232 perennial AUMs. Depending on the number of perennially, if any, authorized AUMs under implementation-level decisions, the Maximum Acreage Alternative could have similar or fewer impacts than the No Action Alternative.

The GCA (Table 4, Appendix 4) shows livestock grazing at historic levels to be incompatible with wildlife and diversity of plant and animal species on the Beloat, Big Horn, Conley, and Lower Vekol allotments. At the implementation-level, compatibility of livestock grazing with wildlife and species diversity would be

achieved through adjustments to grazing management through the modification of range improvements, adjustments in number of perennially authorized AUMs, adjustments in season of use, and/or exclusion of sensitive areas.

Adjustments to grazing management as described above have been shown to maintain and improve the monument objects tied to wildlife, including wildlife habitat. The Maximum Acreage Alternative includes a reduction in the potential maximum perennial AUMs, from historically authorized 8,703 AUMs under the 1985 Lower Gila South RMP to 4,232 AUMs, across the Analysis Area. Adjustments in season of use, such as authorizing ephemeral grazing only, can allow forage plants to withstand grazing during certain times of the year as compared to others (Caldwell 1984). Ephemeral grazing limits the frequency of livestock/wildlife interactions, especially in wash communities that serve as forage areas and movement corridors, and competition for perennial browse. The flexibility and criteria required, including the 2015 Sonoran desert tortoise Candidate Conservation Agreement, to authorize ephemeral grazing would reserve forage for wildlife, prevent potential impacts to wildlife, and prevent potential impacts wildlife habitat.

The maximum potential of 4,232 perennial AUMs would be compatible with monument objects tied to wildlife following the modification of range improvements, such as restricting livestock use of water sources. Restricting livestock access by fencing livestock waters within two miles of saguaro forest areas would allow additional recruitment of saguaro and increase foraging opportunities for saguaro dependent wildlife species. The restriction of access by fencing livestock waters would also be implemented in areas failing to achieve Standards due to livestock grazing which would improve wildlife habitat in these areas. These actions together would result in the overall compatibility of grazing with monument objects tied to wildlife.

Under the Maximum Acreage Alternative, water developments, would be maintained by permittees on allotments available for livestock grazing.

The installation of new fencing around livestock waters to restrict livestock use can cause short-term localized adverse impacts to soils and vegetation. New fencing would be constructed in a wildlife-friendly manner and is unlikely to cause adverse impacts to wildlife. The addition of new livestock water infrastructure may be needed to redistribute livestock to less sensitive areas which can cause adverse impacts to vegetation, wildlife, and soils. The degree of impacts from these implementation-level actions would depend on the extent of the developments and would be evaluated under separate environmental review.

Impacts would vary depending on the classification of each allotment as follows: there would be minor adverse impact to wildlife if a low number of perennial AUMs are allocated without the option of ephemeral increases; there would be a negligible adverse impact to wildlife if ephemeral grazing only is authorized; and there would be a moderate adverse impact to wildlife if the maximum number of perennial AUMs are allocated with the option of ephemeral increases. These conclusions are based on the idea that fewer livestock interactions would be beneficial to wildlife and there would be more forage resources available for wildlife. These adverse impacts could be avoided or reduced at the implementation-level by redistributing livestock through the potential addition of new water sources, excluding livestock from sensitive areas, reducing AUMs, and/or authorizing grazing seasonally/ephemerally.

Overall, under the Maximum Acreage Alternative, impacts to general wildlife, special status species, and migratory birds would be adverse, negligible to moderate, and long-term.

### ***No Grazing Alternative***

In the absence of livestock grazing, competition for wildlife forage vegetation would be reduced, providing more forage for wildlife and insect populations. The absence of livestock grazing could result in cover canopy increasing over time, benefiting cover-dependent species. Livestock disturbance/displacement effects would not occur, benefiting nesting migratory birds and other wildlife. With the absence of grazing, improvements in vegetative cover conditions would be expected to occur more rapidly. This would result

in a potential benefit for wildlife. An increase of herbaceous species frequency, cover, and composition would be expected to be greater under this alternative.

Under the No Grazing Alternative permittees would be reimbursed in accordance with 43 CFR 4120 for their interest in the fair market value of the documented range improvements within the unavailable allotments. These range improvements could then be removed, maintained, or modified to achieve resource goals, such as wildlife, on a case-by-case basis. Allotment fencing and water developments outside the SDNM would continue to be maintained by permittees. However, the number of maintained water sources within the SDNM is likely to decrease due to the removal of permittee maintenance contributions. Fencing hinders the movement of some wildlife species, and it is possible for wildlife to be injured on fencing. Unmaintained fencing is potentially a greater hazard to wildlife. When fence materials break and are on the ground, there is a greater potential for wildlife to become entangled in it. Unmaintained range improvements could result in adverse impacts to wildlife.

Under the No Grazing Alternative, impacts to general wildlife, special status species, and migratory birds would be beneficial, minor to moderate, and long-term.

### ***Reduced Grazing Alternative***

Under the Reduced Grazing Alternative, livestock grazing would be available on all allotments. Under this alternative the northern portions of the Big Horn and Conley allotments would be unavailable for grazing. When compared to the No Action Alternative there would be an additional 46,556 acres of the Conley Allotment, 5,645 acres of the Big Horn Allotment south of SR-238, and 610 acres of the Lower Vekol Allotment that would become available to grazing. There are 30,614 acres of the Big Horn Allotment north of SR-238 that would become unavailable for grazing. The level of grazing authorized across the SDNM would range from ephemeral use only to a maximum of 3,293 perennial AUMs. Depending on the number of authorized AUMs under implementation-level decisions, the Reduced Grazing Alternative could have similar or fewer impacts than the No Action Alternative.

The GCA (Table 4, Appendix 4) shows livestock grazing at historic levels to be incompatible with wildlife and diversity of plant and animal species on the Beloit, Big Horn, Conley, and Lower Vekol allotments. At the implementation-level, compatibility of livestock grazing with wildlife and species diversity would be achieved through adjustments to grazing management through the modification of range improvements, adjustments in number of authorized AUMs, adjustments in season of use, and/or exclusion of sensitive areas.

Adjustments to grazing management, as described above, have been shown to maintain and improve the monument objects tied to wildlife, including wildlife habitat. The Maximum Acreage Alternative includes a reduction in the potential maximum perennial AUMs, from historically authorized 8,703 AUMs under the 1985 Lower Gila South RMP to 3,293 AUMs, across the Analysis Area. Adjustments in season of use, such as authorizing ephemeral grazing only, can allow forage plants to withstand grazing during certain times of the year as compared to others (Caldwell 1984). Ephemeral grazing limits the frequency of livestock/wildlife interactions, especially in wash communities that serve as forage areas and movement corridors, and competition for perennial browse. The flexibility and criteria required to authorize ephemeral grazing would prevent potential impacts to wildlife and wildlife habitat.

The maximum potential of 3,293 perennial AUMs would be compatible with monument objects tied to wildlife following the modification of range improvements, such as restricting livestock use of water sources. Restricting livestock access by fencing livestock waters within two miles of saguaro forest areas would allow additional recruitment of saguaro and increase foraging opportunities for saguaro dependent wildlife species. The restriction of access by fencing livestock waters would also be implemented in areas failing to achieve Standards due to livestock grazing which would improve wildlife habitat in these areas. These actions together would result in the overall compatibility of grazing with monument objects tied to wildlife.



Under the Reduced Grazing Alternative, range improvements such as water developments, would continue to be maintained by permittees in areas available for livestock grazing. The range improvements north of SR-238 would be unmaintained by permittees including two livestock waters on the Big Horn Allotment.

The installation of new fencing around livestock waters to restrict livestock use can cause short-term localized adverse impacts to soils and vegetation. New fencing would be constructed in a wildlife-friendly manner and is unlikely to cause adverse impacts to wildlife. The addition of new livestock water infrastructure may be needed to redistribute livestock to less sensitive areas which can cause adverse impacts to vegetation, wildlife, and soils. The degree of impacts from these implementation-level actions would depend on the extent of the developments and would be evaluated under separate environmental review.

Under the range of potential use on allotments and portions of allotments available for grazing; there would be minor adverse impact to wildlife if a low number of perennial AUMs are allocated without the option of ephemeral increases; there would be a negligible adverse impact to wildlife if ephemeral grazing only is authorized; and there would be a moderate adverse impact to wildlife if the maximum number of perennial AUMs are allocated with the option of ephemeral increases. These conclusions are based on the idea that fewer livestock interactions would be beneficial to wildlife and there would be more forage resources available for wildlife.

Overall, under the Reduced Grazing Alternative impacts to general wildlife, special status species, and migratory birds would be adverse, negligible to moderate, and long-term on the Arnold, Beloit, Hazen, and Lower Vekol allotments. On 36,231 acres of the Conley and 61,586 acres of the Big Horn allotments north of SR-238 there would be beneficial, minor, and long-term impacts to general wildlife, special status species and migratory birds.

### ***Ephemeral Grazing Only***

Under the Ephemeral Grazing Only Alternative, all six allotments within the SDNM would be available for livestock grazing; 77,710 acres of the Conley Allotment, 16,970 acres of the Big Horn Allotment, and 610 acres of the Lower Vekol Allotment which were formerly unavailable for grazing would become available for grazing. The level of use would range from zero AUMs (no use) or ephemeral use only. The Ephemeral Grazing Only Alternative would have fewer impacts than the No Action Alternative.

The GCA (Table 4, Appendix 4) shows livestock grazing at historic levels to be incompatible with wildlife and diversity of plant and animal species on the Beloit, Big Horn, Conley, and Lower Vekol allotments. At the implementation-level, compatibility of livestock grazing with wildlife and species diversity would be achieved through adjustments to grazing management through the modification of range improvements, authorizing ephemeral use only, adjustments in season of use, and/or exclusion of sensitive areas.

Adjustments to grazing management as described above have been shown to maintain and improve the monument objects tied to wildlife, including wildlife habitat. The Ephemeral Grazing Only Alternative includes a reduction in the potential maximum perennial AUMs, from historically authorized 8,703 AUMs under the 1985 Lower Gila South RMP to ephemeral use only, across the Analysis Area. Adjustments in season of use and authorizing ephemeral grazing only can allow forage plants to withstand grazing during certain times of the year as compared to others (Caldwell 1984). Ephemeral use has the potential to lessen habitat degradation over broad areas that may be caused livestock grazing, by allowing for the restriction or removal of livestock when forage and land health requirements are not being met. Ephemeral grazing limits the frequency of livestock/wildlife interactions, especially in wash communities that serve as forage areas and movement corridors, and competition for perennial browse. The flexibility and criteria required, including the 2015 Sonoran desert tortoise Candidate Conservation Agreement, to authorize ephemeral grazing, would allow adequate and suitable native forage, space, and cover to be available to desert tortoises throughout the year and maintain or increase the productivity of native plants important to desert tortoises and prevent potential impacts to wildlife and habitat (Avery 1997). Measures to decrease the potential

dangers from livestock to desert tortoise, such as accidental crushing by livestock, may include season of use restrictions to avoid active grazing during time periods of highest desert tortoise activity. Burrows may also be crushed by livestock, however this is unlikely because most of the burrows within the habitat are under rocks in steep boulder-strewn habitat or in the cut banks of incised desert washes, where cattle are not likely to graze (Boarman 2002).

Ephemeral use only would be compatible with monument objects tied to wildlife. Restricting livestock access by fencing livestock waters within two miles of saguaro forest areas would allow additional recruitment of saguaro and increase foraging opportunities for saguaro dependent wildlife species. The restriction of access by fencing livestock waters would also be implemented in areas failing to achieve Standards due to livestock grazing which would improve wildlife habitat in these areas. These actions together would result in the overall compatibility of grazing with monument objects tied to wildlife.

Under the Ephemeral Grazing Only Alternative, water developments, would be maintained by permittees on allotments available for livestock grazing.

The installation of new fencing around livestock waters to restrict livestock use can cause short-term localized adverse impacts to soils and vegetation. New fencing would be constructed in a wildlife-friendly manner and is unlikely to cause adverse impacts to wildlife. The addition of new livestock water infrastructure may be needed to redistribute livestock to less sensitive areas which can cause adverse impacts to vegetation, wildlife, and soils. The degree of impacts from these implementation-level actions would depend on the extent of the developments and would be evaluated under separate environmental review.

There would be a beneficial impact to wildlife if ephemeral grazing only is authorized. These conclusions are based on the idea that fewer livestock interactions would be beneficial to wildlife and there would be more forage resources available for wildlife. This alternative is expected to allow the vegetative community to meet the Standards for Rangeland Health which would allow for enough forage and quality forage for both wildlife species, including the desert tortoise, and livestock. Potential adverse impacts could be avoided or reduced at the implementation-level by redistributing livestock through the potential addition of new water sources, excluding livestock from sensitive areas, implementing season of use restrictions, and/or authorizing grazing for ephemeral use only.

Overall, under the Ephemeral Grazing Only Alternative, impacts to general wildlife, special status species, and migratory birds would be beneficial, minor to moderate, and long-term.

### **3.8 Soil Resources**

#### **3.8.1 Affected Environment**

Landforms in the Analysis Area consist of broad, alluvial basin floors separated by basaltic or granitic mountains, hills, and rock outcrops, dissected by several major drainages and numerous ephemeral ones. The soils range from shallow to deep, usually calcareous, sandy loams. Upland parts of the basins are carved by desert washes with soils that are coarse- to medium-textured and cobbly to gravelly on the surface. Soils located higher on broad alluvial fans often derive directly from upslope bedrock and are underlain by a caliche layer. Farther down, alluvial fans often occur with loamier texture in the upper horizons and often contain a less distinct carbonate layer. Biotic crusts and desert pavement are common in the Analysis Area and provide increase soil stability, water infiltration (Belnap 1995) and protection against wind and surface-sheet erosion (BLM 2001). Qualitative and quantitative soil-resource data is available from the National Resource Conservation Service soils surveys (NRCS 1997). For additional information on Soils Resources in the Analysis Area, see Section 3.2.6 of the Lower Sonoran/SDNM FEIS (BLM 2012b).

Though overgrazing can lead to increased bare ground and risk of soil erosion, other human activities in the analysis area also impact soils in the Monument. Wildfires, building construction, and linear rights of

way such as pipelines and roads contribute to sedimentation rates at 3-4 times greater rates than grazing (Jeong & Dorn 2019). Wildfire reduces soil aggregate stability, increasing soil and micronutrient loss (Morra et al. 2024) and increase soil compaction (Morra et al. 2024) for at least two years after a fire. The increased use of public lands since Covid-19 has resulted in more damage from off-road vehicles and increased chance of fire ignition. Clearing and construction for solar developments and expanding suburban development, OHV use, and risk of wildfire in the planning area are expected to have greater impacts on soils than some grazing management options (Jeong & Dorn 2019).

### **3.8.2 Environmental Consequences - Soil Resources**

#### ***No Action Alternative (Current Management)***

Under the No Action Alternative, the current livestock management would continue on portions of five of the six allotments available for grazing on the SDNM north of I-8. Portions of the Big Horn and Lower Vekol allotments, and the entire Conley Allotment would remain unavailable inside the SDNM. This alternative decreases the AUMs from historically authorized 8,703 AUMs under the 1985 Lower Gila South RMP to 3,318 AUMs across the five allotments available for grazing. The impacts to soil resources would include soil compaction around water sources and fence-lines, a potential reduction in protective vegetation cover, litter, and damage to biological crusts leading to a potential increase of soil loss through erosion.

Grazing can increase compaction in non-significant ways, but it is less clear what that means for soil erosion. Holechek et al. (2006) found heavy grazing increased compaction, reduced infiltration, and increased erosion, but light to moderate grazing reduced soil bulk density, increased water infiltration, decreased overland flow. Though that 2004 gray literature document mentions compaction, the peer-reviewed literature that was published later using the same data did not include the section on compaction and water interactions (Holechek et al. 2006). Though Jones (2000) suggests soil bulk density doesn't change with grazing, she indicated significant differences in water infiltration and soil erosion. However, by pooling data from multiple ecosystems and testing the mean assuming a lack of variability in a paired t-test seems inappropriate. More recently, the impact of 200-400 cattle per ha (~80-161 per acre) was shown to have nonsignificant impacts to compaction, but decreased water infiltration and retention (Gray et al. 2022). It is unclear if compacted soils in historically high-density cattle areas near wells and corrals will naturally become less dense over time, but the lack of frost heaving may make that less likely in the Sonoran Desert (Hall et al. 2005).

Adjustments to grazing management have been shown to maintain and improve soil resources. Conservatively managed grazing can improve vegetation diversity, productivity, and reduce mortality (Holechek et al. 2006). Adjustments in season of use, such as authorizing ephemeral grazing only, can allow forage plants to withstand grazing during certain times of the year as compared to others (Caldwell 1984). Continuous grazing can slowly increase soil organic carbon while intensive rotational grazing does not (Schatz et al. 2020). Though a review of grazing impacts to soils shows both increases and decreases in soil organic carbon and root responses that may be mediated by access to precipitation or climate (Piñeiro et al. 2010).

The repair and maintenance fencing around livestock waters to restrict livestock use can cause short-term localized adverse impacts to soils and vegetation and would be converted to a wildlife-friendly design. Any new fences would require a NEPA evaluation before constructed but would be built in a wildlife-friendly manner. The addition of new livestock water infrastructure may be needed to redistribute livestock to less sensitive areas which can cause adverse impacts to vegetation, wildlife, and soils and those impacts would be evaluated during implementation-level NEPA evaluation.

There would be a greater risk of impact under current management compared to the No Grazing Alternative and Ephemeral Grazing Alternatives. The impacts to soil resources would be adverse, minor, and long-term.

### ***Maximum Acreage Alternative***

Under the Maximum Acreage Alternative, all six allotments within the SDNM would be available for livestock grazing; 77,710 acres of the Conley Allotment, 16,970 acres of the Big Horn Allotment and 610 acres of the Lower Vekol Allotment which were formerly unavailable to grazing, would become available for grazing. The level of use across all six allotments would range from ephemeral use only to a maximum of 4,232 perennial AUMs. Soil compaction in areas of heavier use and the potential for increased erosion would be similar to the No Action Alternative and would be expected to occur on the additional areas available for grazing under this alternative. The likelihood of disturbance around watering facilities and congregation areas on the Big Horn, Conley, and Lower Vekol allotments would increase. However, the impacts to soil resources would largely depend on the level of grazing authorized under implementation-level decisions.

At the implementation-level, achievement of Standards related to soils would be made through adjustments to grazing management through the modification of range improvements, adjustments in number of authorized AUMs, adjustments in season of use, and/or exclusion of sensitive areas (see the No Action Alternative for a discussion on impact changing grazing management on soils).

The maximum potential of 4,232 perennial AUMs could achieve Standards related to soils following the modification of range improvements, such as restricting use of water sources. The restriction of access by fencing of livestock waters would also be implemented in areas failing to achieve Standards due to livestock grazing. These actions would result in the achievement of Standards tied to soils.

The repair and maintenance fencing around livestock waters to restrict livestock use can cause short-term localized adverse impacts to soils and vegetation and would be converted to a wildlife-friendly design. Any new fences would require a NEPA evaluation before constructed but would be built in a wildlife-friendly manner. Adding new livestock water infrastructure may be needed to redistribute livestock to less sensitive areas which can cause adverse impacts to vegetation, wildlife, and soils and those impacts would be evaluated during implementation-level NEPA evaluation.

Under the range of potential use, there would be a minor adverse impact to soils if a low number of perennial AUMs are allocated without the option of ephemeral increases; there would be a negligible adverse impact to soils if ephemeral grazing only is authorized; and there would be a moderate adverse impact to soils if the maximum number of perennial AUMs are allocated with the option of ephemeral increases.

Overall, under the Maximum Acreage Alternative, impacts to soil resources would be adverse, negligible to moderate, and long-term. These adverse impacts may be avoided or reduced at the implementation-level by redistributing livestock through the potential addition of new water sources, excluding livestock from sensitive areas, reducing AUMs, and/or authorizing grazing seasonally/ephemerally.

### ***No Grazing Alternative***

Under the No Grazing Alternative, livestock grazing would be unavailable on all six allotments in the SDNM north of I-8. Livestock grazing would be eliminated in the SDNM as permits expire (in the case of the Arnold and Beloit allotments). Eliminating grazing would reduce impacts on soil resources by decreasing ground disturbance which would allow vegetation and biological crust cover to establish more quickly than if grazed over time. However, the uncertainty of soil structure becoming less dense over time (Hall et al. 2005) makes it unclear if historic vegetation will recover or if a lack of grazing will result in an increase in invasive plant density or cover (Davies et al. 2010, Davies et al. 2016).

Annual grasses often take advantage of open, disturbed areas, are likely to increase with climate change (Abatzoglou and Kolden 2011). Invasive annual plant dominance in deserts is determined by proximity to urban and agricultural centers, fire history, OHV activity and soil nitrogen (Brooks and Berry 2006). The proximity of SDNM to urban and agricultural centers and recreation activities are likely to increase invasive annual plant dominance in the Monument. The presence of and likely spread of the invasive grass *Schismus*

in the study area means that in the absence of grazing, there is an increased risk of wildfire ignition (Fusco et al. 2019) if the No Grazing Alternative is selected.

Three wildfires occurred in 2024 within the Lower Vekol Allotment, including one that was nearly 2800 acres. Wildfire reduces soil aggregate stability, increasing soil and micronutrient loss including phosphorus (Shaw et al. 2011) and increases soil compaction (Morra et al. 2024) for at least two years after a fire. Soil erosion from wind in burned areas can occur for two years or more after a fire (Shaw et al. 2011, Morra et al. 2024) and can have regional impacts on air quality (Hahnenberger and Nicoll 2012).

The impacts to soil resources would be negative or beneficial, minor, and long-term.

### ***Reduced Grazing Alternative***

Under the Reduced Grazing Alternative, all six allotments within the SDNM would be allocated available for livestock grazing, except for 30,610 acres of the Big Horn Allotment and 41,480 acres of the Conley Allotment north of SR-238. The level of use would change from 3,318 AUMs across five allotments (Conley Allotment excluded), to a range from ephemeral use only to a maximum of 3,293 perennial AUMs across portions of six allotments. Impacts to vegetation would be similar to the areas available for grazing under the No Action Alternative but expanded across the entirety of the four allotments and portions of two allotments available for grazing. The likelihood of soil disturbance around watering facilities and congregation areas, as described in the No Action Alternative, would increase on some portions of the Big Horn, Conley, and Lower Vekol allotments. However, the overall impacts to soil resources would largely depend on the level and management of grazing authorized under implementation-level decisions.

At the implementation-level, achievement of Standards related to soils would be made through adjustments to grazing management through the modification of range improvements, adjustments in number of authorized AUMs, adjustments in season of use, and/or exclusion of sensitive areas (see the No Action Alternative for a discussion on impact changing grazing management on soils). Ephemeral grazing, if authorized, may only occur during wet seasons when biological crusts are less vulnerable to damage by livestock grazing activities (BLM 2001). The flexibility and criteria required to authorize ephemeral grazing would improve vegetative and biological crust cover and prevent potential impacts to soils.

The maximum potential of 3,293 perennial AUMs could achieve Standards related to soils following the modification of range improvements, such as restricting use of water sources. The restriction of access by fencing of livestock waters would also be implemented in areas failing to achieve Standards due to livestock grazing. These actions would result in the achievement of Standards tied to soils.

The repair and maintenance fencing around livestock waters to restrict livestock use can cause short-term localized adverse impacts to soils and vegetation and would be converted to a wildlife-friendly design. Any new fences would require a NEPA evaluation before constructed but would be built in a wildlife-friendly manner. The addition of new livestock water infrastructure may be needed to redistribute livestock to less sensitive areas which can cause adverse impacts to vegetation, wildlife, and soils and those impacts would be evaluated during implementation-level NEPA evaluation.

Under the range of potential use, there would be a minor adverse impact to soils if a low number of perennial AUMs are allocated without the option of ephemeral increases; there would be a negligible adverse impact to soils if ephemeral grazing only is authorized; and there would be a minor adverse impact to soils if the maximum number of perennial AUMs are allocated with the option of ephemeral increases.

Overall, under the Maximum Acreage Alternative, impacts to soil resources would be adverse, negligible to minor, and long-term.

### ***Ephemeral Use Only Alternative***

Under the Ephemeral Use Only Alternative, all six allotments within the SDNM would be available for livestock grazing; 77,710 acres of the Conley Allotment, 16,970 acres of the Big Horn Allotment and 610

acres of the Lower Vekol Allotment which were formerly unavailable to grazing, would become available for grazing. The level of use would range from zero AUMs (annually) and ephemeral inspections would need to be conducted before grazing was authorized. Soil compaction in areas of heavier use (wells, dirt tanks, mineral licks) and the potential for increased erosion would be less than the other grazing alternative but would be expected to occur. The likelihood of disturbance around watering facilities and congregation areas on the Big Horn, Conley, and Lower Vekol allotments would increase. However, the impacts to soil resources would largely depend on the level of grazing authorized under implementation-level decisions, zero AUMs or ephemeral use only.

At the implementation-level, achievement of Standards related to soils would be made through adjustments to grazing management through the modification of range improvements, the authorization of ephemeral use only, adjustments in season of use, and/or exclusion of sensitive areas (see the No Action Alternative for a discussion on impact changing grazing management on soils).

Ephemeral use only could achieve Standards related to soils. The restriction of access by fencing of livestock waters would also be implemented in areas failing to achieve Standards due to livestock grazing. These actions would result in the achievement of Standards tied to soils.

The repair and maintenance fencing around livestock waters to restrict livestock use can cause short-term localized adverse impacts to soils and vegetation and would be converted to a wildlife-friendly design. Any new fences would require a NEPA evaluation before constructed but would be built in a wildlife-friendly manner. The addition of new livestock water infrastructure may be needed to redistribute livestock to less sensitive areas which can cause adverse impacts to vegetation, wildlife, and soils and those impacts would be evaluated during implementation-level NEPA evaluation.

Overall, under the Ephemeral Use Only Alternative, impacts to soil resources would be adverse, negligible, and long-term. These adverse impacts could be avoided or reduced at the implementation-level by redistributing livestock through the potential addition of new water sources, excluding livestock from sensitive areas, and authorizing grazing ephemeraly.

### **3.9 Cultural and Heritage Resources**

#### **3.9.1 Affected Environment – Cultural and Heritage Resources**

Cultural and heritage resources are the physical and traditional remnants of thousands of years of human occupation and use of the land and its resources. Cultural resource sites date to both precontact and historic time periods up to the mid-20th century. Cultural resources also include places of traditional importance to Native Americans and are recognized as fragile and irreplaceable resources.

The types of sites present on the SDNM include: precontact sites with artifact scatters; precontact trails; petroglyphs; and rock alignments. In the Analysis Area, the sites most often found there tend to be associated with short-term resource procurement and various levels of occupation. This translates to light-density, temporary use cultural sites, probably related to hunting and gathering camps, trails, and some processing of resources.

Roughly 80 percent of the cultural sites found on the SDNM reflect aboriginal occupation. About 13 percent of the total number can be attributed to Euro-American occupation, leaving some sites of unknown age and/or cultural affiliation. Within the Analysis Area, roughly half of the cultural resource sites can be associated with indigenous use and half are Euro-American in origin. It is important to note that intensive archaeological survey information is limited, so an unknown number of sites have not been identified.

Historic Euro-American sites found in the Analysis Area include ranching sites with corrals and water troughs, railroad sites with foundations and graves, homesteading attempts with historic artifact scatters, extant historic structures, mining sites, historic trail sites, and sites associated with automobile travel. Most

of these historic era sites are associated with the settling of the west by Euro-American people beginning in the mid to late 19th century. Structures and longer-term settlements typically date to the mid-20th century.

The objects of the SDNM include not only precontact and historic cultural sites, but also the natural historic landscape settings, including a segment of the Juan Bautista de Anza National Historic Trail (Anza NHT) corridor (Figure 9)<sup>8</sup>, a segment of the Butterfield Overland National Historic Trail (Figure 9), and the 19th century era trails that have been documented along the same corridor. The Juan Bautista de Anza NHT, designated by Congress in 1990, is a 1,200-mile historic trail corridor extending from what was to become Mexico to northern California. The Anza NHT commemorates the 1775–1776 land route that Spanish commander Juan Bautista de Anza took in an effort to establish a self-sustaining settlement and presidio near San Francisco Bay. It has been documented only through diaries and journal entries made by the people who followed the trail for the first time, making it a historic corridor. A segment of this historic trail corridor is located north of State Route 238 and runs east-west for approximately 17 miles through the width of both the Big Horn and Conley allotments. Although the Anza NHT has no known surviving trail signature on the ground, certain segments of the trail that traverse the SDNM are considered to be among the best-preserved corridor segments and most representative of the historic trail corridor landscape and conditions.

In addition to the Anza Trail corridor, remnants of 19th century historic trails can be seen. The Mormon Battalion and a segment of the Butterfield Overland National Historic Trail are two of the later trails that were constructed for the use of wheeled vehicles. These 19th century trails are an example of the types of routes that crossed through this part of the Sonoran Desert from east to west in this period. Archaeological evidence is associated with these travel corridors.

For the purposes of this Draft RMPA/EA, the Analysis Area is also known as the *area of potential effect* for purposes of complying with Section 106 of the National Historic Preservation Act. A thorough review of project records and cultural resources information has been performed for this action. This review has revealed that a total of 94 cultural inventory projects have been documented within the Analysis Area. These projects total approximately 14,473 acres. As a result of these efforts, 89 cultural resource sites have been documented within the Analysis Area.

### ***Tribal Interests***

Ongoing consultation with the Gila River Indian Community and the other O’odham-speaking indigenous groups, has resulted in some new understanding about a historic, traditional trail route called the Oyadaibuic-Komadk Trail. This trail is a route connecting the historical Piman villages of Oxibahibuiss and Comac/Komadk (Darling and Eiselt 2009). The Gila River Indian Community has been performing in-depth research and field investigation to document any physical traces of this trail. The route is described in the Oriole Song, a traditional Akimel O’odham song series known by many in the Gila River Indian Community (Darling 2009). The Oriole song creates a song-scape by describing the traveler’s movement along this route from east to west as the sun moves in the daytime and then back from west to east as it moves through the underworld at night or through fire (Darling 2009). This type of song has geographical information in it as well as traditional knowledge that the traveler must learn to follow (Darling and Lewis 2007). There are more than 100 songs that chart a journey over at least 280 miles from their villages along the upper Gila River all the way to particular salt flats in Sonora (Darling and Lewis 2007).

Probable physical traces of the Komadk traditional trail corridor have been observed within the SDNM. Recent archaeological inventory has identified likely trail segments that appear to cut through the northern

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<sup>8</sup> The SDNM ROD also allocated the Anza NHT Management Area (Figure 8).

end of the SDNM. Physical traces have been documented on the western slope of the Sierra Estrella Mountains and in some areas near State Route 85.

On March 21, 2020, the BLM initiated government-to-government consultation with the following tribes: Ak-Chin Indian Community, Tohono O’odham Nation, Pascua Yaqui Tribe, Salt River Pima-Maricopa Indian Community, The Hopi Tribe, and the Gila River Indian Community. Additional information was provided to the tribes on: April 21, 2020; May 5, 2020; and May 8, 2020. On June 4, 2020, the BLM held a conference call with government representatives of the Ak-Chin Indian Community, Pascua Yaqui Tribe, and Gila River Indian Community tribes. On June 10, 2020, the BLM held a conference call with a government representative of the Tohono O’odham Nation. Tribal concerns on the RMPA/EA included the potential impacts on cultural sites from livestock grazing by soil compaction and erosion, and potential direct impacts to sites. The Tohono O’odham Nation considers the SDNM a traditional cultural property.

On June 19, 2020, the BLM received a response from the Gila River Indian Community with concerns about the potential occurrence of the Komadk Trail and the need for additional cultural surveys. Recent inventories have yielded information about probable segments of the Komadk Trail (Wright 2022), and consultation is ongoing regarding this important corridor. On June 19, 2020, the BLM received a response from the Tohono O’odham Nation, expressing opposition to livestock grazing in the SDNM due to the potential damage to fragile-pattern archeological sites. The SDNM is also a portion of the traditional-use areas by the tribe and contains evidence of use by Tohono O’odham Nation ancestors.

Affected tribes were notified of the current planning effort on April 30, 2024. With responses received from the Tohono O’odham Nation, Salt River Pima Maricopa-Indian Community, and the Pascua Yaqui Tribe for this new iteration. On May, 1<sup>st</sup>, 2024, The Tohono O’odham stated that they supported the no grazing alternative by email. On May 3<sup>rd</sup>, 2024, the Salt River Pima-Maricopa Indian Community provided a request for further information and shared that the project area is within the ancestral lands of the Four Southern Tribes, comprised of the Ak-Chin Indian Community, Gila River Indian Community, Tohono O’odham Nation, and Salt River. In response, the BLM presented the project and different alternatives at a monthly Four Southern Tribes Cultural Resources Working Group meeting on May 17<sup>th</sup>, 2024. On May 1<sup>st</sup>, 2024, the Pascua Yaqui Tribe stated that the proposed alternative is a “step in the right direction”, but that grazing presents risks to heritage resources.

### **3.9.2 Environmental Consequences – Cultural and Heritage Resources**

#### ***No Action Alternative (Current Management)***

Under the No Action Alternative, five of the six allotments would be available for livestock grazing. The impacts would be similar the Maximum Acreage Alternative, except that the Conley Allotment and portions of the Big Horn and Lower Vekol allotments would be unavailable for livestock grazing. The No Action Alternative would benefit the Butterfield Overland NHT segment in the vicinity of the North Tank (in the Conley Allotment) by eliminating the potential for livestock to congregate there. According to the GCA (Appendix 4), concentrated livestock use at watering facilities and trailing along fencing can be incompatible with cultural monument objects. At the implementation-level, any new range improvements would be subject to separate review under Section 106 of the National Historic Preservation Act (NHPA). The BLM will follow the procedures identified in the executed Arizona Vegetation and Range Management Programmatic Agreement (2020) in order to comply with Section 106 of the NHPA.

#### ***Maximum Acreage Alternative***

Under the Maximum Acreage Alternative, livestock grazing would be available on all six allotments. The cultural sites documented in the Analysis Area are scattered lightly across the landscape. Soils and slope play a strong role in how precipitation affects the area, which influences the distribution of cultural sites. Lower precipitation, a lack of permanent water sources, and limited areas having thick stands of vegetation results in very light density of cultural sites. Areas of scattered and light density vegetation patterns offer few areas where livestock would congregate. Other areas with soft soils and dense vegetation providing



shade occur along major washes and in proximity to livestock waters provide areas where livestock are most likely to concentrate. Roughly nine of the documented cultural sites within the six allotments show some level of impact from livestock grazing.

Both indigenous and Euro-American trails cross east to west through the Conley and Big Horn allotments. Gap Tank, Gap Well, Conley Tank, and North Tank Well are all livestock water developments that provide water, shade and soft soils where livestock tend to congregate. Livestock use of these water developments in proximity to these trails and their associated sites, have resulted in some level of impacts. Livestock trailing has resulted in vegetation loss and compaction of soils, leading to erosion of some sites. According to the GCA (Appendix 4) concentrated livestock use at watering facilities and trailing along fencing can be incompatible with cultural monument objects.

At the implementation-level, any new range improvements would be subject to the requirements of the Arizona Vegetation and Range Management Programmatic Agreement (2020) in order to comply with Section 106 of the NHPA. The most common mitigation is site avoidance in order to ensure no adverse impacts would occur from concentrated livestock use. If eligible-cultural sites are present, the range improvement(s) such as livestock waters would be excluded from livestock by fencing to avoid impacts to the site(s) and maintain compatibility with monument objects. Allowing livestock grazing in these areas would result in negative, negligible to minor, and long-term impacts to cultural and heritage resources.

### ***No Grazing Alternative***

Under the No Grazing Alternative, livestock grazing would be unavailable for all six allotments. With the elimination of livestock grazing in the SDNM, there would be no potential impacts from livestock grazing on cultural sites. Vegetative cover around existing livestock water developments may increase over time and have a beneficial impact on nearby cultural sites by reducing the potential for erosion. The No Grazing Alternative would eliminate livestock grazing within the Anza NHT Corridor and Management Area. Excluding livestock grazing from Conley and Big Horn allotments north of SR-238 would result in beneficial, negligible to minor, and long-term impacts to historic/indigenous trails, and overall negative, negligible to minor, and long-term impacts to cultural and heritage resources in the SDNM north of I-8.

### ***Reduced Grazing Alternative***

Under the Reduced Grazing Alternative, all six allotments would be available for livestock grazing, except portions of the Conley and Big Horn allotments would be unavailable. The Reduced Grazing Alternative would benefit the Butterfield Overland NHT segment in the vicinity of the North Tank (in the Conley Allotment) by eliminating the potential for livestock to congregate there (Map 2 in the GCA, Appendix 4). The Reduced Grazing Alternative would eliminate livestock grazing within the Anza NHT Corridor and Management Area. According to the GCA (Appendix 4) concentrated livestock use at watering facilities and trailing along fencing can be incompatible with cultural monument objects.

At the implementation-level, any new range improvements would be subject to the requirements of the Arizona Vegetation and Range Management Programmatic Agreement (2020) in order to comply with Section 106 of the NHPA. Allowing livestock grazing in the six allotments, except for portions of the Conley and Big Horn allotments north of SR-238 would result in beneficial, negligible to minor, and long-term impacts to historic/indigenous trails, and overall negative, negligible to minor, and long-term impacts to cultural and heritage resources in the SDNM north of I-8.

### ***Ephemeral Use Only Alternative***

Under the Ephemeral Use Only Alternative, livestock grazing would be available on all six allotments. The impacts would be similar to the Maximum Acreage Alternative except with more restrictions on any authorized use, which would be required to maintain and achieve Standards for Rangeland Health. Grazing would occur only part of the year on a limited basis. This alternative would reduce the impacts to cultural and heritage resources within the Analysis Area due to the more stringent guidelines.

Major Euro-American and indigenous trails cross east to west through the Conley and Big Horn allotments. Gap Tank, Gap Well, Conley Tank, and North Tank Well are all livestock water developments that provide not only water, but shade and soft soils, making it ideal for cattle congregation. Livestock use of these water developments in proximity to the aforementioned trails and their associated sites, have resulted in some level of impacts over the years. Livestock trailing has resulted in vegetation loss and compaction of soils, leading to erosion of some sites. According to the GCA (Appendix 4) concentrated livestock use at watering facilities and trailing along fencing can be incompatible with cultural monument objects. Restricting grazing use to certain times of the year and on a basis that there is suitable forage would reduce these impacts considerably.

At the implementation-level, any new range improvements would be subject to the requirements of the Arizona Vegetation and Range Management Programmatic Agreement (2020) in order to comply with Section 106 of the NHPA. The most common mitigation is site avoidance in order to ensure no adverse impacts would occur from concentrated livestock use. If eligible cultural sites are present, the range improvement(s) such as livestock waters would be excluded from livestock by fencing to avoid impacts to the site(s) and maintain compatibility with monument objects. Allowing any livestock grazing in areas where sensitive cultural resources are present, would likely result in negative, negligible to minor, and long-term impacts to cultural and heritage resources.

### **3.10 Air Resources**

#### **3.10.1 Affected Environment**

The Environmental Protection Agency sets National Ambient Air Quality Standards for six principal or “criteria” pollutants. The pollutants are carbon monoxide (CO), lead, nitrogen dioxide (NO<sub>2</sub>), ozone (O<sub>3</sub>), sulfur dioxide (SO<sub>2</sub>), and two categories of particulate matter (PM), PM with an aerodynamic diameter of  $\leq 10$  microns (PM<sub>10</sub>) and PM with an aerodynamic diameter of  $\leq 2.5$  microns (PM<sub>2.5</sub>). Non-attainment areas overlapping the Analysis Area are associated within the Phoenix metropolitan area, an area with a population of more than four million people. The Phoenix metropolitan area is within Maricopa County and is the fourth most populous county in the U.S. Portions of the Arnold, Hazen, and Beloit allotments are within non-attainment for large particulates (PM<sub>10</sub>) (1.3 percent of the Analysis Area). Primary pollution sources of PM<sub>10</sub> contributing to this non-attainment are windblown dust from construction sites, agricultural fields, unpaved roads and parking lots, and disturbed vacant lots.

Research on the impact of cattle on PM<sub>2.5</sub> and PM<sub>10</sub> is focused on high density cattle production such as dairy and livestock farms (e.g. Guo et al. 2011) or model feed lot conditions and cattle movement (Guo et al. 2011). Van Pelt et al. (2017) compared dust and PM<sub>10</sub> emissions from tilled soil sites with sites with simulated grazing and sites burned in a wildfire in the Chihuahuan Desert on loamy sand and sandy loam soils. Tilled land produced significantly more dust and PM<sub>10</sub> emissions than clipped or clipped and trampled sites in grass and shrub communities. Burned sites and shrub sites with clipping but no trampling resulted in significantly more PM<sub>10</sub> emissions than grasslands clipped or clipped and trampled. Burned grassland and burned grassland that was trampled had greater PM<sub>10</sub> emissions than unburned grassland, but the difference was not statistically significant (Van Pelt et al. 2017). On the Colorado Plateau, dust from areas with heavy grazing use showed greater dust flux in the air, but areas with light or moderate grazing produces similar or even less dust (Nauman et al. 2023). In soils rich in silt and clay in the Negev region of Israel, grazing lead to significantly greater dust and PM<sub>10</sub> than farming with cover crop and thatch left intact (Katra 2020). However, grazing, in the absence of disturbance, resulted in similar PM<sub>10</sub> concentrations as agriculture with disking and lower PM<sub>10</sub> concentrations than farmland that used cultivators (Katra 2020). Wildfires result in measurable increases in local and regional dust for two or more years. Five wildfires Cattle grazing can result in fewer PM<sub>2.5</sub> emissions from wildfires by consuming forage, thinning vegetation that reduces wildfire size (Ratcliff et al. 2023).

Portions of the Arnold, Beloat, Big Horn, Conley, and Hazen allotments are within non-attainment for 8-hour Ozone (O<sub>3</sub>) (49% of the Analysis Area). Ozone is produced by chemical reactions involving naturally occurring gases and gases from pollution sources. Primary pollution sources of O<sub>3</sub> contributing to this non-attainment are industrial solvents and coating use, residential/industrial fuel combustion, open burning/wildfires, and cars and trucks. Though a truck may be used to move cattle and contribute some ozone to the air quality, the single vehicle each allotment would contribute an insignificant amount of pollution relative to the amount produced by vehicles in the area.

Greenhouse gases include carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), water vapor, and several trace gases. From 1990 to 2000, Arizona’s greenhouse gas emissions rose 51 percent compared with a national GHG emissions increase of 23 percent (BLM 2018). The average temperature in the Southwest has increased approximately 1.5°F (0.83°C) above a baseline period of 1960-1990 and is projected to rise 4.0-10.0°F (2.2°C-5.6°C) by the end of the century (BLM 2012b). Methane is produced by ruminants, including livestock, from the consumption of vegetation. Methane is a gas that contributes 28 times more impact on warming than CO<sub>2</sub> (EPA 2024). A single cow produces 154 to 264 pounds of CH<sub>4</sub> per year (EPA 2024). The amount of CH<sub>4</sub> cattle produce is dependent on age (DeRamus et al. 2003), the plant matter they consume (Harper et al. 1999, Beauchemin & McGinn 2005, Richmond et al. 2015), time of year (DeRamus et al. 2003, Richmond et al. 2015), familiarity with digesting local plants (Raynor et al. 2024), average daily weight gain (DeRamus et al. 2003, Richmond et al. 2015, Raynor et al. 2024), and management practices (DeRamus et al. 2003). It is unclear whether the number of cattle a producer raises on private land will differ if they are allowed to graze cattle on public lands. If producers retain the same number of cattle, then the amount of CH<sub>4</sub> those cattle produce could be higher or lower on public land. Due to the complexity in determining methane production and uncertainty about producer actions and cattle management, assumptions about the differences in cattle CH<sub>4</sub> production on public versus private lands would be highly speculative. An effort was made to describe the potential contribution to CH<sub>4</sub> production that grazing in the monument may contribute (Table 8). However, thinning vegetation can result in reduced CO<sub>2</sub> and PM<sub>2.5</sub> released by wildfires, more than compensating for CH<sub>4</sub> emissions from cattle (Ratcliff et al. 2023). With the increased risk of ignition from buffelgrass and *Schismus* (Fusco et al. 2019), both in portions of the Monument, grazing could be a net benefit in greenhouse gas emissions.

Table 8 The estimated methane production by cattle by metric ton (tonne) per year. A tonne is equal to 2204.6 pounds. The per annum cattle methane production was based on EPA estimates of cattle methane production (EPA 2024).

<b>Grazing Management</b>	<b>Cattle (n)</b>	<b>Total Methane Low (tonne/year)</b>	<b>Total Methane High (tonne/year)</b>
Historic	1430	99.89	171.24
Alternative A (No Action)	276	19.28	33.05
Alternative B (Maximum Acreage)	353	24.66	42.27
Alternative C (No Grazing)	0	0.00	0.00
Alternative D (Reduced Grazing)	274	19.14	32.81
Alternative E (Ephemeral)*	50	3.49	5.99

\*Ephemeral grazing is inherently variable making it difficult to estimate cattle number. This number was selected based on cattle only being authorized periodically on allotments. The assumption is that some years there will be more cattle some years there will be no cattle.

### **3.10.2 Environmental Consequences**

#### ***No Action Alternative (Current Management)***

Under the No Action Alternative, five of six allotments in the Analysis Area would continue to be available for livestock grazing. The amount of CH<sub>4</sub> cattle produced would be 80.7% less than historic levels and 21.8% lower than the Maximum Alternative which would authorize the greatest amount of cattle. Alternative C would likely result in more frequent fires than other alternatives so net PM<sub>2.5</sub> emissions may improve relative to the No Grazing Alternative. PM<sub>10</sub> emissions may be higher, than the no grazing alternative, but would contribute less than agriculture in the area. Trampling is expected to offset dust production. Cattle presence on the allotment will also result in slower vehicles speeds and less dust from fast moving vehicles recreating in the Monument. Although there are existing permits for two allotments, no livestock grazing has occurred in the Analysis Area since 2015. Should grazing resume under the No Action Alternative, use of motor vehicles and equipment to maintain livestock infrastructure such as fencing and water developments, would cause localized and short-term increases in fugitive dust. Methane emissions would increase but the reduced wildfire risk may offset the CO<sub>2</sub> and PM<sub>2.5</sub> emissions caused by wildfires resulting in a net benefit. Overall, impacts to air resources would be adverse, moderate, and long-term.

#### ***Maximum Acreage Alternative***

Under the Maximum Acreage Alternative, all allotments within the Analysis Area would be available for livestock grazing. Use of motor vehicles and equipment to maintain livestock infrastructure such as fencing and water developments, would cause localized and short-term increases in fugitive dust. Compared to the No Action Alternative, there would be a 914 AUM increase (21 percent) in authorized livestock use. This alternative has the greatest estimated amount of CH<sub>4</sub> produced by cattle of the alternatives under consideration (24.66 - 42.27 tonnes/year). This is a 75.3% decrease in emissions on public lands relative to historic grazing. Alternative C would likely result in more frequent fires than other alternatives so net PM<sub>2.5</sub> emissions may improve relative to the No Grazing Alternative. PM<sub>10</sub> emissions may be higher, than the no grazing alternative but would contribute less than agriculture in the area. Trampling is expected to offset dust production. Cattle presence on the allotment will also result in slower vehicles speeds and less dust from fast moving vehicles recreating in the Monument. The area available for grazing would increase by 40 percent relative to the no action alternative. Methane emissions would increase but the reduced wildfire risk may offset the CO<sub>2</sub> and PM<sub>2.5</sub> emissions caused by wildfires resulting in a net benefit. Overall, impacts to air resources would be adverse, moderate, and long-term.

#### ***No Grazing Alternative***

Under the No Grazing Alternative, all allotments within the Analysis Area would be unavailable for livestock grazing. Dust is likely to occur only from vehicles used by people recreating. Wildfire risk is higher than other alternatives likely contributing to concentrated short-term increases in PM<sub>2.5</sub> and CO<sub>2</sub> during wildfires and increased PM<sub>10</sub> and dust. Dust escaping burned areas after wildfires can persist for years (Hahnenberger and Nicoll 2012), extending the potential impact. In the decades to come, with further expansion of annual grasses and forbs, this could off-set savings in climate impact from the lack of CH<sub>4</sub> produced by cattle. Overall, impacts to air resources would be adverse or beneficial, negligible, and long-term.

#### ***Reduced Grazing Alternative***

Under the Maximum Acreage Alternative, all allotments within the Analysis Area would be available for livestock grazing. Use of motor vehicles and equipment to maintain livestock infrastructure such as fencing and water developments, would cause localized and short-term increases in fugitive dust. Compared to the No Action Alternative, there would be a 25 AUM decrease in authorized livestock use. The area available for grazing would increase by 12 percent. Livestock grazing on two allotments with existing permits would

result in increased emissions of methane, which contributes to climate change. Overall, impacts to air resources would be adverse, negligible, and long-term.

***Ephemeral Use Only Alternative***

Under the Ephemeral Use Only Alternative, all allotments within the Analysis Area would be available for livestock grazing. Use of motor vehicles and equipment to maintain livestock infrastructure such as fencing and water developments, would cause localized and short-term increases in fugitive dust. Compared to the No Action Alternative, there would be no perennially authorized AUMs. Livestock would be on the allotment(s) only when forage conditions warrant. The area available for grazing would increase by 40 percent. Livestock grazing on two allotments with existing permits would result in increased emissions of methane, which contributes to climate change. Overall, impacts to air resources would be adverse, negligible, and long-term.

**3.11 Visual Resources Management**

**3.11.1 Affected Environment – Visual Resources Management**

The BLM uses the Visual Resource Management (VRM) System to classify and manage visual resources on lands under its jurisdiction. The VRM System involves inventorying scenic values, establishing management objectives for those values through the resource management planning process, and then evaluating proposed activities to determine whether they conform to the management objectives (BLM SDNM ROD and RMP 2012). The BLM’s VRM System incorporates scenic quality, viewer sensitivity, and distance zones to identify visual resource inventory (VRI) classes. These classes represent the relative value of the existing visual landscape, as well as the visual resource baseline from which to measure impacts that a proposed project may have on these values. In its planning process, the BLM weighs visual and competing resource values and designates the VRM classes, with associated management class objectives for a given area’s visual setting.

VRM Classes I, II, and III. Management objectives for the VRM classifications are described below:

Class I Objective: “To preserve the existing character of the landscape. The level of change to the characteristic landscape should be very low and must not attract attention.”

Class II Objective: “To retain the existing character of the landscape. The level of change to the characteristic landscape should be low.”

Class III Objective: “To partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate.”

Table 9 lists the VRM classes in the Analysis Area that were allocated in the 2012 ROD (Table 2-3). VRM classes do not apply to non-BLM lands.

Table 9 VRM Classes and Acres in the Analysis Area.

I	123,804
II	76,564
III	52,082

**3.11.2 Environmental Consequences – Visual Resources Management**

***No Action Alternative (Current Management)***

Under the No Action Alternative, no livestock grazing has occurred in the SDNM since 2015 although there are existing permits on two allotments. Areas of concentrated past livestock use around infrastructure and

water developments has shown loss of vegetative cover through trampling and soil compaction. Any infrastructure such as water troughs or tanks, fencing, and access roads, has caused localized changes to the visual character of the site, but would not impact on the overall scenic condition of the Analysis Area. Overall, the degree of changes to the visual character of the Analysis Area is weak, long-term, adverse and negligible.

#### ***Maximum Acreage Alternative***

Under the Maximum Acreage Alternative, livestock grazing would be available on all six allotments. Areas of concentrated livestock use around infrastructure and water developments has shown loss of vegetative cover through trampling and soil compaction. Any infrastructure such as water troughs or tanks, fencing, and access roads, would cause localized changes to the visual character of the site, but would not impact on the overall scenic condition of the Analysis Area. New infrastructure at the implementation-level would have the potential to introduce additional localized change to the site. New infrastructure would be required to meet VRM standards and could include use of appropriate color (shades of brown, gray, green) to lessen visual contrast, or site placement to lessen visual intrusion. Overall, the degree of changes to the visual character of the Analysis Area would be weak, long-term, adverse and negligible to minor.

#### ***No Grazing Alternative***

Under the No Grazing Alternative, livestock grazing would not be available in the Analysis Area.

Existing livestock infrastructure not needed for other purposes could be removed. Overall impacts to the visual character of the Analysis Area would be weak, long-term, beneficial, and negligible.

#### ***Reduced Grazing Alternative***

Under the Reduced Grazing Alternative, livestock grazing would be available on portions of all six allotments. Areas of concentrated livestock use around infrastructure and water developments has shown loss of vegetative cover through trampling and soil compaction. Any infrastructure such as water troughs or tanks, fencing, and access roads, would cause localized changes to the visual character of the site, but would not impact on the overall scenic condition of the Analysis Area. New infrastructure at the implementation-level would have the potential to introduce additional localized change to the site. New infrastructure would be required to meet VRM standards and could include use of appropriate color (shades of brown, gray, green) to lessen visual contrast, or site placement to lessen visual intrusion. Overall, the degree of changes to the visual character of the Analysis Area would be weak, long-term, adverse and negligible.

#### ***Ephemeral Use Only Alternative***

Under the Ephemeral Use Only Alternative, livestock grazing would be available on all six allotments. Areas of concentrated livestock use around infrastructure and water developments has shown loss of vegetative cover through trampling and soil compaction. Any infrastructure such as water troughs or tanks, fencing, and access roads, would cause localized changes to the visual character of the site, but would not impact on the overall scenic condition of the Analysis Area. New infrastructure at the implementation-level would have the potential to introduce additional localized change to the site. New infrastructure would be required to meet VRM standards and could include use of appropriate color (shades of brown, gray, green) to lessen visual contrast, or site placement to lessen visual intrusion. Overall, the degree of changes to the visual character of the Analysis Area would be weak, long-term, adverse and negligible to minor.

### **3.12 Special Designations– Wilderness**

#### **3.12.1 Affected Environment**

The Analysis Area includes the North Maricopa Mountains Wilderness (63,600 acres) and South Maricopa Mountains Wilderness (60,800 acres) areas totaling 124,400 acres (Figure 1). These two wilderness areas

were designated by the Arizona Wilderness Act of 1990 and are managed according to the Maricopa Complex Wilderness Management Plan (1995). This plan outlines four management goals:

- To provide for the long-term protection and preservation of the area's wilderness character under a principle of non-degradation;
- To manage the wilderness area for the use and enjoyment of visitors in a manner that will leave the area unimpaired for future use and enjoyment as wilderness;
- To manage the area using the minimum tool, equipment or structure necessary to successfully, safely and economically accomplish the objective; and
- To manage nonconforming but accepted uses permitted by the Wilderness Act and subsequent laws in a manner that will prevent unnecessary or undue degradation of the area's wilderness character.

These wilderness areas are also subject to the Wilderness Act of 1964 where Section 4(d)(4)(2) states that grazing, "...where established prior to the effective date of the Act, shall be permitted to continue subject to such reasonable regulations as are deemed necessary by the [administering agency]."

Portions of the Beloat, Big Horn, Hazen, and Conley allotments are within the North Maricopa Mountains Wilderness area and portions of the Big Horn, Conley and Lower Vekol allotments are within the South Maricopa Mountains Wilderness area (Figure 1). Approximately 11 miles of allotment boundary and pasture fencing installed prior to wilderness designation occur within the wilderness areas. There is one well and three dirt reservoirs cherry-stemmed into these wilderness areas but there are no water developments (i.e. wells, troughs, dirt tanks etc.) within the wilderness boundaries. Areas adjacent to water developments typically experience concentrated livestock use (trampling of vegetation etc.). However, steep topography (>20% slope) often restricts livestock movement in most areas and with few exceptions, no permanent livestock water exists within several miles of wilderness boundaries. Livestock permittees operating within the allotments containing wilderness have maintenance responsibility for the range improvements both in and outside of wilderness areas. There are three wildlife water catchments cherry-stemmed and four wildlife water catchments within the wilderness areas which serve wildlife. These catchments are managed and maintained by Arizona Game and Fish Department (AGFD). Maintenance of range improvements and wildlife water catchments within these wilderness areas must abide by the Wilderness Act of 1964, the Arizona Wilderness Act of 1990, and the 2012 SDNM RMP/ROD.

Certain motorized/mechanized uses are authorized within these wilderness areas. Emergency response, some law enforcement activities, motorized retrieval of sick or injured livestock, and other accepted uses are provided for in the Arizona Desert Wilderness Act of 1990.

Within the Analysis Area there are two existing Special Recreation Permits for recreation events. Otherwise, use within the wilderness areas consists of dispersed recreational activities such as birdwatching, horseback riding, hiking, backcountry camping, and hunting.

### **3.12.2 Environmental Consequences - Wilderness**

#### ***No Action Alternative (Current Management)***

Under the No Action Alternative, livestock grazing would continue to be available in the North Maricopa Mountains Wilderness on the Beloat and Hazen allotments and a portion of the Big Horn Allotment. Livestock grazing would also continue to be available in the South Maricopa Mountains wilderness on a portion of the Big Horn and Lower Vekol allotments. Livestock grazing would be unavailable on the North and South Maricopa Mountains wilderness areas on the Conley Allotment.

Areas of concentrated past livestock use around infrastructure and water developments has shown loss of vegetative cover through trampling and soil compaction. Any infrastructure such as water troughs or tanks, fencing, and access roads, in or within close proximity to wilderness areas has caused localized changes to the wilderness character of the site, but would not impact on the overall character of the Analysis Area.

Dispersed livestock grazing in wilderness areas has a low potential to affect the areas naturalness and outstanding opportunities for solitude and primitive, unconfined recreation.

Fencing and cherry-stemmed livestock waters would continue to be maintained by permittees in the areas available for grazing. However, wilderness fencing within the closed portions of allotments would no longer be maintained by permittees. The continuation of dispersed grazing use in available allotments with wilderness areas would be long-term, adverse, and negligible given the large-scale (acres) of the wilderness areas and lack of water developments.

### ***Maximum Acreage Alternative***

Under the Maximum Acreage Alternative, livestock grazing would continue to be available on all allotments within the North and South Maricopa Mountains wilderness areas. Areas of concentrated past livestock use around infrastructure and water developments has shown loss of vegetative cover through trampling and soil compaction. Any infrastructure such as water troughs or tanks, fencing, and access roads, in or within close proximity to wilderness areas has caused localized changes to the wilderness character of the site but would not impact on the overall character of the Analysis Area. Dispersed livestock grazing in wilderness areas has a low potential to affect the areas naturalness and outstanding opportunities for solitude and primitive, unconfined recreation.

Fencing and cherry-stemmed livestock waters would continue to be maintained by permittees. The continuation of dispersed grazing use throughout wilderness areas would be long-term, adverse, and negligible given the large-scale (acres) of the wilderness areas and lack of water developments. Any adverse impacts could be avoided or reduced at the implementation-level by consideration of adjustments to livestock grazing management and range improvements consistent with BLM policies regarding the management of grazing in wilderness area.

### ***No Grazing Alternative***

Under the No Grazing Alternative, livestock grazing would not be available in both the North and South Maricopa Mountains wilderness areas. Existing livestock infrastructure not needed for other purposes could be removed. Overall impacts to wilderness areas would be long-term, beneficial, and negligible.

### ***Reduced Grazing Alternative***

Under the Reduced Grazing Alternative, livestock grazing would continue to be available in the North Maricopa Mountains Wilderness on the Beloit and Hazen allotments and unavailable within the Big Horn and Conley allotments. Livestock grazing would continue to be available on all allotments within the South Maricopa Mountains Wilderness.

Areas of concentrated past livestock use around infrastructure and water developments has shown loss of vegetative cover through trampling and soil compaction. Any infrastructure such as water troughs or tanks, fencing, and access roads, in or within close proximity to wilderness areas has caused localized changes to the wilderness character of the site but would not impact on the overall character of the Analysis Area. Dispersed livestock grazing in wilderness areas has a low potential to affect the areas naturalness and outstanding opportunities for solitude and primitive, unconfined recreation.

Fencing and cherry-stemmed livestock waters would continue to be maintained by permittees in the areas available for grazing. However, wilderness fencing within the closed portions of allotments would no longer be maintained by permittees. The continuation of dispersed grazing use throughout wilderness areas would be long-term, adverse, and negligible given the large-scale (acres) of the wilderness areas and lack of water developments. Any adverse impacts could be avoided or reduced at the implementation-level by consideration of adjustments to livestock grazing management and range improvements consistent with BLM policies regarding the management of grazing in wilderness area.



### ***Ephemeral Use Only Alternative***

Under the Ephemeral Use Only Alternative, livestock grazing would continue to be available on all allotments within the North and South Maricopa Mountains wilderness areas. Areas of concentrated past livestock use around infrastructure and water developments has shown loss of vegetative cover through trampling and soil compaction. Any infrastructure such as water troughs or tanks, fencing, and access roads, in or within close proximity to wilderness areas has caused localized changes to the wilderness character of the site but would not impact on the overall character of the Analysis Area. Dispersed livestock grazing in wilderness areas has a low potential to affect the areas naturalness and outstanding opportunities for solitude and primitive, unconfined recreation.

Fencing and cherry-stemmed livestock waters would continue to be maintained by permittees. The continuation of dispersed grazing use throughout wilderness areas would be long-term, adverse, and negligible given the large-scale (acres) of the wilderness areas and lack of water developments. Any adverse impacts could be avoided or reduced at the implementation-level by consideration of adjustments to livestock grazing management and range improvements consistent with BLM policies regarding the management of grazing in wilderness area.

### **3.13 Residual Effects**

Residual effects are those effects that remain after mitigation measures have been applied to the Ephemeral Alternative or other alternatives and had not been previously incorporated into the Ephemeral Alternative or other alternatives (BLM 2008). No mitigation has been identified for the alternatives; therefore, no residual impacts are discussed.

## **4.0 CUMULATIVE EFFECTS**

A cumulative effect is defined under NEPA as “the change in the environment which results from the incremental impact of the action, decision, or project when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other action.” “Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time” (40 CFR Part 1508.7). Past, present, and reasonably foreseeable future actions are analyzed to the extent that they are relevant and useful in analyzing whether the reasonably foreseeable effects of the Maximum Acreage Alternative and/or alternatives may have an additive and significant relationship to those effects. Only those resources or issues indirectly affected by the alternatives in Chapter 3 and analyzed in detail are considered for cumulative effects.

### **4.1 Geographic Scope**

The Cumulative Effects Study Area (CESA) for all resources, except socioeconomics, is approximately 733,973 acres of BLM-administered, Arizona State Land Department, and privately-owned lands (Figures 10, 11, 12). This CESA consists of the six livestock grazing allotments including those portions outside the SDNM, plus the Kirian, Palo Verde Mountains, and Powers Butte allotments. The Gila River serves as the northern and western boundary of this CESA. Rainbow Valley and the Sierra-Estrella Mountains are located in the northeastern portion of this CESA. Interstate 8 serves as the southern boundary of this CESA. The CESA for socioeconomics is Maricopa County, Arizona (not shown).

### **4.2 Timeframe of Effects**

Individual grazing permits are valid for 10-years, but grazing may continue beyond that with decadal reviews through Environmental Assessments or by using FLMPA 402(C)(2) authority to renew with the existing terms and conditions. In recent years, the Lower Sonoran Field Office has received numerous applications for solar energy development on land adjacent to the Sonoran Desert National Monument. Those Right of Ways are 30 year permits with the option to renew. Impacts to biotic crusts from overgrazing by sheep during a drought persist even 50 years after the end of grazing (Duniway et al. 2018). Due to the potential for long-term impacts resulting from cattle and the Right of Way applications, the timeframe for effects analyze here is 50 years.

### **4.3 Past and Present Actions**

The CESA includes BLM, Arizona State Land Department, other federal agencies including tribal lands, and privately-owned lands. BLM-administered lands make up approximately 407,937 acres (56 percent) of the CESA. CESACESA (BLM SDNM Target Shooting RMPA 2024)

On non-BLM administered lands within the CESA, past and present actions include agriculture; low-density residential development; and small communities on private lands such as Gila Bend (population 1,922), Bosque, Shawmut, Estrella, Enid, and Heaton along Maricopa Road/SR-238 which runs west to east through the SDNM. I-8 crosses west to east through the SDNM and serves as the southern boundary of this CESA with Gila Bend on the west, and the small communities of Big Horn and Freeman along the I-8 corridor on private lands within the SDNM. Interstate, state highways (State Route 85), county roads, overhead transmission lines, and underground natural gas pipelines are examples of transportation and energy infrastructures within the CESA. A portion of the Gila River Indian Reservation and Ak-Chin Indian Community are located within the northeastern portion of this CESA. Maricopa County Department of Parks and Recreation operates the Estrella Mountains Regional Park in the northern portion of this CESA and the Buckeye Hills Recreation Area in the northwestern corner of this CESA.

On BLM-administered lands outside the SDNM and north of I-8, past and present actions include rights-of-ways for overhead transmission lines and underground natural gas pipelines; exploration and mining on unpatented mining claims; county-maintained roads; BLM travel routes ranging from single-track trails to bladed dirt and gravel roads; and permitted livestock grazing on three allotments. There are approximately

270 miles of allotment fencing for BLM-administered allotments outside the SDNM. Uses outside of the SDNM and north of I-8 on BLM-administered lands include non-motorized trails for hiking and equestrian use, travel routes for motorcycles and motor vehicles, dispersed camping, hunting, and recreational target shooting. In 2018 the BLM approved a 250-foot right-of-way for the Sonoran Valley Parkway. This corridor resides outside and along the northeastern corner of the SDNM, connecting the communities of Goodyear and Maricopa with a 15- to 18-mile long, two- to six-lane parkway. Construction of the Sonoran Valley Parkway would impact approximately 472 acres of BLM and non-BLM lands. The timing of construction of the initial two-lane highway by the City of Maricopa is unknown. Outside of the SDNM, there are five wildlife water catchments maintained by the AGFD.

On BLM-administered lands within the SDNM and north of I-8, past and present actions include rights-of-ways for I-8 and overhead transmission lines along the I-8 corridor; and rights-of-ways on Maricopa Road/SR-238 through the SDNM. In 2012 the BLM completed a travel management plan for the SDNM which designated travel routes as open, limited or closed within the SDNM. Uses inside the SDNM and north of I-8 include non-motorized trails for hiking and equestrian use, travel routes for motorcycles and motor vehicles, dispersed camping, hunting, and recreational target shooting.

There are three special recreation permits for recreational activities within the CESA. In June 2008 the BLM temporarily closed approximately 88 miles of routes within the Juan Bautista de Anza RMZ. In January 2017 the BLM approved the Juan Bautista de Anza RMZ Project (Anza RMZ), which authorized the construction of three recreation developments within the SDNM: Butterfield Recreation Area, Sierra-Estrella Wayside Recreation Area, and Christmas Group Camp Recreation Area. Construction of these recreation areas would impact approximately 20 acres of BLM-administered lands and is not anticipated to start until 2020 or later. Approximately 57 miles of routes closed in 2008 would also be re-opened as a part of these developments. In 2018 the BLM approved the SDNM Target Shooting RMPA/ROD, which closed approximately 52,000 acres of the Anza RMZ area to dispersed recreational target shooting. A complaint on the ROD was filed in U.S. District Court in 2020. In 2023 Box Canyon Recreational shooting sport site was opened to provide a developed recreation opportunity for the public. The 2024 SDNM RMPA restricts recreation target shooting to less than 1% of the monument, however, that 1% needs to be surveyed to determine if target shooting would have additional adverse impacts to culturally significant resources by being allowed (BLM SDNM Target Shooting RMPA 2024). In fiscal year 2019 the BLM recorded 20,508 recreation visits to the northern portion of the SDNM based on traffic counts where they exist. Within the SDNM, there are 14 wildlife water catchments maintained by the AGFD.

#### **4.4 Reasonably Foreseeable Future Actions**

Reasonably foreseeable future actions (RFFAs) are actions that are known or could reasonably be anticipated to occur within the CESA (Figures 10-12). They include actions that have existing decisions, funding, formal proposals, or that are highly probable.

On non-BLM administered lands within the CESA, RFFAs include continued population growth, housing and commercial development, and agricultural use. Additional energy and transportation infrastructure, especially along the urban fringe adjacent to BLM-administered lands, is anticipated to continue into the foreseeable future. Areas of growth within the CESA include Rainbow Valley in the northeast, and Gila Bend in the southwest. Livestock grazing and maintenance of range improvements would be expected to occur in the future.

On BLM-administered lands outside the SDNM and north of I-8, RFFAs include renewal of existing authorizations for utility rights-of-ways, livestock grazing (including maintenance of range improvements), exploration on unpatented mining claims, dispersed recreational activities, and construction of the Sonoran Valley Parkway.

The I-11 corridor study area stretches 280 miles from Nogales to Wickenburg, Arizona and may affect BLM and non-BLM lands in the Rainbow Valley area, northeast of the SDNM in the CESA. The study

area varies in width from approximately 10 to 25 miles. The Arizona Department of Transportation/Federal Highway Administration prepared a Draft Environmental Impact Statement that was made available for

Table 10 Past, present, and reasonably foreseeable solar projects in proximity to the SDNM RMPA CESA.

Project	Location Description	Project Area (Acres)	Description	Status
	(Township, Range, Section)			
Caballero	T5S, R1E S10-13,18	1113	200MW alternating current photovoltaic facility.	Pre-NEPA
Fragrant Sage	T3S, R1W, S13, 23-26, 35-36	4866	600MW alternating current single axis tracking photovoltaic solar generation plant with 300 MW battery storage.	Variance
	T3S, R1E, S18-21, 29-31			
	T4S, R1E, S9, 16, 21			
Mariposa	T3S, R1W, S3, 4, 11-14, 22, 23, 26, 27, 34, 35	5391	350MW alternating current solar photovoltaic facility and energy	Pre-NEPA
Pinal West Tap	T4S, R2E, S19, 30, 31	3401	300-400MW photovoltaic facility.	Variance
	T5S, R2E, S5-8			
Pink Sky	T6S, R4W, S15-22, 27-32 T7S, R4W, S4-9	9468	450MW solar photovoltaic power generating facility and 450MW	Variance
Pinyon	T5S, R1E, S2, 3, 9-11	2194	300MW alternating current photovoltaic facility.	EA
Rainbow Valley*	T2S, R1W, S25-27, 34-35 T3S, R1W, S1, 12	2720	Proposed alternating current photovoltaic facility.	Variance
Rainbow Valley Gen-tie*	T4S, R2E, S31	107 (Gentie)	345-500kV dual-circuit alternating current overhead electric transmission.	Pre-NEPA
	T5S, R2E, S6-7	2175 (solar project)†		
Sevenmile	T3S, R2W, S1-3, 11, 12 T3S, R1W, S6-8, 17-20	3096	625MW photovoltaic solar energy facility with 625MW lithium-ion	Variance
Sonoran	T2S, R2W, S7, 18-19, 29-30	3341	260MW solar photovoltaic facility with 260 MW battery storage facility.	Built
	T2S, R3W, S12-16, 20-27			
	T2S, R4W, S24-26			
Southwest Crossroads	T4S, R4W, -S2-3, 10-11, 14-15, 22-23, 27, 34	2298	250MW photovoltaic facility.	Pre-NEPA
Tabletop	T6S, R3E, S33	3435	600MW photovoltaic facility and 600MW battery energy storage	Variance
	T7S, R3E, S3-5, 7-9, 10-12			
	* - Rainbow Valley and Rainbow Valley Gen-Tie are two independent projects.			
	† - The solar generation facility is on state and private lands.			

public input in mid-2019. The timeframe for the selected corridor and implementation is unknown. Construction of I-11 and the Sonoran Valley Parkway are reasonably certain to occur although the timeframes are unknown. There is also potential these two highway projects may be combined.

On BLM-administered lands within the SDNM and north of I-8, RFFAs include renewal of existing authorizations for utility rights-of-ways, dispersed camping, hunting, hiking, and recreational target shooting. Construction of recreation developments in the Anza RMZ is anticipated to start in 2020 or later and be completed in multiple phases.

## **4.5 Livestock Grazing**

### ***Cumulative Impacts Common to All Alternatives***

Livestock grazing in the CESA is currently impacted by activities such as urban sprawl, recreational activities, unauthorized livestock, climate change and drought, utility and road rights-of-way, and mining operations. Urban sprawl, primarily in the northeast and southeast portions of the CESA is likely to increase in the foreseeable future. This may lead to increased recreational activity, human/livestock interactions, and damage to livestock grazing infrastructure in the form of cut fences, damage and tampering with water facilities, and gates left open. Unauthorized livestock have the potential to enter BLM land from adjacent State and private lands due to the lack of, cut, and/or damaged fences. Unauthorized livestock may lead to additional utilization of vegetation which otherwise would sustain the authorized livestock for a longer period. Climate change and drought are likely to reduce the productivity of rangelands and therefore reduce the potential for livestock production. Utility and road rights-of-way and mining operations can fragment allotments and create challenges with moving livestock between pastures. Developed recreational facilities will be constructed within the Anza RMZ which would increase recreational opportunities in or near areas where livestock would be present if the Big Horn and Conley allotments are available for livestock grazing. The Sonoran Valley Parkway is also planned for construction in Rainbow Valley in the foreseeable future and would fragment the Beloat Allotment and portions of the Conley Allotment outside the SDNM. The Sonoran Solar project has been constructed on the boundary of the Arnold and Beloat allotments reducing the overall acres available for livestock grazing. Additional solar rights-of-ways are under consideration on the Beloat and Conley Allotments. The Pinyon Solar project is currently being analyzed thorough NEPA and Mariposa Solar is likely to begin the NEPA process in FY 2025. Those projects and other projects within the CESA would reduce the available acreage used to calculate AUMs and would result in a reduction in the number of cattle potential able to graze within the Beloat and Conley Allotments. The final number of AUMs would be determined by an implementation level Environmental Analysis prior to cattle being released into these allotments. The Big Horn Reservoir closure would temporarily or permanently reduce the number of serviceable waters that could be used for cattle. This would reduce the number of potential AUMs available for cattle producers on the Big Horn Allotment.

### ***No Action Alternative (Current Management)***

Under the No Action Alternative, five of the six allotments associated with the SDNM would be available for livestock grazing, in addition to three other allotments outside the SDNM. Portions of the Big Horn Allotment (16,960 acres), the Lower Vekol Allotment (610 acres), and the entire Conley Allotment (77,170 acres) within the SDNM would be unavailable to grazing within the SDNM. The permittees of the Big Horn, Conley, and Lower Vekol allotments would have less flexibility in their management of livestock. The level and management of grazing on allotments within the CESA would be determined at the implementation-level and could vary in order to meet Standards and adapt to other uses within the CESA. Existing allotment fencing and water developments for livestock would be maintained by permittees in those allotments available for livestock grazing. Urban sprawl and the development of recreational facilities would likely have a minor impact to livestock grazing on these allotments more so than the Maximum Acreage Alternative. Perennial grazing, if selected, could damage plants resulting in an increase plant water

stress in the face of climate change which may increase plant community mortality levels. Plant mortality would reduce habitat and forage for wildlife and future forage for cattle. The cumulative effects of the No Action Alternative, in combination with other past, present, and RFFAs, would result in long-term, moderate, and beneficial to livestock grazing.

### ***Maximum Acreage Alternative***

Under the Maximum Acreage Alternative, all six allotments associated with the SDNM would be available for livestock grazing, in addition to three other allotments outside the SDNM. Existing allotment fencing and water developments for livestock would continue to be maintained by permittees in those allotments available for livestock grazing. The level and management of grazing on allotments within the CESA would be determined at the implementation-level and could vary in order to meet Standards and adapt to other uses within the CESA. The availability of livestock grazing on all six allotments associated with the SDNM would benefit livestock producers as they would have a larger area to manage their herds, allowing flexibility in grazing management. Perennial grazing, if selected, could damage plants resulting in an increase plant water stress in the face of climate change which may increase plant community mortality levels. Plant mortality would reduce habitat and forage for wildlife and future forage for cattle. The cumulative effects of the Maximum Acreage Alternative, in combination with other past, present, and RFFAs, would result in negligible to minor, beneficial, and long-term impacts to livestock grazing.

### ***No Grazing Alternative***

Under the No Grazing Alternative, the SDNM portions of six allotments would be unavailable for livestock grazing. However, the non-SDNM portions of these allotments and three other allotments outside the SDNM would be available for livestock grazing. These allotments are in the urban/rural interface and could be impacted by other uses or activities in the CESA. There would be fewer human/livestock interactions on the SDNM where recreational facilities will be developed in the Big Horn and Conley allotments. Under the No Grazing Alternative, allotment fencing within the SDNM would likely not be maintained by permittees, in addition to water developments solely for the purpose of livestock. The lack of grazing would benefit plant communities by reducing mortality and increasing fecundity. Removing grazing would benefit wildlife through slow increase in plant density and forage availability within the habitat. The cumulative effects of the No Grazing Alternative, in combination with other past, present, and RFFAs, would result in minor to moderate, adverse, and long-term impacts to livestock grazing.

### ***Reduced Grazing Alternative***

Under the Reduced Grazing Alternative, all six allotments associated with the SDNM would be allocated available for livestock grazing, except for 30,610 acres of the Big Horn Allotment and 41,480 acres of the Conley Allotment north of SR-238, in addition to three other allotments outside the SDNM. Existing allotment fencing and water developments for livestock would be maintained by permittees in the allotments and portions of allotments available for grazing. The level and management of grazing on allotments within the CESA would be determined at the implementation-level and could vary in order to meet Standards and adapt to other uses within the CESA. The availability of livestock grazing on the entirety of four and portions of two allotments associated with the SDNM would benefit livestock producers as they would have a larger area to manage their herds allowing flexibility in grazing management. Permittees would be reimbursed, in accordance with 43 CFR 4120, for their interest in the fair market value of the documented range improvements within the unavailable portions of two allotments. Perennial grazing, if selected, could damage plants resulting in an increase plant water stress in the face of climate change which may increase plant community mortality levels. Plant mortality would reduce habitat and forage for wildlife and future forage for cattle. The cumulative effects of the Reduced Grazing Alternative, in combination with other past, present, and RFFAs, would result in negligible to minor, beneficial, and long-term impacts to livestock grazing.

### ***Ephemeral Use Only Alternative***

Under the Ephemeral Use Only Alternative, all six allotments associated with the SDNM would be available for livestock grazing, in addition to three other allotments outside the SDNM. Existing allotment fencing and water developments for livestock would continue to be maintained by permittees in those allotments available for livestock grazing. The level and management of grazing on allotments within the CESA would be determined at the implementation-level. The availability of livestock grazing on all six allotments associated with the SDNM would benefit livestock producers as they would have a larger area to manage their herds, allowing flexibility in grazing management. Ephemeral grazing is more responsive to interannual changes in precipitation reducing the risk of overgrazing and plant community mortality which would be compounded by climate change if perennial grazing were selected. Long-term this means more plant production and available forage for cattle and wildlife in future decades. The cumulative effects of the Ephemeral Use Only Alternative, in combination with other past, present, and RFFAs, would result in minor, beneficial, and long-term impacts to livestock grazing.

## **4.6 Recreation Management**

### ***Cumulative Impacts Common to All Alternatives***

The CESA is adjacent to the fourth most populous county in the U.S. As the population increases and the public seeks more outdoor recreation experiences, visitation to the CESA would be anticipated to grow. BLM-managed lands are used for a variety of recreation activities including hiking, equestrian use, back country camping, and dispersed recreational target shooting. In 2017 the BLM approved the development of three new recreation areas within this Anza RMZ. These developments would increase visitation to the CESA, and potentially increase recreation-related impacts on livestock operations.

### ***No Action Alternative (Current Management)***

Under the No Action Alternative, five allotments associated with the SDNM and three other allotments outside the SDNM would be available for livestock grazing. Recreation activities such as off-road motor vehicle use and dispersed recreational target shooting have the potential to result in loss of vegetative cover and displacement of wildlife and livestock. Concentrated livestock use around water developments and trailing along fence lines would be expected to result in loss of vegetative cover, which would reduce the aesthetic quality of the area. The cumulative effects of the No Action Alternative, in combination with other past, present, and RFFAs, would result in negligible, adverse, and long-term impacts to recreation management.

### ***Maximum Acreage Alternative***

Under the Maximum Acreage Alternative, all six allotments associated with the SDNM and three allotments outside the SDNM would be available for livestock grazing. The impacts from the Maximum Acreage Alternative would be expected to be similar to the No Action Alternative, except that livestock grazing would be allowed over a larger area (40 percent more). The cumulative effects of the Maximum Acreage Alternative, in combination with other past, present, and RFFAs, would result in negligible to minor, adverse, and long-term impacts to recreation management. These adverse impacts could be avoided or reduced at the implementation-level by redistributing livestock through the potential addition of new water sources, excluding livestock from sensitive areas, reducing AUMs, and/or authorizing grazing seasonally/ephemerally.

### ***No Grazing Alternative***

Under the No Grazing Alternative, the SDNM portions of six allotments would be unavailable for livestock grazing. However, the non-SDNM portions of these allotments would be available for grazing, in addition to three other allotments. There would be no recreation-livestock conflicts in the CESA. Recreational activities such as off-road motor vehicle use and dispersed recreational target shooting have the potential to result in loss of vegetative cover and displacement of wildlife, which would reduce the aesthetic quality



of the area. The cumulative effects of the No Grazing Alternative, in combination with other past, present, and RFFAs, would result in negligible, beneficial, and long-term impacts to recreation management.

#### ***Reduced Grazing Alternative***

Under the Reduced Grazing Alternative, six allotments associated with the SDNM and three other allotments outside the SDNM would be allocated available for livestock grazing. Portions of the Big Horn and Conley allotments north of SR-238 would be unavailable to livestock grazing. The elimination of livestock grazing in the Anza RMZ would prevent recreation-livestock conflicts from occurring when three new recreation areas are constructed. The cumulative effects of the Reduced Grazing Alternative, in combination with other past, present, and RFFAs, would result in negligible, adverse, and long-term impacts to recreation management.

#### ***Ephemeral Use Only Alternative***

Under the Ephemeral Use Only Alternative, all six allotments associated with the SDNM and three allotments outside the SDNM would be available for livestock grazing. The impacts from the Ephemeral Use Only Alternative would be expected to be similar to the No Action Alternative, except that livestock grazing would be allowed over a larger area (40% more). The cumulative effects of the Ephemeral Use Only Alternative, in combination with other past, present, and RFFAs, would result in negligible, adverse, and long-term impacts to recreation management. These adverse impacts could be avoided or reduced at the implementation-level by redistributing livestock through the potential addition of new water sources, excluding livestock from sensitive areas, and authorizing grazing for ephemeral use only.

### **4.7 Socioeconomics and Environmental Justice**

#### ***Cumulative Impacts Common to All Alternatives***

The CESA for socioeconomics is Maricopa County (not shown). BLM-administered lands make up approximately 29 percent of Maricopa County. There are portions of 75 BLM-administered grazing allotments within Maricopa County. The Phoenix metropolitan area currently has more than four million people and is projected to increase to more than seven million people by 2050 (MAG 2017). On non-BLM lands, population growth will continue to result in the conversion of Arizona State Land Department and privately-owned lands currently available for grazing into residential and commercial developments. This trend would result in increased pressure on BLM-lands to maintain availability for livestock grazing. Overall agriculture employment in Maricopa County would be expected to decline as lands are converted from agricultural into residential and commercial uses. Open space associated with grazing would also be expected to decline in Maricopa County.

#### ***No Action Alternative (Current Management)***

Under the No Action Alternative, portions of five allotments within the SDNM would be available for livestock grazing. Portions of the Big Horn and Lower Vekol allotments, and the entire Conley Allotment within the SDNM would be unavailable for grazing within the SDNM. The No Action Alternative would provide for less economic contributions from livestock grazing than the Maximum Acreage Alternative, and more than the No Grazing Alternative. Permittees would be reimbursed in accordance with 43 CFR 4120 for their interest in the fair market value of the documented range improvements within the unavailable allotments. The cumulative effects of the No Action Alternative, in combination with other past, present, and RFFAs, would result in negligible to minor, beneficial, and long-term impacts to socioeconomics.

#### ***Maximum Acreage Alternative***

Under the Maximum Acreage Alternative, the portions of the six allotments within the SDNM would be available for livestock grazing. Compared to the other alternatives, the Maximum Acreage Alternative would provide for the greatest economic contributions from livestock grazing. The cumulative effects of

the Maximum Acreage Alternative, in combination with other past, present, and RFFAs, would result in minor, beneficial, and long-term impacts to socioeconomics.

### ***No Grazing Alternative***

Under the No Grazing Alternative, the portions of six allotments inside the SDNM would be unavailable for livestock grazing. However, the portions of these allotments outside the SDNM boundary would be available for grazing. The No Grazing Alternative would provide no economic contributions from livestock grazing on six allotments in the SDNM. Permittees would be reimbursed in accordance with 43 CFR 4120 for their interest in the fair market value of the documented range improvements within the unavailable allotments. The cumulative effects of the No Grazing Alternative, in combination with other past, present, and RFFAs, would result in negligible to minor, adverse, and long-term impacts to socioeconomics.

### ***Reduced Grazing Alternative***

Under the Reduced Grazing Alternative, six allotments associated with the SDNM and portions of 6 other allotments outside the SDNM would be allocated available for livestock grazing. Portions of the Big Horn and Conley allotments north of SR-238 would be unavailable to livestock grazing. The Reduced Grazing Alternative would provide for less economic contributions from livestock grazing than the Maximum Acreage Alternative, and more than the No Grazing Alternative. Permittees would be reimbursed in accordance with 43 CFR 4120 for their interest in the fair market value of the documented range improvements within the unavailable allotments. The cumulative effects of the Reduced Grazing Alternative, in combination with other past, present, and RFFAs, would result in negligible, beneficial, and long-term impacts to socioeconomics.

### ***Ephemeral Use Only***

Under the Ephemeral Use Only Alternative, the portions of all six allotments within the SDNM would be available for livestock grazing. Compared to the No Action alternative, the Ephemeral Use Only Alternative would cause a decrease in economic contributions from livestock grazing. The cumulative effects of the Ephemeral Use Only Alternative, in combination with other past, present, and RFFAs, would result in minor, beneficial, and long-term impacts to socioeconomics.

### ***Social Costs of Greenhouse Gases***

The Executive Order 13990 (2021) entitled *Protecting Public Health and the Environment and Restoring Science To Tackle the Climate Crisis* established an Interagency Working Group (IWG) on the Social Cost of Greenhouse Gases to publish estimates that capture the full costs of greenhouse gas emissions as accurately as possible. The IWG (2021) published the interim estimates of the social cost of carbon (SC-CO<sub>2</sub>), social cost of methane (SC-CH<sub>4</sub>), and social cost of nitrous oxide (SC-N<sub>2</sub>O) for the years 2020 through 2050 in the *Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under Executive Order 13990*. These estimates allow federal agencies to incorporate the social benefits of reducing emissions of each of these greenhouse gases, or the social costs of increasing such emissions, in the policy making process. These estimates are applied to the estimates of methane emissions (that is, the lower values of the range in Table 1 in Section 3.10 Air Resources) for 10 years from 2025 through 2034 for Alternatives A through E and the results of the total present value of social costs of methane in 2020 dollars (Table 11)

. With a discount rate of 5%, compared with Alternative A (No Action), Alternative B (Maximum Acreage) would increase the social cost by approximately \$40,000, Alternative C (No Grazing) would reduce by approximately \$137,000, Alternative D (Reduced Grazing) would reduce by \$1,000, and Alternative E (Ephemeral) would reduce by approximately \$110,000.

Table 11 Social Cost of Methane (2020\$) from 2025 through 2034

Alternative	Average Value, 5% discount rate	Average Value, 3% discount rate	Average Value, 2.5% discount rate	95 <sup>th</sup> Percentile Value, 3% discount rate
Alternative A (No Action)	\$136,879	\$316,941	\$417,858	\$841,682
Alternative B (Maximum Acreage)	\$175,074	\$405,382	\$534,460	\$1,076,550
Alternative C (No Grazing)	\$0	\$0	\$0	\$0
Alternative D (Reduced Grazing)	\$135,885	\$314,640	\$414,824	\$835,570
Alternative E (Ephemeral)	\$24,777	\$57,372	\$75,639	\$152,358

Cattle contribute to greenhouse gas emissions through the production of methane and through defoliating plants (Kauffman et al. 2022). One article suggests the cost of grazing on public lands may be nearly \$36/AUM (Kauffman et al. 2022), but the article seems to misrepresent the US EPA data it quotes. Kauffman et al. (2022) states, “This is why methane emissions from feedlot cattle are only 35–43 kg CH<sub>4</sub> year<sup>-1</sup>, compared to 89–95 kg CH<sub>4</sub> year<sup>-1</sup> for cattle on rangelands” citing an EPA report. The assumption in Kauffman et al. 2022 appears to be that cattle remain in “feedlots” for all of their lives, but the EPA document states that it’s feedlots are temporary places where, “animals are then switched to a finishing diet (concentrated, high energy) for a period of time before they are slaughtered,” and includes “more grain than forage, along with new dietary supplements” (US EPA 2018). A comparison with dairy cows, which produce 146 kg/cow/year, and nondairy cows, 95 kg/cow/year, would be more appropriate comparison (US EPA 2018). This suggests that grazing on public lands can produce less methane than cattle raised on private lands.

#### 4.8 Vegetation, Noxious and Invasive Weed Species

##### *Cumulative Impacts Common to All Alternatives*

The vegetation in the CESA (Figure 10) is currently impacted by activities such as urban sprawl, recreational activities, unauthorized livestock grazing, climate change, drought, agricultural developments, utility and road rights-of-way, and mining operations. Urban sprawl, primarily in the northern and eastern portions of the CESA is likely to increase in the foreseeable future. In addition, the potential solar development in the east and northeast increases the amount of potential disturbance area. Since 2020, public lands have seen increased visitation as people rediscovered recreation on public lands since the Covid pandemic. The increased disturbance from construction to develop homes on private lands and solar, utility and road right-of-ways, mining operations damage and remove vegetation through clearing and maintenance of rights-of-way, and recreation, are all potential vectors for invasive plant species introduction and subsequent establishment. Once weeds established, cattle would also becoming potential vectors for the spread of weeds.

Climate change has resulted in shifts in Sonoran Desert plant communities. Changes in summer temperature and mean annual precipitation contribute to annual variation in the plant reflectance suggesting fewer plants or reduced plant cover during dry or hot years (Hantson et al. 2020) and led to a shift to plant species adapted to grow during cold winter weather (Kimball et al. 2010, 2011, Angert et al. 2010). Climate change is also a substantial factor in saguaro population declines (Parker 1993, Pierson et al. 2013, Conner et al. 2017 Felix-Burrueal et al. 2024). Declines in saguaro populations since the mid-1990s have occurred in 9 of 10 populations reviewed by Pierson et al. (2013). Cattle grazing may exacerbate and hasten population decline, but 2 of 5 grazed populations had an increase in populations between 1960 and the mid 1990s while concurrent grazing occurred.

Climate change has resulted in altered temperature and precipitation timing that may benefit invasive species (Abatzoglou and Kolden 2011). Climate change is expected to cause an expansion of suitable habitat for red brome (*Bromus rubens*) and Sahara Mustard (*Brassica tournefortii*) (Curtis and Bradley 2015); both are found in the analysis area. Buffelgrass's phenotypic plasticity makes it drought tolerant even when competing with an array of native vegetation (Ravi et al. 2021, Farrell et al. 2022). In most climate change models, the Monument appears to continue being suitable for buffelgrass for decades to come (de Albuquerque et al 2019). Since high cover of red brome and buffelgrass increase wildfire ignition rates (Fusco et al. 2019), controlling red brome and buffelgrass to prevent wildfires is key to protecting Monument objects.

Threats to the acuña cactus include drought and climate change, predation by native insect and small mammal predators, nonnative, invasive plants, and habitat destruction, modification, and degradation from United States-Mexico border activities (USFWS 2013). There is the potential for overlapping use since acuña cacti and cattle both prefer flat areas with slope < 30%. Some suggest that cattle grazing and vegetation conversion for cattle grazing may have contributed to habitat degradation or trampling in populations near Ajo and in Organ Pipe Cactus National Monument. These two facts suggest that cattle may contribute to acuña cactus mortality within the 3979 acres of potential habitat in the action area. Closing the Big Horn Reservoir until surveys for acuña cactus are completed will mitigate this risk.

The lack of active use by permittees means fence maintenance and repair has been lacking in recent years. This has resulted in increasing potential of unauthorized livestock enter BLM-managed land from adjacent State and private lands. When present, unauthorized livestock consume vegetation in the absence of permittees maintaining fences.

#### ***No Action Alternative (Current Management)***

Under the No Action Alternative, five of the six allotments associated with the SDNM would be available for livestock grazing. Portions of the Big Horn Allotment, the Lower Vekol Allotment, and the entire Conley Allotment within the SDNM would be unavailable to grazing within the SDNM. The level and management of grazing on allotments within the CESA (Figure 10) would be determined at the implementation-level and could vary in order to meet Standards and adapt to other uses within the CESA. The areas unavailable to grazing within the Big Horn, Lower Vekol, and Conley allotments would benefit vegetation and may help reduce the likelihood of the spread of noxious and invasive species by a small amount. Other dispersal vectors (hikers, horseback riding, and off-road use) will continue to exist. Urban sprawl and the development of recreational facilities within the SDNM would impact vegetation less in the No Action Alternative, than under the Maximum Acreage Alternative. Perennial grazing, if selected, could damage plants resulting in an increase plant water stress in the face of climate change which may increase plant community mortality levels. However, cattle are also expected to help control buffelgrass, *Schismus*, and red brome cover. That reduction would benefit vegetation communities by decreasing wildfire risk. The cumulative effects of the No Action Alternative, in combination with other past, present, and RFFAs, would result in minor to moderate, adverse or beneficial, and long-term impacts to vegetation.

#### ***Maximum Acreage Alternative***

Under the Maximum Acreage Alternative, all six allotments associated with the SDNM would be available for livestock grazing. The level and management of grazing on allotments within the CESA (Figure 10) would be determined at the implementation-level and could vary in order to meet Standards and adapt to other uses within the CESA. The impacts to vegetation would depend on the level of grazing authorized under implementation-level decisions. However, under the Maximum Acreage Alternative vegetation is more likely to be utilized and damaged by livestock and invasive species are more likely to be spread by livestock when compared to other alternatives. Vegetation on the non-SDNM portion of the CESA has the potential to be grazed by livestock on the other allotments available for grazing. Perennial grazing, if selected, could damage plants resulting in an increase plant water stress in the face of climate change which may increase plant community mortality levels. However, cattle are also expected to help control

buffelgrass, *Schismus*, and red brome cover. That reduction would benefit vegetation communities by decreasing wildfire risk. The cumulative effects of the Maximum Acreage Alternative, in combination with other past, present, and RFFAs, would result in moderate, adverse or beneficial, and long-term impacts to vegetation. These adverse impacts could be avoided or reduced at the implementation-level by redistributing livestock through the potential addition of new water sources, excluding livestock from sensitive areas, reducing AUMs, and/or authorizing grazing seasonally/ephemerally.

### ***No Grazing Alternative***

Under the No Grazing Alternative, the SDNM portions of six allotments would be unavailable for livestock grazing. However, the non-SDNM portions of these allotments could potentially be remain available for grazing. These allotments include areas with urban/rural interface and could potentially be impacted by other uses listed in the RFFAs. The lack of grazing pressure would reduce plant stress resulting in less mortality than if grazing was allowed. However, research suggests this would lead to an increase in red brome and buffelgrass cover and subsequent risk of wildfire. In 2024, the SDNM and surrounding area to the east within 3 miles experience 4 fires, three of which were on BLM managed land in the Lower Vekol allotment. The Flying Bucket Fire was nearly 2,800 acres. The cumulative effects of the No Grazing Alternative, in combination with other past, present, and RFFAs, would result in negligible to minor, beneficial or adverse, and long-term impacts to vegetation. Areas without invasive grasses may benefit in the short-term, however, wildfire moving from invaded to relatively intact plant communities is likely which would, in the long term likely result in conversion away from native dominated communities.

### ***Reduced Grazing Alternative***

Under the Reduced Grazing Alternative, all six allotments associated with the SDNM would be allocated available for livestock grazing, except for portions of the Big Horn and Conley allotments north of SR-238, in addition to three other allotments outside the SDNM. The level and management of grazing on allotments within the CESA would be determined at the implementation-level and could vary in order to meet Standards and adapt to other uses within the CESA. The impacts to vegetation would depend on the level of grazing authorized under implementation-level decisions. However, under the Reduced Grazing Alternative vegetation is less likely to be utilized and damaged by livestock and invasive species are less likely to be spread by livestock when compared to the Maximum Acreage Alternative. Vegetation on the non-SDNM portion of the CESA has the potential to be grazed by livestock on the other allotments available for grazing. Perennial grazing, if selected, could damage plants resulting in an increase plant water stress in the face of climate change which may increase plant community mortality levels. However, cattle are also expected to help control buffelgrass, *Schismus*, and red brome cover. That reduction would benefit vegetation communities by decreasing wildfire risk. The cumulative effects of the Reduced Grazing Alternative, in combination with other past, present, and RFFAs, would result in minor to moderate, adverse, and long-term impacts to vegetation.

### ***Ephemeral Use Only Alternative***

Under the Ephemeral Use Only Alternative, all six allotments associated with the SDNM would be available for livestock grazing. The level and management of grazing on allotments within the CESA (Figure 9), either zero AUMs or ephemeral use only, would be determined at the implementation-level and could vary in order to meet Standards and adapt to other uses within the CESA. The impacts to vegetation would depend on the level of grazing authorized under implementation-level decisions. Under the Ephemeral Use Only Alternative vegetation is less likely to be utilized and damaged by livestock and invasive species are less likely to be spread by livestock when compared to the No Action Alternative. Vegetation on the non-SDNM portion of the CESA has the potential to be grazed by livestock on the other allotments available for grazing. Ephemeral grazing would result in the least amount of cattle caused damage to plants resulting in some water stress in the face of climate change which may increase plant community mortality levels. The level of mortality is expected to be less than plans with perennial grazing, but more than if the No Grazing Alternative were selected. The cumulative effects of the Ephemeral Grazing

Only Alternative, in combination with other past, present, and RFFAs, would result in minor to minor, adverse, and long-term impacts to vegetation. These adverse impacts could be avoided or reduced at the implementation-level by redistributing livestock through the potential addition of new water sources, excluding livestock from sensitive areas, and authorizing grazing for ephemeral use only.

#### **4.9 General Wildlife, Special Status Species, Migratory Birds**

##### ***Cumulative Impacts Common to All Alternatives***

Other activities such as recreation and continued population growth in and around the CESA (Figure 11) could result in a variety of impacts to wildlife and wildlife habitat. Roads and other infrastructure projects in the CESA could displace wildlife, fragment and remove habitat, and could contribute to direct mortality. The Sonoran Valley Parkway is an approved right-of-way and is planned for construction in Rainbow Valley in the foreseeable future and would impact approximately 472 acres. The development of solar facilities has the potential to restrict wildlife movement into and out of the SDNM and increase habitat fragmentation. Livestock have the potential to enter BLM land from adjacent State and private lands within the CESA due to the lack of, cut, and/or damaged fences. The combination of solar development and livestock grazing may further restrict wildlife movement and restrict or remove access to suitable forage and habitat. Unauthorized livestock may lead to additional utilization of vegetation which would be additive to authorized livestock use, if any. Climate change and drought have the potential to alter vegetation communities that make up wildlife habitat and reduce forage and water availability in these arid environments. It may also alter fire regimes which may affect wildlife species and habitat in non-fire adapted ecosystems, such as the Sonoran Desert (see sections 3.6 and 4.8 for more detailed information).

##### ***No Action Alternative (Current Management)***

Livestock grazing would continue within the CESA outside of the SDNM on BLM-administered, State and private lands. Under the No Action Alternative, five allotments within the SDNM would continue to be available for livestock grazing. Competition for forage between wildlife and livestock would continue. Range improvements such as water developments for livestock would be maintained by permittees. Grazing, infrastructure projects including highways, and conversion of open space into residential and commercial developments outside of the SDNM and within the CESA would add additional impacts to wildlife. The cumulative effects of the No Action Alternative, in combination with other past, present, and RFFAs, would result in long-term, minor to moderate, adverse impacts to general wildlife, special status species, and migratory birds.

##### ***Maximum Acreage Alternative***

Under the Maximum Acreage Alternative, livestock grazing would be available on all allotments within the SDNM, in addition to three other allotments outside the SDNM. There would be competition for forage and space between wildlife and livestock. Range improvements such as water developments for livestock would be maintained by permittees. Grazing, infrastructure projects including highways, and conversion of open space into residential and commercial developments outside of the SDNM and within the CESA (Figure 11) would add additional impacts to wildlife. The cumulative effects of the Maximum Acreage Alternative, in combination with other past, present, and RFFAs, would result in long-term, negligible to moderate, adverse impacts to general wildlife, special status species and migratory birds. These adverse impacts could be avoided or reduced at the implementation-level by redistributing livestock through the potential addition of new water sources, excluding livestock from sensitive areas, reducing AUMs, and/or authorizing grazing seasonally/ephemerally.

##### ***No Grazing Alternative***

Livestock grazing would continue within the CESA (Figure 11) outside of the SDNM on BLM-administered, State and private lands. Under the No Grazing Alternative, livestock grazing would not be authorized within the SDNM. In the absence of livestock grazing, competition for forage between wildlife

and livestock would be eliminated, which would result in more forage for wildlife and insect populations. The absence of livestock grazing could result in cover canopy increasing over time, a benefit for cover-dependent species. Livestock disturbance/displacement effects would not occur, benefiting nesting migratory birds and other wildlife individuals. The absence of grazing within the SDNM would result in a benefit to wildlife within the SDNM, although as population growth continues in the CESA it is highly likely that recreation on the SDNM would increase, which would contribute to many new stressors on wildlife. Grazing, infrastructure projects including highways, and conversion of open space into residential and commercial developments outside of the SDNM and within the CESA would add additional impacts to wildlife. Range improvements such as water developments within the SDNM would no longer be maintained by permittees. The cumulative effects of the No Grazing Alternative, in combination with other past, present, and RFFAs, would result in long-term impacts that could range from negligible and beneficial to minor and adverse, to general wildlife, special status species and migratory birds.

#### ***Reduced Grazing Alternative***

Under the Reduced Grazing Alternative, livestock grazing would be available on all allotments within the SDNM with portions of the Big Horn and Conley allotments unavailable, in addition to three other allotments outside the SDNM. There would be competition for forage and space between wildlife and livestock. Except on the Big Horn and Conley allotments north of SR-238, range improvements such as water developments for livestock would be maintained by permittees. Grazing, infrastructure projects including highways, and conversion of open space into residential and commercial developments outside of the SDNM and within the CESA (Figure 11) would add additional impacts to wildlife. The cumulative effects of the Reduced Grazing Alternative, in combination with other past, present, and RFFAs, would result in long-term, negligible to moderate, adverse impacts to general wildlife, special status species and migratory birds.

#### ***Ephemeral Use Only Alternative***

Under the Ephemeral Use Only Alternative, livestock grazing would be available on all allotments within the SDNM. There would be seasonal competition for forage and space between wildlife and livestock. Range improvements such as water developments for livestock would be maintained by permittees. Grazing, infrastructure projects including highways, and conversion of open space into residential and commercial developments outside of the SDNM and within the CESA (Figure 11) would add additional impacts to wildlife. The cumulative effects of the Ephemeral Use Only Alternative, in combination with other past, present, and RFFAs, would result in long-term, minor to moderate, beneficial impacts to general wildlife, special status species and migratory birds.

### **4.10 Soil Resources**

#### ***Cumulative Impacts Common to All Alternatives***

Soils in the CESA are currently impacted by activities such as urban sprawl, recreational activities, livestock grazing and unauthorized livestock, climate change and drought, agricultural developments, utility and road rights-of-way, mining operations, and solar development. Livestock have the potential to enter BLM land from adjacent State and private lands within the CESA due to the lack of fences or cut and damaged fences as the result of OHV use or other recreational use. If present, unauthorized livestock would add to soil disturbance. Urban sprawl, primarily in the northeast and eastern portions of the CESA, is likely to increase in the foreseeable future. There are also several solar developments proposed within the CESA. Construction has been shown to increase soil erosion by more than three times the impact of livestock grazing (Jeong & Dorn 2018). Climate change and drought may alter the composition of vegetation communities and potentially reduce soil protecting canopy structure and alter biologic crust communities like disturbance (Ferrenberg 2015), but the result may be community dependent (Steven 2015). Soil type can also influence the impact of disturbance on soil biotic crusts (Duniway et al. 2018) suggesting crusts on some soils are at more risk than others. Utility and road rights-of-way and mining operations damage

and remove soil through clearing of vegetation and maintenance of right-of-ways. Clearing for road construction and maintenance has been shown to increase soil erosion by more than three times the impact of livestock grazing (Jeong & Dorn 2018).

The acreage associated with the proposed solar development may have an impact on sedimentation. Solar development in this region of Arizona has, to date, primarily resulted in clearing vegetation and grazing the soil surface and would likely have similar effects to building and road development resulting in sedimentation increases along ephemeral washes downstream solar projects. The SDNM is at a higher elevation than most of the surrounding proposed solar development, so the sedimentation from water erosion is unlikely to impact the Monument, but wind erosion could blow additional sediment into the Monument.

The Sonoran Valley Parkway is an approved rights-of-way and is planned for construction in Rainbow Valley in the foreseeable future and would cause soil disturbance to approximately 472 acres. Developed recreational facilities will be constructed within the Juan Bautista de Anza RMZ of the SDNM, which would increase recreational opportunities and would increase the potential for soil damage from motor vehicle use and camping.

Fire in the Sonoran Desert is rare but becoming more frequent. Two wildfires occurred within the Monument in 2024 and another four occurred within 3 miles of the monument boundary. Since 2000, 2 fires have occurred within two miles of the monument since 2005 with another 5 have occurred within 10 miles since 2007. Wildfire reduces soil aggregate stability, increasing soil and micronutrient loss and increases soil compaction (Morra et al. 2024) for at least two years after a fire. The increased use of public lands since Covid-19 has resulted in more damage from off-road vehicles and increased chance of fire ignition. Clearing and construction for solar developments and expanding suburban development, OHV use, and risk of wildfire in the planning area are expected to have greater impacts on soils than some grazing management options (Jeong & Dorn 2019).

#### ***No Action Alternative (Current Management)***

Under the No Action Alternative, five of the six allotments associated with the SDNM would be available for livestock grazing. Portions of the Big Horn Allotment, the Lower Vekol Allotment, and the entire Conley Allotment within the SDNM would be unavailable to grazing within the SDNM. The level and management of grazing on allotments within the SDNM would be determined at the implementation-level and could vary to meet Standards and adapt to other uses within the CESA. The areas unavailable to livestock grazing within the Big Horn, Lower Vekol, and Conley allotments would benefit soils as the areas would not be subject to compaction, disturbance, and potential erosion caused by livestock grazing where intensive use occurs. Urban sprawl and the development of recreational facilities within the SDNM would contribute to less impacts under the No Action Alternative than under the Maximum Acreage Alternative. Further aridification caused by climate change could be exacerbated by plant mortality due increased stress resulting from perennial cattle grazing. Perennial cattle grazing could reduce biotic crusts and disturb desert pavement that could ultimately lead to greater wind or water erosion resulting from the anticipated increase in severe storms. The cumulative effects of the No Action Alternative, in combination with other past, present, and RFFAs, would result in minor to moderate, adverse, and long-term impacts to soils.

#### ***Maximum Acreage Alternative***

Under the Maximum Acreage Alternative, all six allotments associated with the SDNM would be available for livestock grazing. The level and management of grazing on allotments within the SDNM would be determined at the implementation-level and could vary in order to meet Standards and adapt to other uses within the CESA. Under the Maximum Acreage Alternative, soils are more likely to be damaged by livestock through trampling and removal of vegetation when compared to the other alternatives. Soils on the non-SDNM portion of the CESA have the potential to be disturbed by livestock on all allotments available for grazing, in addition to impacts from other activities such as conversion of open space to



residential and commercial developments. Further aridification caused by climate change could be exacerbated by plant mortality due increased stress resulting from perennial cattle grazing. Perennial cattle grazing could reduce biotic crusts and disturb desert pavement that could ultimately lead to greater wind or water erosion resulting from the anticipated increase in severe storms. The cumulative effects of the Maximum Acreage Alternative, in combination with other past, present, and RFFAs, would result in minor to moderate, adverse, and long-term impacts to soils. These adverse impacts could be avoided or reduced at the implementation-level by redistributing livestock through the potential addition of new water sources, excluding livestock from sensitive areas, reducing AUMs, and/or authorizing grazing seasonally/ephemerally.

### ***No Grazing Alternative***

Under the No Grazing Alternative, the SDNM portions of six allotments would be unavailable for livestock grazing. Within the SDNM no soil disturbance associated with livestock grazing would occur. However, the non-SDNM portions of these allotments could potentially remain available for grazing. These allotments include an urban/interface outside the SDNM, and soils could be impacted by other uses listed in the RFFAs. The cumulative effects of the No Grazing Alternative, in combination with other past, present, and RFFAs, would result in negligible, beneficial, and long-term impacts to soils.

### ***Reduced Grazing Alternative***

Under the Reduced Grazing Alternative, all six allotments associated with the SDNM would be allocated available for livestock grazing, except for portions of the Big Horn and Conley allotments north of SR-238, in addition to three other allotments outside the SDNM. The level and management of grazing on allotments within the CESA would be determined at the implementation-level and could vary in order to meet Standards and adapt to other uses within the CESA. The impacts to soils would depend on the level of grazing authorized under implementation-level decisions. However, under the Reduced Grazing Alternative soils are less likely to be damaged by livestock, when compared to the Maximum Acreage Alternative. Soils on the non-SDNM portion of the CESA has the potential to be damaged by livestock on the other allotments available for grazing. Further aridification caused by climate change could be exacerbated by plant mortality due increased stress resulting from perennial cattle grazing. Perennial cattle grazing could reduce biotic crusts and disturb desert pavement that could ultimately lead to greater wind or water erosion resulting from the anticipated increase in severe storms. The cumulative effects of the Reduced Grazing Alternative, in combination with other past, present, and RFFAs, would result in minor to moderate, adverse, and long-term impacts to soils.

### ***Ephemeral Use Only***

Under the Ephemeral Use Only Alternative, all six allotments associated with the SDNM would be available for livestock grazing. The level and management of grazing on allotments within the SDNM, either zero AUMs or ephemeral use only, would be determined at the implementation-level and could vary in order to meet Standards and adapt to other uses within the CESA. Under the Ephemeral Use Only Alternative, soils are less likely to be damaged by livestock through trampling and removal of vegetation when compared to the No Action Alternative. Soils on the non-SDNM portion of the CESA have the potential to be disturbed by livestock on all allotments available for grazing, in addition to impacts from other activities such as conversion of open space to residential and commercial developments. The risk of increased aridification caused by climate change is unlikely to be greatly exacerbated by plant mortality induced by perennial grazing caused stress. Ephemeral cattle grazing would reduce the impact to biotic crusts and desert pavement by keeping it to the wet season. Retention of those resources would reduce erosion caused by the increased number of severe storms predicted with climate change. The cumulative effects of the Ephemeral Use Only Alternative, in combination with other past, present, and RFFAs, would result in minor to minor, adverse, and long-term impacts to soils. These adverse impacts could be avoided or reduced at the implementation-level by redistributing livestock through the potential addition of new water sources, excluding livestock from sensitive areas, and authorizing grazing for ephemeral use only.

## 4.11 Cultural and Heritage Resources

### *Cumulative Impacts Common to All Alternatives*

Forty-four percent of the CESA (Figure 11) is non-BLM administered land, where the greatest impacts to cultural sites is from the conversion of lands from open space to residential and commercial uses associated with population growth. Cultural sites may also be impacted from other authorized uses on BLM-administered lands outside the SDNM including right-of-ways, renewable energy, mining, and exploration on unpatented mining claims. The Sonoran Valley Parkway is an approved rights-of-way and is planned for construction in Rainbow Valley in the foreseeable future and mitigation for impacts to cultural sites has been addressed through an approved Programmatic Agreement.

### *No Action Alternative (Current Management)*

Under the No Action Alternative, five of the six allotments within the SDNM would be available for livestock grazing, in addition to three other allotments outside the SDNM (Figure 11). No livestock grazing would occur in portions of the Big Horn Allotment, the Lower Vekol Allotment, and the entire Conley Allotment. The level of potential impacts to cultural sites would depend on the grazing management system set at the implementation-level. The potential for trampling and accelerated erosion due to loss of vegetation and topsoil would be eliminated in areas unavailable to livestock grazing. Impacts from livestock grazing to cultural sites within five allotments would continue, with the greatest potential for impacts to areas near concentrated livestock use near water developments which can lead to loss of vegetative cover and increase in potential for soil erosion. Impacts from livestock would be less where use is generally dispersed across the allotments. Other activities would be expected to continue such as recreation and motor vehicle use, which can lead to the loss of vegetative cover and potential for increase in soil erosion, which could impact cultural sites. Outside the SDNM, the conversion of open space into residential and commercial developments would also be expected to impact cultural sites. The cumulative effects of the No Action Alternative, in combination with other past, present, and RFFAs, would result in negative<sup>9</sup>, negligible to minor, and long-term impacts to cultural and heritage resources.

### *Maximum Acreage Alternative*

Under the Maximum Acreage Alternative, all six allotments would be available for livestock grazing, in addition to three other allotments outside the SDNM (Figure 11). The level of potential impacts to cultural sites would depend on the level of grazing and adjustments of grazing management set at the implementation-level. Dispersed livestock grazing has low potential to impact cultural sites. Cultural sites adjacent to areas of concentrated use around water developments have the greatest potential to be impacted by livestock grazing. Concentrated use can lead to loss of vegetative cover and increase in potential for soil erosion, which could impact cultural sites. Other activities would be expected to continue such as recreation and motor vehicle use, which can lead to the loss of vegetative cover and potential for increase in soil erosion, which could impact cultural sites. Outside the SDNM, the conversion of open space into residential and commercial developments would also be expected to impact cultural sites. The cumulative effects of the Maximum Acreage Alternative, in combination with other past, present, and RFFAs, would result in negative, negligible to minor, and long-term impacts to cultural and heritage resources. These adverse impacts could be avoided or reduced at the implementation-level by redistributing livestock through the potential addition of new water sources, excluding livestock from sensitive areas, reducing AUMs, and/or authorizing grazing seasonally/ephemerally.

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<sup>9</sup> In this Section the term ‘negative’ is used instead of adverse (as defined in Section 3.1), because adverse has a specific meaning under the NHPA.

### ***No Grazing Alternative***

Under the No Grazing Alternative, all six allotments would be unavailable for livestock grazing within the SDNM. Three other allotments outside the SDNM would continue to be available for livestock grazing (Figure 11). The potential for trampling and accelerated erosion due to loss of vegetation and topsoil from livestock grazing would be eliminated in the SDNM. Under the No Grazing Alternative, there would be no livestock grazing within the Anza NHT Corridor and Management Area, eliminating potential impacts to historic trails. Other activities would be expected to continue such as recreation and motor vehicle use, which can lead to the loss of vegetative cover and potential for increase in soil erosion, which could impact cultural sites. Outside the SDNM, the conversion of open space into residential and commercial developments would also be expected to impact cultural sites. The cumulative effects of the No Grazing Alternative, in combination with other past, present, and RFFAs, would result in negative, negligible to minor, and long-term impacts to cultural and heritage resources.

### ***Reduced Grazing Alternative***

Under the Reduced Grazing Alternative, all six allotments within the SDNM would be available for livestock grazing, except for portions of the Conley and Big Horn allotments north of SR-238, in addition to three other allotments outside the SDNM (Figure 11). The level of potential impacts to cultural sites would depend on the grazing management system set at the implementation-level. The potential for trampling and accelerated erosion due to loss of vegetation and topsoil would be eliminated in areas unavailable to livestock grazing. Impacts from livestock grazing to cultural sites within the allotments would continue, with the greatest potential for impacts to areas near concentrated livestock use near water developments which can lead to loss of vegetative cover and increase in potential for soil erosion. Impacts from livestock would be less where use is generally dispersed across the allotments. Under the Reduced Grazing Alternative, there would be no livestock grazing within the Anza NHT Corridor and Management Area, eliminating potential impacts to historic trails. Other activities would be expected to continue such as recreation and motor vehicle use, which can lead to the loss of vegetative cover and potential for increase in soil erosion, which could impact cultural sites. Outside the SDNM, the conversion of open space into residential and commercial developments would also be expected to impact cultural sites. The cumulative effects of the Reduced Grazing Alternative, in combination with other past, present, and RFFAs, would result in negative, negligible to minor, and long-term impacts to cultural and heritage resources.

### ***Ephemeral Use Only Alternative***

Under the Ephemeral Use Only Alternative, all six allotments would be available for livestock grazing, in addition to three other allotments outside the SDNM (Figure 11). The level of potential impacts to cultural sites would depend on the level of grazing, zero AUMs to ephemeral use only, and adjustments of grazing management set at the implementation-level. Dispersed livestock grazing has low potential to impact cultural sites. Cultural sites adjacent to areas of concentrated use around water developments have the greatest potential to be impacted by livestock grazing. Concentrated use can lead to loss of vegetative cover and increase in potential for soil erosion, which could impact cultural sites. Other activities would be expected to continue such as recreation and motor vehicle use, which can lead to the loss of vegetative cover and potential for increase in soil erosion, which could impact cultural sites. Outside the SDNM, the conversion of open space into residential and commercial developments would also be expected to impact cultural sites. The cumulative effects of the Ephemeral Use Only Alternative, in combination with other past, present, and RFFAs, would result in negative, negligible, and long-term impacts to cultural and heritage resources. These adverse impacts could be avoided or reduced at the implementation-level by redistributing livestock through the potential addition of new water sources, excluding livestock from sensitive areas, and authorizing grazing for ephemeral use only.

## 4.12 Air Resources

### *Cumulative Impacts Common to All Alternatives*

Portions of the CESA are in non-attainment for three regulated pollutants. Approximately 58 percent of the CESA is in non-attainment for Ozone (O<sub>3</sub>), 29 percent of the CESA is in non-attainment for large particulates (PM<sub>10</sub>), and seven percent of the CESA is in non-attainment for fine particulates (PM<sub>2.5</sub>). Vehicle travel on paved roads in the CESA represents the largest single emission source which contributes to the formation of O<sub>3</sub>. The largest source of particulate matter emissions in the CESA are surface-disturbing activities, including construction, mining, and off-highway (recreation-related) travel. Emissions from agricultural facilities, particularly during field tilling and harvest, also contributes to particulate emissions (BLM 2018). In the Southwestern US, net PM<sub>2.5</sub> and O<sub>3</sub> emissions decreased between 2000 and 2010 but plateaued between 2010 and 2022 (EPA 2023). Net PM<sub>10</sub> emissions have been variable, but it seems to be increasing slightly since 2000 in the region (EPA 2023). Expected population in the Phoenix Metro area is predicted increase by 29.84% - 55.77% of the 2022 population by 2050 (AZ OEO 2024). Barring technological advances, the population growth will increase O<sub>3</sub> and PM air pollution. It is difficult to assess the impact from increases in dust, motor vehicle emissions, and methane from climate change outside the CESA to specific impacts within the CESA or vice versa.

There are 12 solar project applications submitted within the CESA. None of the projects are in the Monument, but some are near the boundary. The number of projects that will be approved to move forward is unclear. Construction activities for those projects would be an additional, short-term increase in dust, CO<sub>2</sub>, O<sub>3</sub>, sulfur, and PM. Pinyon Solar, currently under NEPA development and review may start construction in 2025 or 2026. Given the number of potential projects, it is possible that episodic construction of solar facilities may continue for 10-15 years. Project sizes vary and designs and construction plans are not finalized so any estimate of their impact on air quality would be speculative. However, construction activities create triple the erosion susceptibility compared to livestock grazing which would include wind erosion and dust (Jeong & Dorn 2018). In the near-term cattle contribution to dust in the CESA will be dwarfed by any construction activities for solar development. Solar development will result in a net decrease in CO<sub>2</sub> emissions once solar facilities start generating electricity.

On all lands within the CESA, climate change and drought would influence vegetation communities. The exact timing, changes, and intensity are unknown but are likely to include more extreme fluctuations in precipitation patterns and temperatures. Climate change is expected to create periods of drought punctuated by high rain years in the Sonoran Desert. In dry years, dust storms during high wind events will be increasing likely as the century progresses. Significantly greater dust is present coming from burned areas for years after wildfires occur (Morra et al. 2024) particularly in high wind events (Hahnenberger and Nicoll 2012).

### *No Action Alternative (Current Management)*

Under the No Action Alternative, portions of five allotments within the SDNM, in addition to three allotments outside the SDNM, would be available for livestock grazing within the CESA. Agricultural, residential and commercial land, and transportation are sources of dust, PM, and O<sub>3</sub> on non-BLM lands within the CESA. Within the SDNM the primary source of O<sub>3</sub>, PM, and dust is from recreation-related motor vehicle use. Livestock grazing would contribute to methane (CH<sub>4</sub>) emissions on the Monument but the difference in total methane emissions produced by cattle in the CESA would depend on whether the cattle producers raise the same number of cattle on private land and on the other management decisions discussed in Section 3.10 (Harper et al. 1999, DeRamus et al. 2003, Beauchemin & McGinn 2005, Richmond et al. 2015) The CH<sub>4</sub> cattle produced would be 80.7% less than historic levels and 21.8% lower than the Maximum Alternative which would authorize the greatest number of cattle. Cattle forage consumption will thin fine fuels (Davies et al. 2010, Diamond et al. 2012, Davies et al. 2015) and the methane cows produce could be offset by the reduction in CO<sub>2</sub> and PM<sub>2.5</sub> emissions from wildfires that would otherwise occur (Ratcliff et al. 2023). The cumulative effects of the No Action Alternative, in

combination with other past, present, and foreseeable federal actions, and the type of pollutant, the result would be negligible to minor, adverse or beneficial, long-term impacts to air resources.

### ***Maximum Acreage Alternative***

Under the Maximum Acreage Alternative, all the allotments within the CESA would be available for livestock grazing. Agricultural, residential and commercial land, and transportation are sources of dust, PM, and O<sub>3</sub> on non-BLM lands within the CESA. Within the SDNM the primary source of O<sub>3</sub>, PM, and dust is from recreation-related motor vehicle use. Livestock grazing would contribute to methane (CH<sub>4</sub>) emissions on the Monument but the difference in Livestock grazing would contribute to CH<sub>4</sub> emissions that contribute to climate change, but there would be a 75.3% decrease in emissions on public lands relative to historic grazing. The total CH<sub>4</sub> emissions produced by cattle in the CESA would depend on whether the cattle producers raise the same number of cattle on private land and on the other management decisions discussed in Section 3.10 (Harper et al. 1999, DeRamus et al. 2003, Beauchemin & McGinn 2005, Richmond et al. 2015). Cattle forage consumption will thin fine fuels (Davies et al. 2010, Diamond et al. 2012, Davies et al. 2015) and the CH<sub>4</sub> cows produce could be offset by the reduction in CO<sub>2</sub> and PM<sub>2.5</sub> emissions from wildfires that would otherwise occur (Ratcliff et al. 2023). The cumulative effects of the maximum Acreage Alternative, in combination with other past, present, and foreseeable federal actions, and the type of pollutant, the result would be negligible to minor, adverse or beneficial, long-term impacts to air resources.

### ***No Grazing Alternative***

Under the No Grazing Alternative, six allotments within the SDNM would be unavailable for livestock grazing. Portions of six allotments outside the SDNM, in addition to three other allotments, would be available for livestock grazing within the CESA. Agricultural, residential and commercial land, and transportation are sources of dust, PM, and O<sub>3</sub> on non-BLM lands within the CESA. Within the SDNM the primary source of O<sub>3</sub>, PM, and dust is from recreation-related motor vehicle use. Livestock grazing would not contribute to CH<sub>4</sub> emissions on the Monument, but the difference in total methane emissions produced by cattle in the CESA would depend on whether the same number of cattle are raised by producers on private land and public land, and on the other management decisions discussed in Section 3.10. Fine fuels from *Schismus* and other annual species would accumulate increasing the risk of wildfire ignitions (Fusco et al. 2019). The CO<sub>2</sub> and PM<sub>2.5</sub> emissions would increase during wildfires and there would be an increase in fugitive dust for at least 2 years (Morra et al. 2024, Hahnenberger and Nicoll 2012). This increase in wildfire risk is not hypothetical. In May 2024, the Flying Bucket fire started within the Monument and burned nearly 2800 acres of private and public land. Another four fires occurred on BLM managed lands between May and July 2024, two of which were less than 0.5 miles from the Monument boundary. Three of the wildfires occurring in the Lower Vekol Allotment, covered in this EA. Though there would not be livestock grazing in the SDNM, the same number of cattle could be grazed on private lands. The uncertainty makes it unclear whether banning grazing from the SDNM will reduce the greenhouse causing CH<sub>4</sub> emissions. The cumulative effects of the No Grazing Alternative, in combination with other past, present, and foreseeable federal actions, and the type of pollutant, the result would be negligible to minor, adverse or beneficial, long-term impacts to air resources.

### ***Reduced Grazing Alternative***

Under the Reduced Grazing Alternative, all six allotments within the SDNM would be available for livestock grazing, although portions of two allotments would be unavailable. Three allotments outside the SDNM would continue to be available for livestock grazing. Agricultural, residential and commercial land, and transportation are sources of dust, PM, and O<sub>3</sub> on non-BLM lands within the CESA. Within the SDNM the primary source of O<sub>3</sub>, PM, and dust is from recreation-related motor vehicle use. Livestock grazing would contribute to CH<sub>4</sub> emissions on the Monument, but the difference in total CH<sub>4</sub> emissions produced by cattle in the CESA would depend on whether the same number of cattle are raised by producers on private land and public land, and on the other management decisions discussed in Section 3.10 (Harper et al. 1999, DeRamus et al. 2003, Beauchemin & McGinn 2005, Richmond et al. 2015). Livestock grazing

would contribute to methane emissions that contribute to climate change, but there would be an 80.84% decrease in emissions on public lands relative to historic grazing level. Cattle forage consumption will thin fuels (Davies et al. 2010, Diamond et al. 2012, Davies et al. 2015) and the methane cows produce could be offset by the reduction in CO<sub>2</sub> and PM<sub>2.5</sub> emissions from wildfires that would otherwise occur (Ratcliff et al. 2023). The cumulative effects of the Reduced Grazing Alternative, in combination with other past, present, and foreseeable federal actions, and the type of pollutant, the result would be negligible to minor, adverse or beneficial, long-term impacts to air resources.

#### ***Ephemeral Use Only Alternative***

Under the Ephemeral Use Only Alternative, all nine allotments within the CESA would be available for livestock grazing. Agricultural, residential and commercial land, and transportation are sources of dust, PM, and O<sub>3</sub> on non-BLM lands within the CESA. Within the SDNM the primary source of O<sub>3</sub>, PM, and dust is from recreation-related motor vehicle use. Livestock grazing would contribute to CH<sub>4</sub> emissions on the Monument, but the difference in total CH<sub>4</sub> emissions produced by cattle in the CESA would depend on whether the same number of cattle are raised by producers on private land and public land, and on the other management decisions discussed in Section 3.10 (Harper et al. 1999, DeRamus et al. 2003, Beauchemin & McGinn 2005, Richmond et al. 2015). Livestock grazing would contribute to CH<sub>4</sub> emissions on public lands, but ephemeral grazing is inherently variable. Precipitation can vary within the SDNM within storms and per season. That variability means that in a typical grazing may occur on some, but not all six allotments. Fifty cattle grazing per year on average is possible. That number would result in 85.8% less CH<sub>4</sub> than the Maximum Acreage Alternative and a 96.5% reduction from historic grazing management. The remaining cattle that would have grazed on the SDNM at historic levels may continue to graze on private lands making the impact of cattle reduction on total CH<sub>4</sub> production in the CESA unclear. The cumulative effects of the Ephemeral Grazing Alternative, in combination with other past, present, and foreseeable federal actions, and the type of pollutant, the result would be negligible to minor, adverse or beneficial, long-term impacts to air resources.

### **4.13 Visual Resources Management**

#### ***Cumulative Impacts Common to All Alternatives***

BLM-managed lands within the CESA have been allocated a VRM Classification. Approximately 19 percent of the CESA is Class I, 10 percent of the CESA is Class II, 15 percent of the CESA is Class III, and 12 percent of the CESA is Class IV. Class IV is defined as: “The objective is to provide for management activities that require major modification of the existing landscape character. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention; however, every attempt should be made to minimize the impact of these activities, through careful location, minimal disturbance, and repeating of the basic elements.” All Class IV areas are outside the SDNM. VRM classes apply to BLM-managed lands only. Within the CESA, significant alterations of the visual setting on non-BLM lands are the result of the conversion of open space to agricultural fields west of State Route 85 and in Rainbow Valley. Open space has been converted to residential and commercial uses; Gila Bend is the largest community in the CESA. The four-lane State Route 85 is a significant north-south transportation corridor. On BLM-managed lands, there are mining activities outside the SDNM, and rights-of-ways for transportation and utilities. Within the SDNM there are unpaved travel routes outside of wilderness areas and areas of concentrated recreational shooting sports. SR-238 is an east-west transportation corridor which includes a Union Pacific Railroad line.

#### ***No Action Alternative (Current Management)***

Under the No Action Alternative, portions of five allotments within the SDNM, in addition to three allotments outside the SDNM, would be available for livestock grazing within the CESA. Alteration of the visual character on non-BLM lands through conversion of open space to agricultural, residential, or commercial uses would be expected to continue. Existing and new livestock infrastructure such as water

developments and fencing has impacted the visual character at these sites through loss of vegetative cover and soil compaction. These changes are weak in consideration that the CESA involves all or portions of nine livestock grazing allotments and nearly three-quarters of a million acres. The cumulative effects of the No Action Alternative, in combination with other past, present, and RFFAs, would result in negligible, adverse, and long-term impacts to visual resources management.

#### ***Maximum Acreage Alternative***

Under the Maximum Acreage Alternative, all nine allotments within the CESA would be available for livestock grazing. Alteration of the visual character on non-BLM lands through conversion of open space to agricultural, residential, or commercial uses would be expected to continue. Existing and new livestock infrastructure such as water developments and fencing have and would impact the visual character at these sites through loss of vegetative cover and soil compaction. These changes are weak in consideration that the CESA involves all or portions of nine livestock grazing allotments and nearly three-quarters of a million acres. The cumulative effects of the Maximum Acreage Alternative, in combination with other past, present, and RFFAs, would result in negligible to minor, adverse, and long-term impacts to visual resources management. These adverse impacts could be avoided or reduced at the implementation-level by redistributing livestock through the potential addition of new water sources, excluding livestock from sensitive areas, reducing AUMs, and/or authorizing grazing seasonally/ephemerally.

#### ***No Grazing Alternative***

Under the No Grazing Alternative, six allotments within the SDNM would be unavailable for livestock grazing. Portions of six allotments outside the SDNM, in addition to other three allotments, would be available for livestock grazing within the CESA. Alteration of the visual character on non-BLM lands through conversion of open space to agricultural, residential, or commercial uses would be expected to continue. Existing and new livestock infrastructure (outside the SDNM) such as water developments and fencing has impacted the visual character at these sites through loss of vegetative cover and soil compaction, although none of the existing infrastructure has been used or maintained since at least 2015. These changes are weak in consideration that the CESA involves all or portions of nine livestock grazing allotments and nearly three-quarters of a million acres. The cumulative effects of the No Grazing Alternative, in combination with other past, present, and RFFAs, would result in negligible, adverse, and long-term impacts to visual resources management.

#### ***Reduced Grazing Alternative***

Under the Reduced Grazing Alternative, all six allotments within the SDNM would be available for livestock grazing, although portions of two allotments would be unavailable. Alteration of the visual character on non-BLM lands through conversion of open space to agricultural, residential, or commercial uses would be expected to continue. Existing and new livestock infrastructure such as water developments and fencing have and would impact the visual character at these sites through loss of vegetative cover and soil compaction. These changes are weak in consideration that the CESA involves all or portions of eight livestock grazing allotments and nearly three-quarters of a million acres. The cumulative effects of the Reduced Grazing Alternative, in combination with other past, present, and RFFAs, would result in negligible, adverse, and long-term impacts to visual resources management.

#### ***Ephemeral Use Only Alternative***

Under the Ephemeral Use Only Alternative, all nine allotments within the CESA would be available for livestock grazing. Alteration of the visual character on non-BLM lands through conversion of open space to agricultural, residential, or commercial uses would be expected to continue. Existing and new livestock infrastructure such as water developments and fencing have and would impact the visual character at these sites through loss of vegetative cover and soil compaction. These changes are weak in consideration that the CESA involves all or portions of nine livestock grazing allotments and nearly three-quarters of a million acres. The cumulative effects of the Ephemeral Use Only Alternative, in combination with other past,

present, and RFFAs, would result in negligible, adverse, and long-term impacts to visual resources management. These adverse impacts could be avoided or reduced at the implementation-level by redistributing livestock through the potential addition of new water sources, excluding livestock from sensitive areas, and authorizing grazing for ephemeral use only.

#### **4.14 Special Designations - Wilderness**

##### ***Cumulative Impacts Comment to All Alternatives***

The wilderness areas of the CESA are currently impacted by activities such as urban sprawl, recreational activities, and livestock grazing. Three wilderness areas are present within the CESA, two within the SDNM and one outside (Figure 12). The North and South Maricopa Mountains Wilderness areas are within the SDNM and span the entirety of the Maricopa Mountains, and the Sierra Estrella Wilderness area is in the northeast portion of the CESA encompassing a portion of the Estrella Mountains and its foothills. These three wilderness areas are receiving a continuous increase in visitation due to the urban sprawl of the Phoenix metropolitan area which has also resulted in illegal off-road travel. Urban sprawl and therefore increased recreational activity, primarily in the northeast and southeast portions of the CESA, is likely to increase in the foreseeable future.

The three wilderness areas are also entirely within BLM grazing allotments. The North Maricopa Mountains Wilderness contains portions of four grazing allotments, the South Maricopa Mountains Wilderness contains portions of three grazing allotments, and the Sierra Estrella Wilderness is entirely within one grazing allotment. The majority of these wilderness areas are steep, rugged, and remote which prevents significant livestock grazing from occurring.

##### ***No Action Alternative (Current Management)***

Under the No Action Alternative, portions of five allotments within the wilderness areas of SDNM, in addition to one allotment in the wilderness area outside the SDNM, would be available for livestock grazing. Impacts related to the continuation of livestock grazing in these areas as well as the existing livestock infrastructure such as water developments and fencing is expected to continue in the areas available for grazing. These impacts are negligible as the level of livestock grazing and the livestock grazing infrastructure is minimal when compared to the overall acreage of the wilderness areas. The cumulative effects of the No Action Alternative, in combination with other past, present, and RFFAs, would result in negligible, adverse, and long-term impacts to wilderness.

##### ***Maximum Acreage Alternative***

Under the Maximum Acreage Alternative, all five allotments within the wilderness areas of SDNM, in addition to one allotment in the wilderness area outside the SDNM, would be available for livestock grazing. Impacts related to the continuation of livestock grazing in these areas as well as the existing livestock infrastructure such as water developments and fencing is expected to continue. These impacts are negligible as the level of livestock grazing and the livestock grazing infrastructure is minimal when compared to the overall acreage of the wilderness areas. The cumulative effects of the Maximum Acreage Alternative, in combination with other past, present, and RFFAs, would result in negligible, adverse, and long-term impacts to wilderness. These adverse impacts can be avoided or reduced at the grazing implementation-level by consideration of adjustments to livestock grazing management and range improvements consistent with BLM policies regarding the management of grazing in wilderness areas.

##### ***No Grazing Alternative***

Under the No Grazing Alternative, all five allotments within the wilderness areas of SDNM would be unavailable to grazing and the portions of one allotment in the wilderness area outside the SDNM would be available for livestock grazing. Impacts related to livestock grazing in the SDNM would end. The existing livestock infrastructure, such as water developments and fencing, within the SDNM would no longer be maintained by the permittees and may be maintained or removed on a case-by-case basis by the



BLM. The cumulative effects of the No Grazing Alternative, in combination with other past, present, and RFFAs, would result in negligible, beneficial, and long-term impacts to wilderness.

***Reduced Grazing Alternative***

Under the Reduced Grazing Alternative, portions of five allotments within the wilderness areas of SDNM, in addition to one allotment in the wilderness area outside the SDNM, would be available for livestock grazing. Impacts related to the continuation of livestock grazing in these areas as well as the existing livestock infrastructure such as water developments and fencing is expected to continue in the areas available for grazing. These impacts are negligible as the level of livestock grazing and the livestock grazing infrastructure is minimal when compared to the overall acreage of the wilderness areas. The cumulative effects of the Reduced Grazing Alternative, in combination with other past, present, and RFFAs, would result in negligible, adverse, and long-term impacts to wilderness.

***Ephemeral Use Only Alternative***

Under the Ephemeral Use Only Alternative, all five allotments within the wilderness areas of SDNM, in addition to one allotment in the wilderness area outside the SDNM, would be available for livestock grazing. Impacts related to the continuation of livestock grazing in these areas as well as the existing livestock infrastructure such as water developments and fencing is expected to continue. These impacts are negligible as the level of livestock grazing and the livestock grazing infrastructure is minimal when compared to the overall acreage of the wilderness areas. The cumulative effects of the Ephemeral Use Only Alternative, in combination with other past, present, and RFFAs, would result in negligible, adverse, and long-term impacts to wilderness. These adverse impacts can be avoided or reduced at the grazing implementation-level by consideration of adjustments to livestock grazing management and range improvements consistent with BLM policies regarding the management of grazing in wilderness areas.

## 5.0 PERSONS, GROUPS, AND AGENCIES CONSULTED

### 5.1 List of Preparers

The following BLM Staff were involved in the preparation of this RMPA/EA:

Name	Title	Project Expertise
Dale Ohnmeiss	Planning and Environmental Coordinator	National Environmental Policy Act, Cumulative Effects
Laura Howland	Wildlife Biologist	Biological Resources, Wildlife, Sensitive Species
Breanna Van Horn	Wildlife Biologist	Biological Resources, Wildlife, Sensitive Species
Chris Bowman-Prideaux	Rangeland Management Specialist	Livestock Grazing, Vegetation, Noxious and Invasive Weeds, Soils, Wilderness
Doug Whitbeck	State Rangeland Management Lead	Livestock Grazing, Vegetation, Noxious and Invasive Weeds, Soils
Hebin Lin	Socioeconomic Specialist	Socioeconomics and Environmental Justice
Amber Redger	Archeologist	Cultural and Heritage Resources
Cynthia Barrett	Outdoor Recreation Planner	Wilderness, Visual Resources, Recreation Management

### 5.2 Tribes, Individuals, Organizations or Agencies Consulted

The following tribes, individuals, organizations, or agencies were consulted during public scoping and/or public review of the 2020 SDNM Grazing RMPA/EA. To keep interested parties informed of the changes, the individuals, agencies, and organization on this list were contacted directly by mail or email to notify them of the current comment period for the Proposed RMPA starting May 6, 2024.

#### 5.2.1 Organizations, Tribes, Agencies

##### *Organizations and Corporations*

Arizona Wilderness Coalition	Leibold Livestock LLC
Archeology Southwest	Pacific Biodiversity Institute
Arizona Cattlemen's Association	Plains Pipeline LP
Arizona Wilderness Coalition	Public Lands Foundation
Bureau of Reclamation, Arizona Project Office	Public Lands Guardian
Center for Biological Diversity	Qwest dbA CenturyLink
Conservation Congress	Roberts Enterprises Inc.
City of Goodyear	Sierra Club
Defenders of Wildlife	Southern Pacific Railroad
Desert Tortoise Council	Southern Pacific Transportation
Federal Highway Administration	Southwest Gas Corporation
El Paso Natural Gas Company	Transwestern Pipeline Company
Friends of Cabeza Prieta	The Wilderness Society
Friends of Saddle Mountain	Roberts Enterprises Inc.
Friends of the Sonoran Desert National Monument	UTZ Enterprises Inc.
Keith Cattle LLC	Western Watersheds Project
K Cross Cattle Co.	Wild Earth Guardians
Land and Water Fund	Wilderness Watch

***Tribes***

Ak-Chin Indian Community  
Gila River Indian Community  
Hopi Tribe  
Pasua Yaqui Tribe  
Salt River Pima-Maricopa Indian Community  
Tohono O'odham Nation  
Gila River Indian Community

***Agencies***

Arizona Department of Administration  
Arizona Department of Agriculture  
Arizona Department of Environmental Quality  
Arizona Department of Transportation  
Arizona Game and Fish Department, Regions 4 and 6  
Arizona Public Service  
Arizona State Health Services Department  
Arizona State Lands Department  
AZ State Highway Department  
AZ State Health Services  
AZ State Historic Preservation Office  
Bureau of Reclamation AZ Project Office  
City of Goodyear  
Federal Highways Administration  
Maricopa Department of Transportation  
Maricopa County  
Maricopa County Flood Control District  
Paloma Irrigation & Drainage  
Pinal County  
Salt River Project Land Department  
U.S. Army Corps of Engineers, Arizona Project Office  
U.S. Fish and Wildlife Service, AZ Ecological Services  
U.S. Geological Services, Tempe Field Office  
U.S. National Park Service

### 5.2.2 Individuals

Alcock, J	DeJong, H	Ingram, J	Meachum, C	Singleton, D
Allison, K	Devlin, M	Jackson, A	Meehan, K	Singleton, N
Amorosi, P	Dixon, K	Jacobs, S	Menor, C	Smith, H
Ashby, L	Dollard, N	James, A	Menor, P	Smith, L
Backman, J	Donofrio, M	Jean, L	Mercier, M	Smith, R
Baranow, R	Downer, C	Johnson, D	Miyake, J	Smith, J
Beck, M	Downer, D	Johnson, J	Morris, A	Soler, J
Berkson, L	Draper, M & P	Johnson, P	Moss, A	Solomon, A
Besinger, M	Driskill, D	Kelley, S	Moss, P	Spencer, M
Blackstone, E	Drosendahl, A	Klug, K	Motzer, R	Spotts, R
Boggs, D	Dugan, L	Knauer, H	Murillo, E	Stevens, R
Bolbol, D	Eagle, J	Kobylarz-	Nessel, L	Stringham, R
Boothe, S	Edwards, L	Chouvarda, W	Ogg, G	Stromberg, J
Borg, C	Eisenberg, A	Koehler, M	Oster, S	Thill, R
Brach, D	Ericsson, T	Kozarsky, D	Paramore, E	Tiede, M
Braukis, Y	Evans, S	Krajewski, B	Parry, R	Trew, T
Bridges, A	Feeney, J	Kreemer, C	Pearson, R	Trudeau, J
Brooker, E	Finchum, K	Krupp, C	Pierce, N	Tuell, C
Brooks, S	Finnell, D	Kueltzo, C	Prather, E	Turner, D
Boothe, S	Floren, K	LaLoggio, P	Public, J	Utz, T
Brown, J	Gaines, D	Lappin, L	Quartuccio, J	Vaaler, J
Bryant, E	Gentile, D	Larson, M	Ramias, CJ	Vazquez, D
Burgess, J	Gill, M	LaRue, E	Ramirez, C	Wagner, R
Burris, C	Glaccum, E	LaRue, E	Rasmussen, M	Walsh, M
Caldwell, D	Goldberg, V	LaRue, E	Reber, L	Wederski, B
Campbell, C	Goldsmith, K	Leonard, P	Reilly, C	Weiss, A
Campbell, K	Grace, A	Licon, A	Robinson, M	Welch, J
Castillo, L	Gregg, K	Lines, P	Roeder, C	Welsh, J
Chamberlin, L	Haas, R	Lybarger, L	Roy, S	Welsh, S
Chizmar, M	Hand, D	Mac Farlane, G	Russman, L	Wennes, J
Chizmar, RE E	Hanken, J	Marcus, S	Samples, L	West, K
Cohen, E	Harrington, C	Marsh, J	Sanchez, E	Whitlock, G
Cooke, D	Harris, M	Marvel, J	Sauber, M	Williams, L
Coors, J	Hedgecoke, S	Matteson, B	Saubolle, S	Williams, M
Corless, S	Henderson, B	Mauceli, G	Schmid, B	Williamson, J
Cox, A	Henry, J	McCully, C	Schnitzer, K	Wilson, J
Crocker, K	Hill, A	McDermott, P	Schoolcraft, G	Womack, K
Cuezze, T	Holm, D	McEwan, S	Sealing, C	Wuerthner, G
Cusick, J	Hoover, C	McGeough, K	Seibert, J & C	Yule, K
Dahl, K	Hughes, B	McKever, L	Shelton, J	
Dalley, C & K	Hughes, B	McMahon, A	Shumaker, J	
DeJong, C	Imig, C	McNeil, B	Sibley, R	

## 6.0 REFERENCES

- Abatzoglou, John T. and Crystal A. Kolden. 2011. Climate change in western US Deserts: Potential for increased wildfire and invasive annual grasses. *Rangeland Ecology Management*, 64: 471–478.
- Arizona Game and Fish Department (AGFD). 2011. *Guidelines for Wildlife Compatible Fencing*. <https://www.azgfd.com/wildlife-conservation/planning-for-wildlife/planning-for-wildlife-wildlife-friendly-guidelines/>. Accessed on June 10, 2020.
- Arizona Game and Fish Department (AGFD). 2024. *Arizona Game and Fish Laws and Rules*. <https://azgfd-portal-wordpress-pantheon.s3.us-west-2.amazonaws.com/wp-content/uploads/2024/08/06175147/AZGFD-Laws-and-Rules-Book-081024.pdf>
- Arizona Game and Fish Department (AGFD). 2022. (*Glaucidium brasilianum cactorum*). Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, AZ.
- Arizona Office of Economic Opportunity (AZ OEO) 2024. Population Projections. <https://oeo.az.gov/population/projections> Data viewed and downloaded on August 8, 2024.
- Austin, D.D., P. J. Urness. 1986. Effects of Cattle Grazing on Mule Deer Diet and Area Selection. *Journal of Range Management*, 39(1): 18-21.
- Averill-Murray, R.C., H. Christen, G. Flemin, and J. Darien Riedle. 2020. Reptile Home Ranges Revisited: a case study of space use of Sonoran desert tortoises (*Gopherus morafkai*). *Herpetological Conservation and Biology*, 15(2):253–271.
- Avery, H. W. 1998. Nutritional ecology of the desert tortoise (*Gopherus agassizii*) in relation to cattle grazing in the Mojave Desert. Ph.D. dissertation. University of California, Los Angeles.
- Avery, H.W. and A.G. Neibergs. 1997. Effects of cattle grazing on the desert tortoise, *Gopherus agassizii*: nutritional and behavioral interactions. *Proceedings: conservation, restoration, and management of tortoises and turtles – an International Conference*. New York Turtle and Tortoise Society, NY, pages 13-20.
- Beauchemin, Karen A. and S. M. McGinn. 2005. Methane emissions from feedlot cattle fed barley or corn diets. *Journal of Animal Science*, 83: 653-661
- Berry, K. H. 1978. Livestock grazing and the desert tortoise. *Transactions of the North American Wildlife and Natural Resources Conference*, 43: 505–519.
- Belnap, J. 1995. *Surface Disturbances: Their Role in Accelerating Desertification*. *Environmental Monitoring and Assessment* 37:39-57.
- Bissonette, J.A., M.J. Steinkamp. 1996. Bighorn Sheep Response to Ephemeral habitat Fragmentation by Cattle. *The Great Basin Naturalist*, 56(4): 319-325.
- Blanco, L.J., C.A. Ferrando, and F.N. Biurrun. 2009. Remote Sensing of Spatial and Temporal Vegetation Patterns in Two Grazing Systems. *Rangeland Ecology & Management*. *Rangeland Ecology & Management*. 62(5): 445-451.
- Boarman, W.I. 2002. Threats to desert tortoise populations: a critical review of the literature. Unpubl. Report, prepared for the West Mojave Planning Team and the Bureau of Land Management. 86 pp.

- Brooks, M.L., C.S. Brown, J.C. Chambers, C.M. D'Antonia, J. Keeley, and J. Belnap. 2016. Exotic Annual Bromus Invasions: Comparisons Among Species and Ecoregions in the Western United States. *Exotic Brome-Grasses in Arid and Semiarid Ecosystems of the Western US*. Germino, M., Chambers, J., Brown, C. (eds) Springer Series on Environmental Management. Springer International Publishing, New York: pages 11-60.
- Brooks, M.L. and K.H. Berry. 2006. Dominance and environmental correlates of alien annual plants in the Mojave Desert, USA. *Journal of Arid Environments*. 67: 100-124.
- Brooks, M., J.R. Matchett, and K.H. Berry. 2006. Effects of livestock watering sites on alien and native plants in the Mojave Desert, USA. *Journal of Arid Environments*, 67: 125-147.
- Brown, N.A., K.E. Ruckstuhl, S. Donelon, C. Corbett. 2010. Changes in vigilance, grazing behaviour and spatial distribution of bighorn sheep due to cattle presence in Sheep River Provincial Park, Alberta. *Agriculture, Ecosystems & Environment*, 135(3): 226-231.
- Bureau of Land Management (BLM). 1985. *Lower Gila River South, Final Environmental Impact Statement/ Resource Management Plan*. U.S. Department of the Interior. Phoenix, Arizona. August.
- \_\_\_\_\_. BLM. 2001. *Biological Soil Crusts: Ecology and Management*. Technical Reference 1730-2. U.S. Department of the Interior. Ed. Pam Peterson.
- \_\_\_\_\_. BLM. 2005. *Land Use Planning Handbook (H-1601-1)*. U.S. Department of the Interior. March.
- \_\_\_\_\_. BLM. 2008. *National Environmental Policy Act Handbook (H-1790-1)*. U.S. Department of the Interior. January.
- \_\_\_\_\_. BLM. 2012a. Sonoran Desert National Monument Record of Decision & Approved Resource Management Plan. Phoenix, Arizona. September.
- \_\_\_\_\_. BLM. 2012b. Lower Sonoran and Sonoran Desert National Monument Proposed Resource Management Plan and Final Environmental Impact Statement. Phoenix, Arizona. June.
- \_\_\_\_\_. BLM. 2020. Sonoran Desert National Monument Livestock Grazing Resource Management Plan Amendment (DOI-BLM-AZ-P040-2020-0001-EA). Phoenix, Arizona. July.
- \_\_\_\_\_. BLM. 2022. Grazing Permit Renewal for Childs, Coyote Flat #2, and Sentinel Allotments Environmental Assessment (DOI-BLM-AZ-P020-2021-0013-EA). U.S. Department of the Interior. Phoenix, Arizona. January.
- Bruegger, R.A., L.A. Varelas, L.D. Howery, L.A. Torell, M.B. Stephenson, and D.W. Bailey. 2016. Targeted Grazing in Southern Arizona: Using Cattle to Reduce Fine Fuel Loads. *Rangeland Ecology & Management*. 69(1): 43-51.
- Conver J.L, T. Foley, D. Winkler, and D.E. Swann. 2017. Demographic changes over >70 yr in a population of saguaro cacti (*Carnegiea gigantea*) in the northern Sonoran Desert. *Journal of Arid Environments*, 139: 41-48.
- Council on Environmental Quality (CEQ) March 23, 1981 as amended 1986. Executive Office of the President, Memorandum to Agencies, Forty Most Asked Questions Concerning CEQs National Environmental Policy Act. Ref: 40 CFR Parts 1500-1508 (1987)
- Council on Environmental Quality (CEQ). 1997. Environmental Justice: Guidance Under the National Environmental Policy Act, [https://www.epa.gov/sites/default/files/2015-02/documents/ej\\_guidance\\_nepa\\_ceq1297.pdf](https://www.epa.gov/sites/default/files/2015-02/documents/ej_guidance_nepa_ceq1297.pdf)
- Caldwell, M.M. 1984. Plant Requirements for Prudent Grazing. Pages 117-152 in *Developing Strategies for Rangeland Management: A Report Prepared by the Committee on Developing Strategies for*

- Rangeland Management*. National Research Council/National Academy of Sciences. Westview Press, Boulder, Colorado.
- D'Antonio, Carla M. and Peter M. Vitousek. 1992. Biological Invasions by Exotic Grasses, the Grass/Fire Cycle, and Global Change. *Annual Review of Ecology and Systematics*, 23: 63-87.
- Darling, J. Andrew and Barnaby Lewis. 2007. *Ancient Trails of the Arid Southwest* in *Archaeology Southwest*, Volume 21, Number 4, pages 16-17.
- Darling, J. Andrew and B. Sunday Eiselt. 2009. "O'odham Trails and the Archaeology of Space" in *Landscape of Movement: Trails, Paths, and Roads in Archaeological Perspective*, edited by James E. Snead, Clark L. Erickson, and J. Andrew Darling, pages 61 - 83. University of Pennsylvania Museum of Archaeology and Anthropology, Philadelphia.
- Darling, J. Andrew and Sunday Eiselt. 2009. "Trails Research in the Gila Bend Area" in *Trails, Rock Features, and Homesteading in the Gila Bend Area: A Report on the State Route 85 Gila Bend to Buckeye Archaeological Project, Gila River Indian Community Research Papers 4*, edited by John L. Czarzasty, Kathleen Peterson, Glen E. Rice, and J. Andrew Darling, pages. 199-227, ASU Anthropological Field Studies, Number 43. Gila River Indian Community, Cultural Resource Management Program, Sacaton, Arizona.
- Davies, K.W., J.D. Bates, T.J. Svejcar, and C.S. Boyd. 2010. Effects of Long-Term Livestock Grazing on Fuel Characteristics in Rangelands: An Example From the Sagebrush Steppe. *Rangeland Ecology & Management*. 63(6): 662-669.
- Davies, K.W., J.D. Bates, C.S. Boyd, and T.J. Svejcar. 2016. Prefire grazing by cattle increases postfire resistance to exotic annual grass (*Bromus tectorum*) invasion and dominance for decades. *Ecology and Evolution*. 6: 3356–3366.
- Davies, K.W., C.S. Boyd, J.D. Bates, and A. Hulet. 2015. Winter grazing can reduce wildfire size, intensity and behaviour in a shrub-grassland. *International Journal of Wildland Fire*. 25: 191-199.
- DeRamus, H. Alan, Terry C. Clement, Dean D. Giampola, and Peter C. Dickison. 2003. Methane Emissions of Beef Cattle on Forages: Efficiency of Grazing Management Systems. *Journal of Environmental Quality*. 32: 269-277.
- Diamond, J. M., C. A. Call, and N. Devoe. 2012. Effects of Targeted Grazing and Prescribed Burning on Community and Seed Dynamics of Downy Brome (*Bromus tectorum*)-Dominated Landscape. *Invasive Plant Science and Management* 5: 259–269.
- DiTomaso, J.M., G.B. Kyser et al. 2013. *Weed Control in Natural Areas in the Western United States*. Weed Research and Information Center, University of California. 544 pp.
- Dubay, S. A., Rosenstock, S. S., Stallknecht, D. E., & deVos, J. C. (2006). Determining prevalence of bluetongue and epizootic hemorrhagic disease viruses in mule deer in Arizona (USA) using whole blood dried on paper strips compared to serum analyses. *Journal of Wildlife Diseases*, 42(1), 159–163. <https://doi.org/10.7589/0090-3558-42.1.159>
- Duniway, M.C., E.L. Geiger, T.J. Minnick, S.L. Philips, and J. Belnap. 2018. Insights from Long-Term Ungrazed and Grazed Watersheds in a Salt Desert Colorado Plateau Ecosystem. *Rangeland Ecology and Management*, 71(4): 492-505.
- Dutcher, Michael and Gilsdorf, Michael J. 2005. Status of the State and Federal Cooperative Bovine Tuberculosis (tb) Eradication Program Fiscal Year 2005. Report of the Committee on Tuberculosis. 684-685, 687-689.
- Enright, N.J. and B.P. Miller. 2007. Livestock Grazing Impacts on Desert Vegetation, Khirthar National Park, Pakistan. *Rangeland Ecology and Management*. 60:680-684.

- Environmental Protection Agency (EPA). 2024. Agriculture and Aquaculture: Food for Thought. Viewed July 30, 2024. <https://www.epa.gov/snep/agriculture-and-aquaculture-food-thought>. Original publication October 2020, Last updated February 6, 2024.
- \_\_\_\_\_. EPA. 2023. National Air Quality: Status and Trends of Key Air Pollutants. <https://www.epa.gov/air-trends>. Viewed 8/8/2024, last up dated November 1, 2023.
- \_\_\_\_\_. EPA. 2023. Report on the Social Cost of Greenhouse Gasses: Estimates Incorporating Recent Scientific Advances. Published November 2023.
- Executive Order No. 12898. 1994. Federal Register Vol. 50, No. 32 (February 16, 1994), Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, <https://www.archives.gov/files/federal-register/executive-orders/pdf/12898.pdf>.
- Executive Order 13990, Protecting public health and the environment and restoring science to tackle the climate crisis, <https://www.govinfo.gov/content/pkg/FR-2021-01-25/pdf/2021-01765.pdf>, accessed on May 1, 2024.
- Felix-Burrue, R.E., E. Larios, E. Gonzalez, and A. Burquez. 2024. Population decline of the saguaro cactus throughout its distribution is associated with climate change. (Corrected Proof) *Annals of Botany*, 11 pp. <https://doi.org/10.1093/aob/mcae094>.
- Fensham, R.J., S. Donald, J.M. Dwyer. 2013. Propagule pressure, not fire or cattle grazing, promotes invasion of buffel grass *Cenchrus ciliaris*. *Journal of Applied Ecology*, 50: 138–146.
- Ferrenberg, S., S.C. Reed, and J. Belnap. 2015. Climate change and physical disturbance cause similar community shifts in biological soil crusts. *Proceedings of the National Academy of Sciences*. 112(39).
- Fusco, Emily, J.T. Finn et al. 2019. Buffelgrass and Mediterranean grass have been shown to increase the likelihood of wildfires, but only buffelgrass has increased the mean fire size in the desert southwest. *Proceedings of the National Academy of Sciences*. 116(47): 23594–23599.
- Gamoun, Mouldi. 2014. Grazing intensity effects on the vegetation in desert rangelands of Southern Tunisia. *Journal of Arid Land*, 6(3): 324–333.
- Garrison, K.R., J.W. Cain III, E.M. Rominger, E.J. Goldstein. 2015. Sympatric cattle grazing and desert bighorn sheep foraging. *The Journal of Wildlife Management*, 80(2): 197-207.
- Gori, D.F., and C.A.F. Enquist. 2003. An Assessment of the Spatial Extent and Condition of Grasslands in Central and Southern Arizona, Southwestern New Mexico and Northern Mexico. Prepared by The Nature Conservancy, Arizona Chapter. Available at: [https://azconservation.org/dl/TNCAZ\\_Grasslands\\_Assessment\\_Report.pdf](https://azconservation.org/dl/TNCAZ_Grasslands_Assessment_Report.pdf). Accessed November 17, 2022
- Gornish, E. S., D.J. Eastburn, S. Oneto, L.M. Roche. 2018. Livestock grazing and topographic site effects on grassland plant communities after long-term grazing cessation. *Rangeland Journal*, 40(6): 577–582.
- Gray, C. W., C.P. Ghimire, R.W. McDowell, and R.W. Muirhead. 2021. The impact of cattle grazing and treading on soil properties and the transport of phosphorus, sediment and *E. coli* in surface runoff from grazed pasture. *New Zealand Journal of Agricultural Research*, 65(6): 445–462.
- Guo, Li, R. G. Maghirang, E.B. Razote, S.L. Trabue, and L.L. McConell. 2011a. Concentrations of Particulate Matter Emitted from Large Cattle Feedlots in Kansas, *Journal of the Air & Waste Management Association*, 61 (10): 1026-1035.
- Guo, Li, R. G. Maghirang, E.B. Razote, and B. W. Auvermann. 2011b. Laboratory Evaluation of Dust-Control Effectiveness of Pen Surface Treatments for Cattle Feedlots. *Journal of Environmental Quality*, 40: 1503-1509.



- Hahnenberger, M. and K. Nicoll. 2012. Meteorological characteristics of dust storm events in the eastern Great Basin of Utah, U.S.A. *Atmospheric Environment*, 60: 601-612.
- Hall, J.A, S. Weinstein, and C.L. McIntyre. 2005. *The Impacts of Livestock Grazing in the Sonoran Desert: A Literature Review and Synthesis*. The Nature Conservancy in Arizona, Tucson.
- Harper, L. A., O. T. Denmead, J. R. Freney and F. M. Byers. 1999. Direct measurements of methane emissions from grazing and feedlot cattle. *Journal of Animal Science*. 77: 1392-1401.
- Headwaters Economics (Headwaters). 2020. *Economic Profile System*. Accessed on April 10, 2020. <https://headwaterseconomics.org/tools/economic-profile-system/>.
- Holechek, Jerry L., Milton Thomas, Francisco Molinar, and Dee Galt. 1999. Stocking Desert Rangelands: What We've Learned. *Rangelands*, 21(6): 8-12.
- Holechek, J.L., T.T. Baker, J.C. Boren and D. Galt. 2006. Grazing Impacts on Rangeland Vegetation: What We Have Learned. *Rangelands*, 28(1): 7-13.
- Interagency Working Group on Social Cost of Greenhouse Gases, United States Government, 2021, Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under Executive Order 13990, [https://www.whitehouse.gov/wp-content/uploads/2021/02/TechnicalSupportDocument\\_SocialCostofCarbonMethaneNitrousOxide.pdf](https://www.whitehouse.gov/wp-content/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf), accessed on May 1, 2024.
- Jeong, Ara and Ronald Dorn. 2019. Soil erosion from urbanization processes in the Sonoran Desert, Arizona, USA. *Land Degradation and Development*. 30: 226–238.
- Jones, Allison. 2000. Effects of cattle grazing on North American arid ecosystems: A quantitative review. *Western North American Naturalist*. 60 (2): 155-164.
- Katra, Itzhak. 2020. Soil Erosion by Wind and Dust Emission in Semi-Arid Soils Due to Agricultural Activities. *Agronomy*. 10(1): 89.
- Kazmaier, R.T., E.C. Hellgren, D.C. Ruthven III, D.R. Synatzske. 2002. Effects of Grazing on the Demography and Growth of the Texas Tortoise. *Conservation Biology*, 15(4):1091-1101.
- Krausman, P.R., A.J. Kuenzi, R.C. Etchberger, K.R. Rautenstrauch, L.L. Ordway, and J.J. Hervert. 1997. Diets of desert mule deer. *Journal of Range Management*, 50: 513-522.
- Loft, E.R, J.W. Menke, J.G. Kie. 1991. Habitat Shifts by Mule Deer: The Influence of Cattle Grazing. *The Journal of Wildlife Management*, 55(1):16-26.
- Lyons, Mark. 2023. National Tuberculosis (TB) and Cervid DPP Testing Update. Cattle and Bison Subcommittee on Tuberculosis. [https:// www.usaha.org/cattle-and-bison](https://www.usaha.org/cattle-and-bison).
- Martin, S.C. and K.E. Severson. 1988. Vegetation Response to the Santa Rita Grazing System. *Journal of Range Management*, 41:291-295.
- Mata-González, Ricardo, Benjamín Figueroa-Sandoval, Fernando Clemente, and Mario Manzano. 2007. Vegetation Changes After Livestock Grazing Exclusion and Shrub Control in the Southern Chihuahuan Desert. *Western North American Naturalist*, 67(1): 63-70.
- Maricopa County Association of Governments (MAG). 2017. *Fast Facts, Population and Growth*. Phoenix, Arizona.
- Maricopa Flood Control District. 2024. Weather Sensor Data. Downloaded, January 30, 2024. <https://www.maricopa.gov/3769/Weather-Sensor-Data>.

- McGranahan, D.A., D. Engle, B. Wilsey, S. Fuhlendorf, J. Miller, D. Debinski. 2012. Grazing and an invasive grass confound spatial pattern of exotic and native grassland plant species richness. *Basic and Applied Ecology*, 13(8): 654-662.
- Miller, R.S., M.L. Farnsworth, J.L. Malmberg. 2013. Diseases at the livestock-wildlife interface: status, challenges, and opportunities in the United States. *Preventive Veterinary Medicine*, 110(2):119-32.
- Molinar, F., J. Navarro, J.L. Holechek, D. Galt, and M. Thomas. 2011. Long-term vegetation trends on grazed and ungrazed Chihuahuan Desert rangelands. *Rangeland Ecology & Management*, 64(1): 104-108.
- Morra, B.M., B.A. Newingham, A.C. Ganguli, B.K. Howard, and N.L. Shaw. 2024. Effects of Postwildfire Mechanical Seeding on Soil Properties in Wyoming Big Sagebrush Communities. *Rangeland Ecology & Management*, 96: 163-172.
- Natural Resources Conservation Service (NRCS). 1997. *Soil Survey AZ653*. U.S. Department of Agriculture. Washington, D.C.
- Nauman, T.W., S.M. Munson, S. Dhital, N.P. Webb, and M.C. Duniway. 2023. Synergistic soil, land use, and climate influences on wind erosion on the Colorado Plateau: Implications for management. *Science of the Total Environment*, 893: 164605.
- Navarro, J., D. Galt, J. Holechek, J. McCormick, F. Molinar. 2002. Long-term impacts of livestock grazing on Chihuahuan Desert rangelands. *Journal of Rangeland Management*, 55: 400-405.
- Niering, W. A., R. H. Whittaker and C. H. Lowe. 1963. The Saguaro: A Population in Relation to Environment. *Science*, 142 (3588): 15-23
- Noon, T. H., Wesche, S. L., Cagle, D., Mead, D. G., Bicknell, E. J., Bradley, G. A., Riplog-Peterson, S., Edsall, D., & Reggiardo, C. (2002). Hemorrhagic disease in bighorn sheep in Arizona. *Journal of Wildlife Diseases*, 38(1), 172–176. <https://doi.org/10.7589/0090-3558-38.1.172>
- Oftedal, O.T. 2002. Nutritional Ecology of the Desert Tortoise in Mojave and Sonoran Deserts. Pages 194-241 in T. R. Van Devender. ed. *The Sonoran Desert Tortoise: Natural History, Biology, and Conservation*. University of Arizona Press and the Arizona-Sonora Desert Museum, Tucson, Arizona.
- Orr, D.A. J.D. Bates, and K.W. Davies. 2023. Grazing Intensity Effects on Fire Ignition Risk and Spread in Sagebrush Steppe. *Rangeland Ecology and Management*. 89: 51-60.
- Ortega, I.M., S. Soltero-Gardea, F.C. Bryant, D.L. Drawe. 1997. Evaluating grazing strategies for cattle: Deer and cattle food partitioning. *Journal of Range Management*, 50(6): 622-630.
- Orum, T.V., N. Ferguson, J.D. Mihail J.D. 2016. Saguaro (*Carnegiea gigantea*) mortality and population regeneration in the cactus forest of Saguaro National Park: Seventy-Five Years and Counting. *PLoS ONE*, 11(8): e0160899. doi:10.1371/journal.pone.0160899.
- Parker, Kathleen C. 1993. Climatic Effects on Regeneration Trends for Two Columnar Cacti in the Northern Sonoran Desert. *Annals of the Association of American Geographers*, 83 (3): 452-474.
- Perryman, B.L., B.W. Schultz, M. Burrows, T. Shenkoru, J. Wilker. 2020. Fall-Grazing and Grazing-Exclusion Effects on Cheatgrass (*Bromus tectorum*) Seed Bank Assays in Nevada, United States. *Rangeland Ecology & Management*, 73(3): 343-347.
- Pelliza, Y.I., A. Fernandex, H. Saiz, M. Tadey. 2021. Together we stand, divided we fall: Effects of livestock grazing on vegetation patches in a desert community. *Journal of Vegetation Science*, 32: (e13015) <https://doi.org/10.1111/jvs.13015>.

- Pierson, E.A., R.M. Turner, J.L. Betancourt. 2013. Regional demographic trends from long-term studies of saguaro (*Carnegiea gigantea*) across the northern Sonoran Desert. *Journal of Arid Environments*, 88: 57-69.
- Piñeiro, G., J.M. Paruelo, M. Oesterheld, and E.G. Jobbágy. 2010. Pathways of Grazing Effects on Soil Organic Carbon and Nitrogen. *Rangeland Ecology & Management*, 63(1): 109-119.
- Porensky, L.M., R. McGee, and D.W. Pellatz. 2020. Long-term grazing removal increased invasion and reduced native plant abundance and diversity in a sagebrush grassland. *Global Ecology and Conservation*, 24: e01267.
- Portacci, Katie, J. Lombard, C. Fossler, E. Bush, K. Johnson, D. Mitchell, J. Weaver, R. Pritchard, S. Sweeney, R. Miller, and R. Harris. 2010. Assessment of Pathways for the Introduction and Spread of *Mycobacterium bovis* in the United States. United States Department of Agriculture, Animal Plant Health Inspections Service.
- Pozo, R.A., J.J. Cusack, P. Acebes, J.E. Malo, J. Traba, E.C. Iranzo, Z. Morris-Trainor, J. Minderman, N. Bunnefeld, S. Radic-Schilling, C.A. Moraga, R. Arriagada, P. Corti. 2021. Reconciling livestock production and wild herbivore conservation: challenges and opportunities. *Trends in Ecology & Evolution*, 36(8): 750-761.
- Ratcliff, F., S. Barry, D. Rao, R. Peterson, T. Becchetti, E. Kebreab, K. Motamed, M. Jung, and F. Mitloehner. 2023. Cattle Grazing Moderates Greenhouse Gas and Particulate Matter Emissions from California Grassland Wildfires. *Sustainability*. 15: 13539.
- Raynor, Edward J., Ashley Schilling-Hazlett, Sara E. Place, and others. 2024. Snapshot of Enteric Methane Emissions from Stocker Cattle Grazing Extensive Semiarid Rangelands. *Rangeland Ecology & Management*, 93: 77-80.
- Richmond, A. S., A. R. G. Wylie, A. S. Laidlaw, and F. O. Lively. 2015. Methane emissions from beef cattle grazing on semi-natural upland and improved lowland grasslands. *Animal*, 9(1): 130-137.
- Reisner, M. D., J. B. Grace, D. A. Pyke, and P. S. Doescher. 2013. Conditions Favouring *Bromus tectorum* Dominance of Endangered Sagebrush Steppe Ecosystems. *Journal of Applied Ecology* 50: 1039–1049.
- Rhodes, A.C., R.M. Plowes, and L.E. Gilbert. 2023. Mitigating buffelgrass invasion through simulated targeted grazing: Understanding restoration potential in a variable precipitation regime. *Restoration Ecology*. 31: e13923.
- Rhodes, A., J. Rutledge, B. DuPont, R. Plowes, L. Gilbert. 2021. Targeted Grazing of an Invasive Grass Improves Outcomes for Native Plant Communities and Wildlife Habitat. *Rangeland Ecology & Management*. 75: 41-50.
- Rhodes, A.C., R.M. Plowes, and L.E. Gilbert. 2023. Mitigating buffelgrass invasion through simulated targeted grazing: Understanding restoration potential in a variable precipitation regime. *Restoration Ecology*. 31: e13923.
- Sassi, P., P. Taraborelli, C.E. Borghi, R.A. Ojeda. 2009. Cattle grazing effects on annual plants assemblages in the Central Monte Desert, Argentina. *Journal of Arid Environments*. 73: 537-541.
- Schachtschneider, C.L., E.K. Strand, K.L. Launchbaugh, and S. Jensen. 2024. Targeted Cattle Grazing to Alter Fuels and Reduce Fire Behavior Metrics in Shrub-Grasslands. *Rangeland Ecology & Management*. 96:105-116.
- Schatz, T., D. Ffoulkes, P. Shotton, and M. Hearnden. 2020. Effect of high-intensity rotational grazing on the growth of cattle grazing buffel pasture in the Northern Territory and on soil carbon sequestration. *Animal Production Science*. 60: 1814-1821.

- Shaw, N., B. Newingham, A.C. Ganguli, A.L. Hild, R.D. Cox, J. Truax, M. Pellant, D. Pyke, D. Ogle, and L. St. John. 2011. Equipment and strategies to enhance the post-wildfire establishment and persistence of Great Basin native plants. JFSP Research Project Reports. Paper 65.
- Siembieda, Jennifer. 2023. USDA-VS National Brucellosis Program Overview and Updates. Cattle and Bison Subcommittee on Brucellosis. 2023. [https:// www.usaha.org/cattle-and-bison](https://www.usaha.org/cattle-and-bison).
- U.S. Bureau of Labor Statistics (USBLS). Consumer Price Index Retroactive Series (R-CPI-U-RS), U.S. City Average, All Items, <https://www.bls.gov/cpi/research-series/r-cpi-u-rs-home.htm>.
- U.S. Bureau of Labor Statistics (USBLS). Consumer Price Index Retroactive Series (R-CPI-U-RS), U.S. City Average, All Items, <https://www.bls.gov/cpi/research-series/r-cpi-u-rs-home.htm>.
- Snetsinger, S.D and P.H. Morrison. 2004. Native Grass Abundance in the Sonoran Desert National Monument and Adjacent Areas, Pacific Biodiversity Institute, Winthrop, Washington. 63 p.
- Steven, Blaire, Cheryl R. Kuske, La Verne Gallegos-Graves, Sasha C. Reed, and Jayne Belnap. 2015 Climate Change and Physical Disturbance Manipulations Result in Distinct Biological Soil Crust Communities. *Applied and Environmental Microbiology*, 81(21): 7448 –7459.
- Sullivan, B.K., A.K. Owens, K.O. Sullivan, and E.A Sullivan. 2016. Spatial ecology of Sonoran desert tortoises (*Gopherus morafkai*): I. Fidelity in home range, refuge use and foraging behavior. *Journal of Herpetology*, 50(4) : 509-519.
- Tuma, M.W., C. Millington, N. Schumaker, and P. Burnett. 2016. Modeling Agassizi’s desert tortoise population response to anthropogenic stressors. *Journal of Wildlife Management*, 80:414–429.
- University of Arizona (UofA). 2014. The Contribution of the Beef Industry to the Arizona Economy. Tucson, Arizona.
- U.S. Animal Health Association (USAHA). 2005. Proceedings One Hundred and Ninth Annual Meeting of the United States Animal Health Association. Hershey, Pennsylvania.
- U.S. Animal Health Association (USAHA). 2023. Proceedings One Hundred and Twenty Seventh Annual Meeting of the United States Animal Health Association. National Harbor, Maryland.
- U.S. Census Bureau (USCB). 2022. Glossary, <https://www.census.gov/programs-surveys/geography/about/glossary.html>.
- U.S. Census Bureau (USCB). 2023a. 2018-2022 American Community Survey 5-Year Estimates and 2012-2016 American Community Survey 5-Year Estimates, <https://data.census.gov/cedsci/table>.
- U.S. Census Bureau (USCB). 2023b. Cartographic Boundary Files, Year of 2022, Scale of 1: 500,000 <https://www.census.gov/geographies/mapping-files/time-series/geo/cartographic-boundary.html>.
- U.S. Census Bureau (USCB). 2023c. Press Kit: 2018-2022 American Community Survey 5-Year Estimates, <https://www.census.gov/newsroom/press-kits/2023/acs-5-year.html>.
- U.S. Code. 1934. Title 43 Chapter 8A. <https://uscode.house.gov/view.xhtml?path=/prelim@title43/chapter8A&edition=prelim>
- USDI BLM. 1990. Strategy for Desert Tortoise Habitat Management on Public Lands in Arizona: A Range wide Plan.
- USDI BLM. 2017. Bureau of Land management, Arizona-Bureau Sensitive Species List (February 2017). List, [AZ-IM-2017-009-a1.pdf \(blm.gov\)](https://www.blm.gov/az-im-2017-009-a1.pdf)
- United States Environmental Protection Agency (US EPA). 2018. Inventory of U.S. greenhouse gas emissions and sinks: 1990- 2016. Annex 3, Section 3.10. Methodology for Estimating CH4

- Emissions from Enteric Fermentation. [https://www.epa.gov/sites/production/files/2018-01/documents/2018\\_annex\\_3\\_-\\_part\\_b.pdf](https://www.epa.gov/sites/production/files/2018-01/documents/2018_annex_3_-_part_b.pdf)
- U.S. Fish and Wildlife Service (USFWS). 2013. Endangered and Threatened Wildlife and Plants; Endangered Species Status for *Echinomastus erectocentrus* var. *acunensis* (Acuña Cactus) and *Pediocactus peeblesianus* var. *fickeiseniae* (Fickeisen Plains Cactus) Throughout Their Ranges. *Federal Register*, 78:60607–60652.
- U.S. Fish and Wildlife Service (USFWS) and Arizona Interagency Desert Tortoise Team (AIDTT). 2015. *Candidate Conservation Agreement for the Sonoran Desert Tortoise (Gopherus morafkai) in Arizona*. U.S. Fish and Wildlife Service, Southwest Region, 138 pages. May.
- USFWS. 2016. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Acuña Cactus and the Fickeisen Plains Cactus; Final Rule. August.
- Van Pelt, R.S., M.C. Baddock, T.M. Zobeck, P. D’Odorico, S. Ravi, and A. Bhattachan. 2017. Total vertical sediment flux and PM<sub>10</sub> emissions from disturbed Chihuahuan Desert surfaces. *Geoderma*. 293: 19-25.
- Waser, Nickolas and Mary Price. 1981. Effects of Grazing on Diversity of Annual Plants in the Sonoran Desert. *Oecologia*, 50(3): 407-411.
- Williamson, M.A., Fleishman, E., Mac Nally, R.C. *et al.* 2020. Fire, livestock grazing, topography, and precipitation affect occurrence and prevalence of cheatgrass (*Bromus tectorum*) in the central Great Basin, USA. *Biol Invasions*, 22: 663–680.
- Wright, Aaron. 2022. A Survey of the Komack Trail through the Maricopa Mountains, Southwest Arizona. Archaeology Southwest, Technical Report No. 2-22-101.