DRAFT ENVIRONMENTAL ASSESSMENT
Ecological Restoration Plan on Department of Interior Lands in Western Pima County, Arizona

SUMMARY

Organ Pipe Cactus National Monument (OPCNM) proposes to implement an Ecological Restoration Plan (ERP) that will restore disturbed lands on OPCNM, Cabeza Prieta National Wildlife Refuge (CPNWR) and Bureau of Land Management (BLM)-Ajo Block. An ERP would support the missions of the National Park Service (NPS), US Fish and Wildlife Service (USFWS), and BLM, and would help manage public lands for sustainable use.

This environmental assessment (EA) evaluates two alternatives: a no action alternative and a proposed action alternative. The no action alternative describes the current conditions and consequences if limited ecological restoration is implemented. The proposed action alternative addresses the ecological restoration of disturbed lands on OPCNM, CPNWR, and BLM lands, using a full scope of restoration strategies and treatment methods.

This EA has been prepared in compliance with the National Environmental Policy Act (NEPA) of 1969 to provide the decision making framework that 1) analyzes a reasonable range of alternatives to meet objectives of the proposal, 2) evaluates potential issues and impacts on resources and values, and 3) identifies best management practices to lessen the degree or extent of these impacts. The impacts on cultural resources and landscapes, soils, special status species, surface hydrology, vegetation, wilderness and wildlife are analyzed. All other resource topics were dismissed because the project would result in negligible or minor effects to those resources.

PUBLIC COMMENT

If you wish to comment on the environmental assessment, you may post comments online at http://parkplanning.nps.gov/orpi or mail comments to: Superintendent; Organ Pipe Cactus National Monument, 10 Organ Pipe Drive, Ajo, Arizona 85321.

This EA will be on public review for 30 days. Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment – including your personal identifying information – may be made publicly available at any time. Although you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

Table of Contents

Table of Contents

TABLES

FIGURES

APPENDIX

CHAPTER 1 PURPOSE AND NEED

1.1 INTRODUCTION

Ecological restoration involves repairing disturbances to natural areas by using passive, facilitated and active restoration strategies to assist the disturbed areas to recover to pre-disturbed conditions or at least to recover to an alternate stable state. Sometimes ecological restoration means removing invasive species, while other times it means changes to an erosion control structure, or erasing a undesignated vehicle route (UVR). For the purposes of this document, ecological restoration would occur on UVRs and other disturbed lands, with the purpose of restoring healthy soils, natural or more stable hydrologic functions, and a natural native plant and animal community.

NPS is the lead agency for the development of a programmatic Environmental Restoration Plan (ERP) and Environmental Assessment (EA). NPS is cooperating with the U.S. Customs and Border Protection (CBP)*, USFWS and BLM. Prior to implementation of the ERP, the agencies are required to consider potential environmental impacts on the quality of the human environment that would result. This EA has been prepared in accordance with the National Environmental Policy Act (NEPA), regulations of the Council on Environmental Quality (CEQ) (40 CFR 1508.9), Section 106 of the National Historic Preservation Act, and the NPS Director's Order (DO) 12 (*Conservation Planning, Environmental Impact Analysis, and Decision Making).* A project Programmatic Agreement (PA) between the federal agencies, tribes, and the Arizona State Historic Preservation Office (SHPO) is being developed to address the potential effects to cultural resources within the project area. Based on the results of the EA process, NPS will determine whether to prepare an Environmental Impact Statement or a Finding of No Significant Impact.

For purposes of this document, the project area will be defined as the entirety of OPCNM, all CPNWR land that lies east of the Pima County line, and a portion of the Ajo Block of BLM that is considered to be Sonoran pronghorn habitat (Figures 1 and 2). The ERP excludes restoration activities on private inholdings or on Arizona State Lands within the boundaries of OPCNM, CPNWR, and the BLM Ajo Block. The ERP will address lands disturbed by a variety of activities, including those affected by vehicle traffic, construction and development, and invasive plant species.

* Please note that for the purposes of this document "CBP" also refers to other subsidiary agencies of the Department of Homeland Security (DHS) that conduct relevant work within the project area.

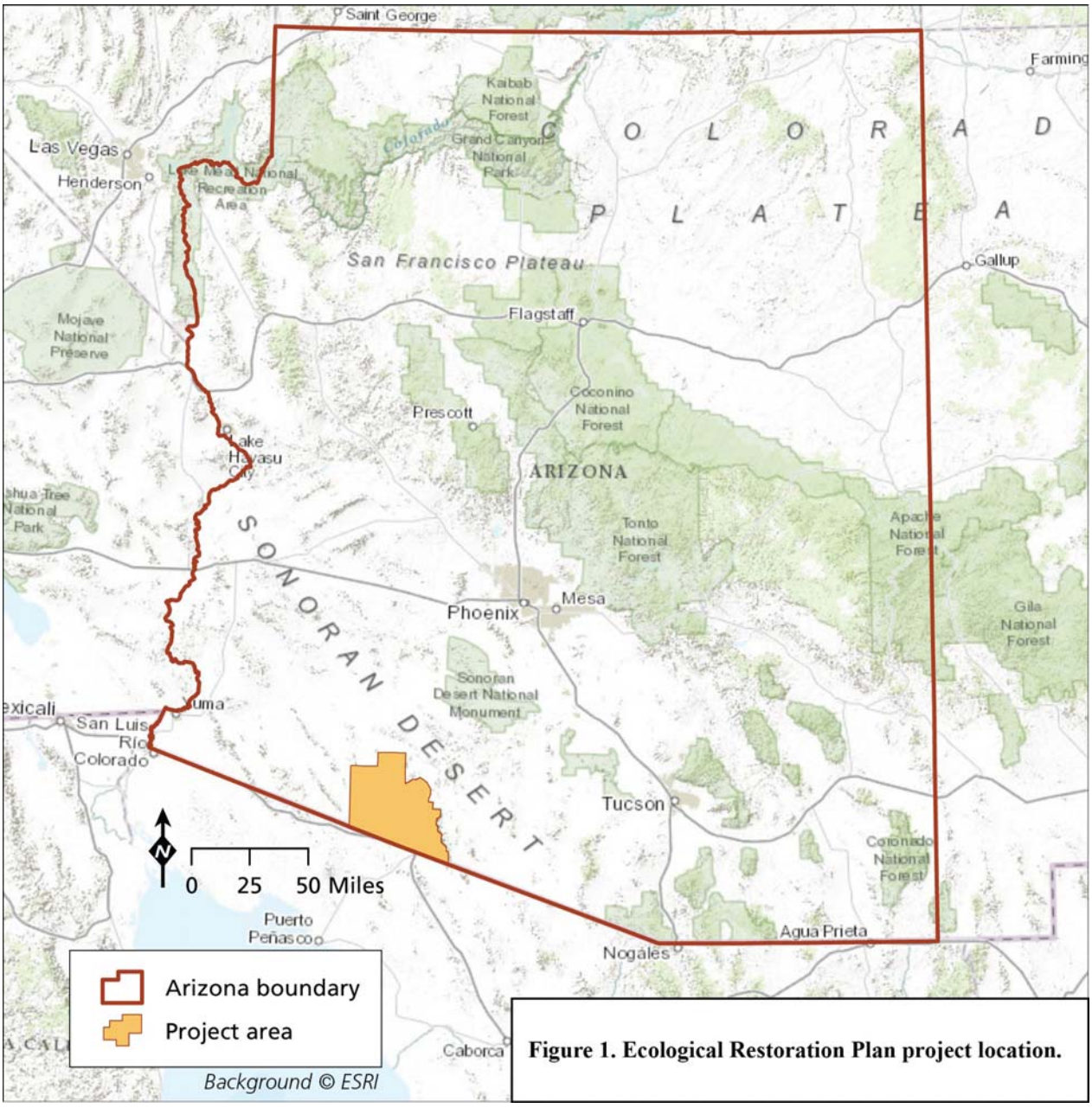

Figure 1. Ecological Restoration Plan project location.

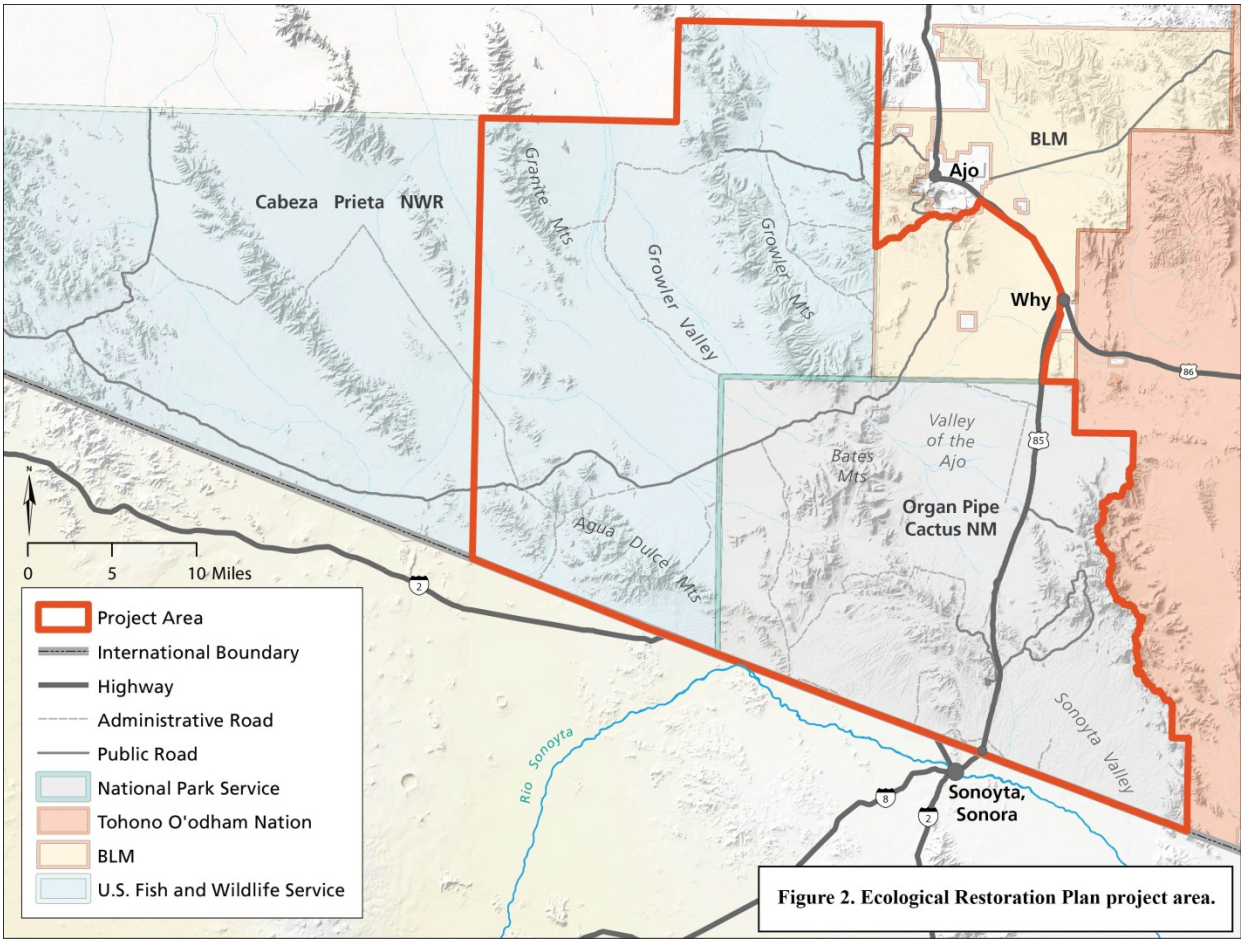

Figure 2. Ecological Restoration Plan project area.

1.2 BACKGROUND

The NPS, USFWS, and BLM share a common goal of conserving resources for future generations. The project area includes a significant portion of the Sonoran desert region of the United States. Prior to the late 1990s, most modern human disturbances occurring within the project area were related to historic mining and livestock grazing. Since the late 1990s, the central Arizona-Mexico borderlands have changed considerably, primarily due to increased border-related activities (NPS 2013). For the purposes of this document the phrase "border-related activities" includes both illegal cross-border activities and the corresponding law enforcement response. As a result of these increased border-related activities, environmental impacts have increased. Some of the disturbances are temporary in nature, while others such as invasive species and UVRs can have long term consequences. (NPS 2013, NPS 2014, and USFWS 2011a).

1.2.1 Undesignated Vehicle Routes

UVRs and other resource impacts result from border-related activities. NPS, USFWS, BLM and CBP are consequently collaborating to conduct UVR closures and other restoration work where opportunities exist. Within this document's defined project area (see figure 2) administrative roads are those designated roads that DOI agencies maintain for visitor access or conducting regular business and daily work. Each DOI agency maintains information regarding their respective administrative road systems. For the purposes of this document therefore, UVRs are

those vehicle routes occurring in the project area that do not form part of each respective DOI agency's administrative road system. UVRs traverse important Sonoran pronghorn and lesser long nosed bat habitats, fragmenting them while at the same time altering soil properties and interfering with fundamental geo-morphological and ecological processes of the Sonoran desert (NPS 2013, Webb et al,) Consequently, UVRs and other disturbed areas are targeted as a priority for restoration by all cooperating agencies.

As of 2012, about 818 miles of repeatedly used UVRs and more than 8,500 miles of single use vehicle tracks have been documented within OPCNM, CPNWR, and BLM Ajo Block (OPCNM 2005, USFWS 2011a, NPS 2014). The presence of such routes often jeopardizes efforts to manage and conserve trust resources to which areas are dedicated. Closure to vehicle traffic alone is not sufficient in all areas to ensure habitat recovery. Natural recovery times for UVR areas depend on site conditions, many could take several decades and possibly a century or more; soil and full ecosystem recovery times are on the order of centuries to several thousand years, and some very old soil types are not considered recoverable in human timeframes once they are disturbed (Webb and Wilshire 1983). Once an area has been altered by an UVR through soil compaction, plant mortality, and redirection of water flow, positive feedbacks between lost plant cover and further erosion enforce continued degradation that may become difficult to reverse without active intervention (Hobbs and Suding 2009).

Restoration actions are needed to counteract the adverse impacts of UVRs that are widespread in the project area. Many UVRs are located on vulnerable soils, which quickly become compacted and incised frequently resulting in accelerated soil erosion and sedimentation. Compacted soils absorb less moiture and increase runoff, which increases erosion potential. Incised sections capture water runoff, and ultimately interfere with the normal transfer of water runoff to areas further downslope, thus interrupting important desert water distribution processes. Drivers faced with degraded road conditions sometimes create bypasses on previously undisturbed land, which further widen impacted areas.

Vehicle activity can cause accelerated erosion and deposition in other ways. First, vehicle traffic removes or buries stabilizing gravel or rock surfaces and raises fine soil particles, which are then transported away from the area. As traffic volume increases, the amount of erosion increases. Second, wheel tracks on wash banks are 'nick points' where accelerated erosion by water can start.

Third, surface disturbance can destroy physical and biological soil crusts, which serve to protect soil surfaces from wind and water erosion and which produce important soil nutrients needed for plant growth. A single vehicle track destroys or damages the soil crust. Biological soil crusts and plants can also be killed or disturbed when a

thick layer of airborne dust generated by vehicle traffic is deposited on the native soil surface. Disturbed or destroyed soil crusts leave the soil surface prone to accelerated wind and water erosion.

Vehicle tracks and soil disturbance, as mentioned previously, frequently result in changes to surface hydrology. Excessive runoff in remote regions of the project area is often triggered by reduction or loss of plant cover or by soil compaction or both. Current disruptions to surface hydrology caused by UVRs are on a local to regional scale. Some watersheds or drainages are extensively damaged by off-road vehicle travel, while others experience minimal damage. UVRs that have become entrenched can capture sheet and stream flow disrupting existing drainage patterns and dewatering 'downstream' areas.

Loss of plant cover can also trigger accelerated erosion and deposition. Accelerated erosion and arroyo cutting on OPCNM triggered by overgrazing during the 20th century provide evidence of the vulnerability of Holocene soils (Rutman 1996). Substantial compaction occurs on Gilman soil types after 10 passes by a single vehicle (Webb et al. 2012). Net loss of soil through both compaction and erosion was also substantial at disturbed sites throughout OPCNM soil types.

The amount of native plant damage or mortality on disturbed areas varies greatly. Devegetation of construction sites is typical, but plant cover on UVRs depends on pre-disturbance cover and the amount of traffic. Off-road vehicle traffic causes crushing damage to plants. Some plants can recover from crushing, but others (such as most cacti) are killed immediately. Repeated crushing damage kills plants. The more severely impacted UVRs—those that have experienced a high traffic volume on vulnerable soils—have been devegetated and soil crusts have been lost. Natural revegetation does not occur quickly where soils are compacted, runoff is excessive and collected by tire ruts, and light reflection off bare soil is great. When these conditions are mitigated, natural and assisted revegetation happens more quickly.

In recent years, border-related activities have increased in both the CPNWR and OPCNM wildernesses. This has resulted in a proliferation of foot trails, single vehicle tracks, and established UVRs (USFWS 2011a, NPS 2014). Construction of surveillance towers and forward operating bases adjacent to wilderness areas has also increased the footprint of human presence in these areas. This presence of man-made features, and in particular the widespread presence of UVRs, is degrading wilderness character within the project area.

Similarly, UVRs throughout the project area adversely affects wildlife in diverse ways. The aforementioned impacts to soils and vegetation correspondingly fragment and degrade wildlife habitat. UVR use both spatially and temporally reduces available wildlife habitat for activities such as foraging, nesting, birthing, or rearing of young, etc. The proliferation of UVRs has increased the risk of collision with wildlife and can also induce behavioral changes in many different animal species. For example, single and multiple use UVRs cause actively used burrows and tunnels to collapse. Burrows and tunnels provide important habitat for all types of desert animals.

Of all the special status species in the project area, Sonoran pronghorn, a critically endangered species, are the most sensitive to human presence, typically avoiding heavily used areas. Because Sonoran pronghorn prefer valley bottom and bajada environments, their habitat has been particularly heavily impacted by recent increases in border-related activities including the proliferation of UVRs, because this terrain is more susceptible to cross-country motor vehicle travel than steeper, complex dissected terrain. (Wright, deVos 1986; Hervert, et.al. 2000).

UVRs have also affected cultural resources (NPS 2013). Direct and immediate damage to cultural resources can be caused by a single vehicle. These impacts can include loss of site integrity and significance, destruction of artifacts, burial of surface material, and loss of ethnographic resources. Indirect and sometimes delayed impacts can also occur due to accelerated erosion and sedimentation. The extent of these impacts is largely unknown because cultural resources surveys have been completed on less than five percent of the project area and only a small portion of known sites have been documented and assessed. The area around the southern border contain good examples where prehistoric to historic cultural resources have been degraded and lost due to border-related activities (Collis 2011, Bradford 2012, Gibson 2012, 2013).

1.2.2 Biological Opinions

The USFWS Ecological Services Division has issued two Biological Opinions in response to separate CBP sponsored border infrastructure proposals within the project area: 1) a 5.2 mile pedestrian fence along the international border with Mexico (Lukeville pedestrian fence) (USFWS 2008), and 2) the Southern Border Initiative Network (SBI*net* Ajo-1) tower project (USFWS 2009). These projects were completed in 2008 and 2010, respectively. CBP assessed the effects of these projects and determined that each project adversely affected federally endangered species. The Biological Opinion issued for each project required CBP undertake specific actions that would offset the adverse effects on the endangered Sonoran pronghorn and lesser long-nosed bat. The Biological Opinion for the pedestrian fence requires the restoration of 84 acres in Sonoran pronghorn and lesser long-nosed bat habitat as well as the management of invasive plants in OPCNM. The Biological Opinion for SBI*net* Ajo-1 requires that UVRs be mapped and assessed, and also that UVRs be closed and restored in Sonoran pronghorn habitat. DOI is working with CBP to prioritize areas to close and restore based on importance of the areas to Sonoran pronghorn and lesser long-nosed bats. The restoration activities assessed in this EA will not be limited to the requirements of these Biological Opinions.

1.2.3 Invasive Plants

Invasive plants pose a difficult challenge for land managers. Sometimes widespread and abundant, sometimes in remote areas, or sometimes in special habitats, these invaders can have a significant impact on natural resources. Some species have the potential for damaging the ecological integrity of the protected area through modifying soil properties, surface hydrology and nutrient cycling; competing with native plants; and changing natural disturbance regimes such as fire intensity, frequency and return intervals (for reviews, see Walker and Smith 1997, DiTomaso 2000).

Approximately 81 species of invasive plants have been documented in the CPNWR and OPCNM. Many of these were also known to occur on adjacent BLM land. Felger (1990) completed the first report on non-native plants for OPCNM. Halvorson and Guertin (2003) provide a thorough review of many of these invasive plants and their management techniques. A

recent checklist of the plants of OPCNM, CPNWR, and Tinajas Altas provides an updated list of plants, including non-natives (Felger and others 2012). Individual species accounts provide information regarding the history of these non-native plants in the state and in OPCNM, their original habitat, and current status and management actions (Rutman 2012). The majority (83 percent) of invasive plants in the project area originate from Europe, Africa, and central to western Asia, with less than 17 percent originating in the Americas. Invasions of plants from the drylands of Australia are currently lacking but are expected to become a management issue in the future. In the project area, invasive plants are primarily spread by vehicles, people, and wind. Highway 85 is a common site for introduction of invasive plants. Vehicles and people traveling across country are common carriers of seed. The seeds of some species, such as buffelgrass and fountain grass, are spread by wind from unmanaged infested areas such as Ajo, Arizona, and Sonora, Mexico. A few species that have a high priority for treatment in the project area are as follows:

Buffelgrass (*Cenchrus ciliaris*) is a perennial African grass that has become widespread in the project area since the 1980s. When compared with other resource threats, buffelgrass, if left untreated poses the most serious environmental threat to the project area by increasing fuel loading in non-fire adapted ecosystems. Buffelgrass outcompetes many of the native grasses. Localized populations and scattered individuals occur throughout OPCNM and CPNWR, with population increases every year.

Sahara mustard (*Brassica tournefortii*) has transformed the ecology of sand dunes and sandy flats in the project area, but has had less of an environmental impact on other substrates. The species is widespread in the project area. The large, leafy rosettes of Sahara mustard in high density stands can obscure foraging habitat for birds, mammals and herpetofauna and can prevent the germination and establishment of competing winter annuals. The tall (up to 6 feet) flowering stalks, when dry, can provide the fine fuels necessary to carry a fire into habitat that is not adapted to it. No large scale management efforts have been tried in the project area.

Fountain grass (*Cenchrus setaceus*) is another perennial African grass that is rapidly expanding its range and populations within the Sonoran Desert. CPNWR successfully eradicated a large and expanding population on Childs Mountain (C. McCasland, pers. comm. 2004). Fountain grass is likely to escape from the Ajo urban area, where it is common, into CPNWR. OPCNM has recorded a handful of isolated sites in the Ajo Mountains. Several plants have been removed from the Bull Pasture Trail, suggesting that hikers transported seeds.

Malta star thistle (*Centaurea melitensis*) is currently known from only two localized populations at Quitobaquito, OPCNM, and Jose Juan Charco, CPNWR. The species could become invasive in the eastern portion of the project area. Successful control depends on early observation and treatment.

1.3 PURPOSE AND NEED

The purpose and need for this programmatic ERP is to disclose and evaluate strategies and treatments that will be used to restore disturbed lands to pre-disturbance conditions or an alternate stable state. Ongoing border-related activities and invasive species colonization and expansion require a response from land managers in order to offset these disturbances. A programmatic assessment of the impacts of ecological restoration has never been prepared for the project area. Environmental compliance has been prepared for each individual action, and this did not consider the cumulative impacts or the restoration program as a whole. The ERP

would improve efficiency and ensure compliance for small and large projects as long as projects and best management practices comply with the final recommendations of the EA. This would address requirements in the Biological Opinions. The ERP is structured to be flexible and allows a learning process that will improve management techniques. The objectives of this ERP are as follows:

- Restore degraded natural areas to conditions that approximate their pre-disturbance states or alternate stable states
- Preserve and protect natural conditions, ecological processes, and wilderness character
- Preserve and protect archeological and historical sites and cultural landscapes
- Implement environmentally sound, cost effective restoration strategies and treatments

1.4 RELATIONSHIP TO OTHER PLANS AND POLICIES

Laws Common to All Agencies

A Presidential Proclamation (27 May 1907), also known as the Roosevelt Reservation, set aside all public lands within 60 feet of the international boundary between the U.S. and Mexico, to be used to "protect against the smuggling of goods" from Mexico into the U.S. In 1930, President Hoover issued Executive Order 5462 (14 October 1930), which withdrew public lands in the Lukeville area for the purpose of U.S. Customs and Immigration Inspection. The Lukeville Port of Entry now occupies the land. The ERP must not interfere with the purposes of the Roosevelt Reservation or Executive Order 5462.

Section 102 of the Illegal Immigration Reform and Immigrant Responsibility Act of 1996, as amended, 8 U.S.C. § 1103 gave authority to the Secretary of Homeland Security to waive any law that interferes with infrastructure construction in the vicinity of the U.S. border.

The purpose of the *National Historic Preservation Act* (NHPA) of 1966 (Public Law 89-665, October 15, 1966; 16 U.S.C. 470 et seq.) is to preserve the irreplaceable historical and cultural foundations of the United States to give a sense of orientation to the American people. Section 106 of the NHPA requires that federal agencies consider the effects of their undertakings on properties listed on or potentially eligible for listing on the National Register of Historic Places.

The alternatives described in this document are subject to section 106 of the NHPA. The NHPA, NEPA, the NPS Organic Act, and NPS guidelines call for the consideration and protection of cultural resources listed on or eligible for listing on the National Register of Historic Places, including archaeological resources, prehistoric and historic structures, cultural landscapes, ethnographic resources, and museum collections. The assessment of environmental impacts of the alternatives on significant historic properties is required by NEPA and NHPA, as is attention to the provisions of the Native American Graves Protection and Repatriation Act (NAGPRA) for sites where human remains or burials may be present.

The purpose of the *Archaeological Resources Protection Act* (ARPA) of 1979 (PL 96-95; 16 U.S.C. 470aa-mm) is to secure the protection of archaeological resources and sites on public lands. It protects archeological resources from unlawful excavation, removal, damage, alteration or defacing or attempt to do the same.

In March 2006, a *Memorandum of Understanding* (MOU) was signed between CBP, DOI, and the Department of Agriculture in order to provide goals and guidance authorizing border security

actions such as law enforcement, tactical infrastructure installation, utilization of roads, minimization and/or prevention of significant impact on natural and cultural resources, and to coordinate and share information. Prohibited uses identified in the Wilderness Act are authorized so long as the activities meet the conditions set forth in the MOU. If wilderness activities are significantly impacting resources, as determined by the land management agency, CBP and the land management agency would meet to resolve the issues.

The Wilderness Act of 1964

The *Wilderness Act of 1964* (Public Law 88-577, 16 U.S.C. 1131-1136) established a national wilderness preservation system, "administered for the use and enjoyment of the American people in such manner as will leave them unimpaired for future use and enjoyment as wilderness, and so as to provide for the protection of these areas, the preservation of their wilderness character, and for the gathering and dissemination of information regarding their use and enjoyment as wilderness". The Wilderness Act further defined wilderness as "an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, and which is protected and managed to preserve its natural conditions." The Wilderness Act gives the land manager responsibility for preserving the wilderness character of the area and devoting the area to the public purpose of recreational, scenic, scientific, educational, conservation, and historical use.

To maintain the wilderness characteristics of designated wilderness areas, the Wilderness Act prohibits the following activities or structures, unless special provisions apply: commercial enterprise; permanent or temporary roads; use of mechanical transport or motorized equipment; and structures or installations. These prohibitions can be excepted as necessary to provide for the administration of the wilderness area or the health and safety of persons within the area.Two laws modify the application of the Wilderness Act on the Cabeza Prieta Wilderness Area. The *Arizona Desert Wilderness Act* of 1990 (Public Law 101-628), which designated 803,418 acres as the Cabeza Prieta Wilderness, stated that the designation would not preclude or otherwise effect some border-related activities. Similarly, under the *National Defense Authorization Act of 2000* (Public Law 106-65) low level overflights were not precluded by or subject to compatibility determinations. This law also gave the Department of Defense the authority to close roads on CPNWR. The National Parks and Recreation Act of 1978 designated 312,600 acres of wilderness within OPCNM known as Organ Pipe Cactus Wilderness and is not subject to the same preclusions in CPNWR Wilderness legislation (see Wilderness analysis on Page 52).

National Park Service

On NPS lands, the Organic Act requires the management, protection, and conservation of resources and values in a manner that will leave them unimpaired for the enjoyment of future generations (16 U.S.C. §§ 1-18f, 39 Stat. 535).

Presidential Proclamation 2232, issued 13 April 1937, established Organ Pipe Cactus National Monument. Three provisions were identified in the proclamation. First, the right of the Tohono O'odham people to harvest fruit was protected. Second, the existence and purposes of the Roosevelt Reservation were acknowledged. Third, it recognized the Executive Order of 21 November 1923, reserving a 40 acre tract as a public water reserve at Quitobaquito Springs.

The Final General Management Plan/ Development Concept Plans/ Environmental Impact Statement (GMP) for OPCNM was completed in 1997. The GMP addresses the issues and

changes affecting the monument; provides direction and guidance in decision making; and fulfills the legal requirements of the NPS to develop and execute a plan to guide management of the monument over the next 10 to 15 years. Maintaining the natural character of OPCNM includes mitigating activities that affect the native plant communities and endangered species known to occur within the park boundaries.

OPCNM's Foundation for Planning and Management (OPCNM 2008) defines the mission of the NPS at OPCNM and also provides a foundation for planning future NPS management activities. Four significance statements stress the importance of OPCNM in protecting this representative sample of the biologically diverse Sonoran Desert ecosystem: providing recreational opportunities for visitors, preserving wilderness character, protecting watersheds and landscapes, and continuing the park's role in research.

NPS Management Policies (NPS 2006) provide further interpretation and policy guidance relative to laws, proclamations, executive orders, regulations, and special directives. These policies direct the NPS to return "…disturbed areas to the natural conditions and processes characteristic of the ecological zone in which the damaged resources are situated." The policies further directs the NPS to:

- use best available technology to accelerate the recovery of the biological and physical components as well as the recovery of landscape and biological community structure and function.
- "actively seek to understand and preserve the soil resources of parks, and to prevent, to the extent possible, the unnatural erosion…of the soil."
- provide guidance regarding the management of invasive species and directs the NPS and each park unit to use an integrated pest management (IPM) approach to manage non-native plant to reduce risks to the public, park resources, and the environment, and directs the use of pesticides (including herbicides) on NPS lands.
- protect, preserve, and foster appreciation of the cultural resources in its custody and demonstrate its respect for the peoples traditionally associated with those resources through appropriate programs of research, planning, and stewardship. NPS shall prevent or minimize the destruction or loss of or injury to the cultural resource, or abate or minimize the imminent risk of such destruction, loss, or injury.
- establish general management guidelines for wilderness areas within the NPS system. The management of wilderness will preserve the physical wilderness resource as well as the wilderness character.

The NPS *Director's Order 12* and its accompanying handbook (NPS 2001) lay the groundwork for how the NPS complies with the National Environmental Policy Act (NEPA). *Director's Order 12* and the handbook set forth a planning process for incorporating scientific and technical information and for establishing an administrative record for NPS projects. *Director's Order 12* requires that impacts on park resources be analyzed in terms of their context, duration, and intensity. To help the public and decision makers understand the implications of impacts, they are described in terms of how long they would last, in conjunction with other impacts (cumulative impacts), and within context, based on an understanding and interpretation by resource professionals and specialists. *Director's Order 12* also requires that an analysis of impairment to park resources and values be made as part of the NEPA document.

NPS's Director's Order 28A affirms a long term commitment to the appropriate investigation, documentation, preservation, interpretation, and protection of archeological resources inside units of the National Park System. Archeological resources are nonrenewable and irreplaceable, so it is important that all management decisions and activities throughout the National Park System reflect a commitment to the conservation of archeological resources as elements of our national heritage.

Natural Resource Reference Manual 77, provides guidance for NPS employees responsible for managing, conserving, and protecting the natural resources found in national park system units.

US Fish and Wildlife Service

The National Wildlife Refuge System Administration Act of 1966 (Public Law 89-669, 16 U.S.C. 668dd-668ee), as amended, by the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57) is the "Organic Act" for the National Wildlife Refuge System. The Act gives the force of law to Executive Order 12996. The Act clarifies that conservation of wildlife and its habitats is the first priority of the National Wildlife Refuge System. The Act unifies the Refuge System, calling for each refuge to be managed to fulfill the mission of the Refuge System, as well as specific purposes for which that refuge was established, and directing that each refuge shall be managed in a manner that maintains the biological integrity, diversity and environmental health (ecological integrity) of the Refuge System.

The Act establishes the legitimacy and appropriateness of six wildlife dependent recreational uses of the Refuge System when they are determined to be compatible: hunting, fishing, wildlife observation, wildlife photography, environmental education and interpretation. These priority public uses shall receive enhanced consideration over other public uses in refuge planning and management. The following general hierarchy between refuge activities and public uses will apply: Priority 1- activities necessary to fulfill the refuge purposes and the Refuge System mission; Priority 2- provide opportunities for wildlife dependent recreational uses, when determined to be compatible. All other public uses will be a lower priority.

CPNWR was originally established as a "Game Range" on January 25, 1939 by Executive Order 8038. On March 21, 1975, Executive Order 8038 was amended and the Game Range was changed to CPNWR. According to the 2007 CPNWR Comprehensive Conservation Plan (CCP), the refuge is dedicated first and foremost to conservation of wildlife and habitats and the Service's role at the refuge is to protect native wildlife and plant populations within the greater Sonoran Desert ecosystem.

CPNWR's CCP sets the direction for the protection and management of CPNWR's resources, including endangered and threatened species and other wildlife, wilderness, and cultural resources. It directs the CPNWR staff to record the location of invasive plant populations and remove invasive species. It also directs staff to protect and conserve refuge wilderness employing strategies of wildlife and plant conservation that will maintain, conserve, and where possible, restore the wilderness character of CPNWR.

Bureau of Land Management

The BLM completed an EIS Lower Sonoran and Sonoran Desert National Monument; Resource Management Plan and Environmental Impact Statement in September 2012. The EIS is prepared under planning regulations (43 CFR 1610.3), Federal Land Policy and Management Act (43 USC 1712), and regulations for implementing NEPA (40 CFR 1501.5 and 1501.6). Its intent is to

provide a framework for future land management actions and guidance for management of public lands.

Presidential Proclamation 7397, issued January 17, 2001. Supersedes guidance provided by current land use plans, and it is the legal instrument that established boundaries and purposes for the Lower Sonoran and Sonoran Desert National Monument.

Vegetation Treatments on BLM Lands in 17 Western States Programmatic Environmental Report, 2007. This establishes guidance for treatment of invasive plants and use of herbicides on BLM land.

1.5 SCOPING

Scoping is an early and open process to identify the resources that may be affected by a project proposal, and to explore possible alternative ways of achieving the proposal while minimizing adverse impacts. OPCNM conducted internal scoping with NPS, FWS and BLM staff resource specialists to identify feasible alternatives and help determine potential impacts associated with the proposed action.

External scoping was initiated with the public, interested groups, and Native American tribes by distributing a scoping letter to inform them of the proposal to implement this ERP, and to generate input on the preparation of this EA. The scoping letter, dated December 1, 2011, was mailed to 77 members of the public, various federal, state, and local agencies, affiliated Native American tribes, and non-governmental organizations. During the 45 day scoping period, three responses were received from the Ak-Chin, Cocopah, and Hopi Indian Tribes.

The Hopi Tribe claims cultural affiliation to the Hohokam prehistoric cultural group in southern Arizona, and the Hopi Tribe supports the identification and avoidance of prehistoric archeological sites. The Hopi Tribe asks that we consider prehistoric archeological sites to be Traditional Cultural Properties. The Hopi Tribe expressed appreciation of solicitation of their input and reiterated that they are interested in consulting on any proposal with the potential to adversely affect prehistoric cultural resources in Arizona. The Hopi Tribe requested that OPCNM address the identification and protection of cultural resources so they are not inadvertently affected during restoration activities. The Hopi Tribe requested and will receive a copy of this EA document for review and comment, as will all the affiliated tribes.

The Cocopah Indian Tribe expressed appreciation for OPCNM's consultation efforts and indicated they would like to be kept informed on the progress of the project; they did not wish to make any comments at this time and deferred to more local tribes.

The Ak-Chin Indian Community, basing their comments on the proximity of the restoration project to the Tohono O'odham Nation, deferred comments to the Tohono O'odham Tribal Historic Preservation Office in Sells, Arizona.

1.6 IMPACT TOPICS RETAINED FOR FURTHER ANALYSIS

NPS *Director's Order 12* lists mandatory topics that must be considered in a NEPA analysis. Impact topics are the resources of concern that could be affected by the range of alternatives. The impact topics listed below have been retained for further analysis and are described in more detail in Chapter 3, the Affected Environment and Environmental Consequences section. The impact topics retained for further analysis were identified by specialists in the NPS based on

federal laws, regulations, and orders (NPS 2006). Impact topics that are carried forward for further analysis in this EA include:

- Soils
- Surface Hydrology
- Vegetation
- Wilderness
- Special Status Species
- Wildlife
- Archeological Resources
- Cultural Landscapes
- Historic Structures

1.7 IMPACT TOPICS DISMISSED FROM FURTHER ANALYSIS

Some impact topics have been dismissed from further consideration. During internal scoping, the OPCNM's interdisciplinary team conducted a preliminary analysis of resources to determine the context, duration, and intensity of effects that the proposal may have on those resources. If the magnitude of effects was determined to be at the negligible or minor level, there is no potential for significant impact and further impact analysis is unnecessary, therefore the resource is dismissed as an impact topic. If however, during internal scoping and further investigation, resource effects still remain unknown, or are more at the minor to moderate level of intensity, then the analysis of that resource as an impact topic is carried forward.

For the purposes of this section, an impact of negligible intensity is one that is "at the lowest levels of detection, barely perceptible, and not measurable." An impact of minor intensity is one that is "measurable or perceptible, but is slight, localized, and would result in a limited alteration or a limited area." The rationale for dismissing these specific topics is stated for each resource.

1.7.1 Bedrock Geology

The project area includes many mountain ranges that expose 1.8 billion years of the Earth's history. A diverse suite of rock lithologies, geologic resources, and unique morphologic features result in a complex geologic history (Skinner, Haxel and Umhoefer 2006, Haxel 2006).

The oldest exposed rocks in the area are gneisses and granitoids of the Quitobaquito Hills, Pinacate region, Sonoyta area, and some mountain ranges on the CPNWR. These rocks were formed just after the continental crust of southwest North America was formed, 1.75 to 1.6 billion years ago (Haxel 2006). The older rocks are exposed along the Quitobaquito thrust, a strike-slip fault that is part of a system of faults known as the Mojave-Sonora megashear (Anderson and others 2005).

Several NPS policies apply to bedrock management in the project area. According to the National Park Service's 2006 Management Policies, the NPS will preserve and protect geologic resources and features from adverse effects of human activity, while allowing natural processes to continue. The proposed action includes few activities that would occur on bedrock. Some invasive plant populations occur on bedrock; however, treatments would have no effect on bedrock, so this topic is dismissed from further analysis.

1.7.2 Wetlands

According to the Clear Water Act, the term wetlands means "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas.

NPS Procedural Manual 77-1: Wetland Protection was developed for use in carrying out Executive Order 11990. NPS adopts a policy of "no net loss of wetlands" and uses "Classification of Wetlands and Deepwater Habitats of the United States (Cowardin) as the standard for defining, classifying, and inventorying wetlands." Restoration activities to reestablish a natural ecosystem to function as it did prior to disturbance are considered "excepted actions" under this policy. Therefore, a Statement of Findings will not be required.

The only known potential wetland within the project area is the Quitobaquito Spring and Pond system located within OPCNM. None of the actions described in this EA propose to restore disturbed wetlands or potential wetlands; Quitobaquito is an area that would be avoided for restoration under this EA. Impacts to wetlands as a result of this project will be minor or less; therefore, this topic is dismissed from further analysis.

1.7.3 Floodplains

All NPS units must recognize and manage for the preservation of floodplain values, to minimize potentially hazardous conditions associated with flooding, and to comply with the NPS Organic Act and all other federal laws and Executive orders related to the management of activities in flood prone areas (*NPS Resource Manual 77-2 Floodplain Management*). Specifically, it is the policy of the NPS to:

- Protect and preserve the natural resources and functions of floodplains;
- Avoid the long and short term environmental effects associated with the occupancy and modification of floodplains;
- Avoid direct and indirect support of floodplain development and actions that could adversely affect the natural resources and functions of floodplains or increase flood risks; and
- Restore, when practicable, natural floodplain values previously affected by land use activities within floodplains.

According to the *NPS Management Policies 2006*, the NPS will protect, preserve, and restore the natural resources and functions of floodplains, and avoid actions that would adversely affect the natural resources and functions of floodplains or increase flood risks (Chapter 4.6.4 *Floodplains*). The same policies (Chapter 4.1.5 *Restoration of Natural Systems*) require the NPS to reestablish natural functions and processes where human disturbance has caused changes to hydrologic patterns and sediment transport, the acceleration of erosion and sedimentation, and the disruption of natural processes.

The alternatives proposed in this ERP/EA would repair existing and future damage to floodplains, and neither alternative would change the risk of flooding. The NPS will use the best available technology, within available resources, to restore the biological and physical components of these systems, accelerating both their recovery and the recovery of landscape and biological community structure and function. Efforts would include the removal of invasive plants, restoration of native plants and animals, and restoration of abandoned roads and disrupted natural waterways. The topic is dismissed from further analysis because floodplain function and resources would not be adversely impacted by either alternative.

1.7.4 Air Quality

The Clean Air Act of 1963 (42 U.S.C. 7401 et seq.) was established to promote the public health and welfare by protecting and enhancing the nation's air quality. The act establishes specific

programs that provide special protection for air resources and air quality related values associated with National Park Service units. Section 118 of the Clean Air Act requires a park unit to meet all federal, state, and local air pollution standards. OPCNM and CPNWR are designated as a Class II air quality area under the Clean Air Act. The southern portion of the Ajo Block of BLM land carries no air quality designation. A Class II designation indicates the maximum allowable increase in concentrations of pollutants over baseline than Class I areas. Class I areas require the highest level of air quality protection. Further, the Clean Air Act provides that the federal land manager has an affirmative responsibility to protect air quality related values (including visibility, plants, animals, soils, water quality, cultural resources, and visitor health) from adverse pollution impacts.

Restoration activities such as ripping and digging soil with mechanized equipment as well as manual tools could result in temporary increases of vehicle exhaust, emissions, and fugitive dust in the general project area. Any exhaust, emissions, and fugitive dust generated from restoration activities would be temporary and localized and would likely dissipate rapidly because air stagnation in the project area is rare. Overall, the project could result in a negligible degradation of local air quality, and such effects would be temporary, lasting only as long as restoration activities are being conducted. Best management practices for herbicide application will be followed, which minimizes chemical drift, volatilization, and other adverse impacts. There would be negligible effects on air quality; therefore, this topic is dismissed from further analysis.

1.7.5 Soundscape Management

According to the NPS's 2006 Management Policies and Director's Order 47 Soundscape Preservation and Noise Management, an important component of NPS's mission is the preservation of natural soundscapes associated with national park units. Natural soundscapes exist in the absence of human caused sound. The natural ambient soundscape is the aggregate of all the natural sounds that occur in park units, together with the physical capacity for transmitting natural sounds. Natural sounds occur within and beyond the range of sounds that humans can perceive and can be transmitted through air, water, or solid materials. The frequencies, magnitudes, and durations of human caused sound considered acceptable varies among NPS units as well as potentially throughout each park unit, being generally greater in developed areas and less in undeveloped areas.

Restoration activities would include use of noise sources such as vehicles, motorized equipment, and people conducting work. Noise impacts would be temporary and short term lasting only as long as implementation activities Specific best management actions will be implemented to minimize soundscape level impacts to Sonoran pronghorn and lesser long-nosed bats. After restoration is complete, noise levels return to their natural condition. These impacts are minor or less in degree; therefore, this topic is dismissed from further analysis.

1.7.6 Lightscape Management

According to the NPS's 2006 Management Policies, the NPS strives to protect and preserve natural lightscapes, which encompasses the moon, stars, and rarely meteors contributing brief flashes of illumination. Light pollution is an adverse effect of human caused light and disrupts the natural quality of wilderness areas. Restoration activities would not occur during night time hours, require use of artificial light, or cause light pollution. Therefore, this topic is dismissed from further analysis.

1.7.7 Socioeconomics

Socioeconomic values consist of local and regional businesses and residents, and local and regional economy. The local economy and most business in neighboring communities are based on construction, recreation, transportation, tourist sales, services, and educational research; the regional economy is strongly influenced by tourist activity. Restoration activities would be small scale, both spatially and temporally, and would not affect local or regional socioeconomics. Therefore, this topic is dismissed from further analysis.

1.7.8 Prime and Unique Farmlands

The Farmland Protection Policy Act of 1981, as amended, requires federal agencies to consider adverse effects to prime and unique farmlands that would result in the conversion of these lands to non-agricultural uses. The U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS), in cooperation with other interested federal, state, and local government organizations, have inventoried land that can be used for the production of the nation's food supply. The inventory does not constitute a recommendation for a particular land use. Prime farmland is defined as land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. Unique farmland is defined as land other than prime farmland that is used for the production of specific high value food and fiber crops. Because the soils within the project area are not classified as prime or unique farmlands (USDA 2012), this topic is dismissed from further analysis.

1.7.9 Indian Trust Resources

Secretarial Order 3175 requires that any anticipated impacts on Indian trust resources from a proposed project or action by DOI agencies be explicitly addressed in environmental documents. The federal Indian trust responsibility is a legally enforceable fiduciary obligation on the part of the United States to protect tribal lands, assets, resources, and treaty rights, and it represents a duty to carry out the mandates of federal law with respect to American Indian and Alaska Native tribes. The project area lands and resources related to this project are not held in trust by the Secretary of the Interior for the benefit of Native Americans. Because no Indian trust resources are related to this project, this topic is dismissed from further analysis.

1.7.10 Environmental Justice

Executive Order 12898 *General Actions to Address Environmental Justice in Minority Populations and Low Income Populations* requires all federal agencies to incorporate environmental justice into their missions by identifying and addressing disproportionately high and adverse human health or environmental effects of their programs and policies on minorities and low income populations and communities. Because there would be no disproportionate health or environmental effects on minorities or low income populations or communities, this topic is dismissed from further analysis.

1.7.11 Climate Change and Sustainability

The earth's climate is changing due to the increasing amount of greenhouse gases in the atmosphere. In the desert southwest, winter and summer days and nights have been warming since the 1980s. The number of days with below freezing temperatures has been decreasing and the period of time between the first and last days of freezing temperatures has also been decreasing, and the overall future will likely be one of increased aridity as the subtropical zone expands poleward. Climate alterations can induce significant changes in the Sonoran Desert

ecosystem, particularly in species' ranges and the structure and composition of vegetation communities (Turner 1990; MacDonald 2010; IPCC 2007; OPCNM 2006; Weiss and Overpeck 2005).

Neither alternative would measurably increase or decrease impacts on the global phenomena of climate change. The analysis in this document; therefore, is based on past and current weather patterns with the understanding that future weather and climate patterns are likely to change. Climate change and sustainability is dismissed from further analysis.

1.7.12 Park Operations

Park operations refer to adequacy of staffing levels and quality and effectiveness of park infrastructure in protecting and preserving the park resources and providing for effective visitor experience. It also refers to the levels of staff, funding and time needed to accomplish a project. Specially funded restoration projects would involve permanent staff time supplemented with project funded term positions and other temporary help, such as security personnel to accompany restoration workers. These impacts would affect staff only during the implementation of funded restoration actions. Additionally, invasive species management is currently done by DOI staff and volunteers, and has negligible or minor impact on permanent staff and operations. Because the impacts would be short term and minor, this topic is dismissed from further analysis.

1.7.13 Visitor Use and Experience

Visitor use and experience includes access, visual quality, noise, encounter levels, and opportunities for solitude. The enjoyment of park resources and values by people is part of the fundamental purpose of all park units (NPS 2006). The National Park Service is committed to providing appropriate, high quality opportunities for visitors to enjoy the parks, and will maintain within the parks an atmosphere that is open, inviting, and accessible to every segment of society. Further, the National Park Service will provide opportunities for forms of enjoyment that are uniquely suited and appropriate to the superlative natural and cultural resources found in the parks. The National Park Service 2006 NPS Management Policies also state that scenic views and visual resources are considered highly valued associated characteristics that the National Park Service should strive to protect (NPS 2006).

During the past ten years, annual visitation at OPCNM has ranged between 210,000 and 340,000 visitors; CPNWR has averaged 10,000 visitors. The typical visitor to OPCNM hikes, relaxes in the campground, watches birds and wildlife, studies plants, and enjoys the dark night skies, sounds of nature, and photography. Visitation to CPNWR is primarily centered on driving the historic El Camino del Diablo trail or other public use roads. There is no evidence that UVRs are created by visitors on OPCNM or CPNWR (S. Slone pers comm 2014,M. Sturm pers comm 2012). No information about total visitation on the Ajo Block is available.

The visitor experience may be impacted in specific or local areas during short term restoration activities. Visitors may encounter staff, hear motorized equipment, or see areas of treatment and restoration. Because impacts would be short term and minor, visitor use and experience is dismissed from further analysis.

1.7.14 Museum Collections

According to Director's Order 24, Museum Collections, the National Park Service requires the consideration of impacts on museum collections (historic artifacts, natural specimens, and archival and manuscript material), and provides further policy guidance, standards, and

requirements for preserving, protecting, documenting, and providing access to, and use of, National Park Service museum collections. There are no plans to collect artifacts from archeological sites in the project area. Areas inventoried for cultural resources and discovered to contain artifacts would be avoided or handled in accordance with NHPA Section 106. Thus, the topic of museum collections will not be addressed further as an impact topic.

1.7.15 Ethnographic Resources

Ethnographic resources are defined by the NPS as any "site, structure, object, landscape, or natural resource feature assigned traditional legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it" (Director's Order 28). Some places of traditional cultural use may be eligible for inclusion in the National Register of Historic Places as Traditional Cultural Properties (TCPs) because of their association with cultural practices or beliefs of a living community that (a) are rooted in that community's history and (b) are important in maintaining the continuing cultural identity of the community. The Four Southern O'odham tribes plus the Hia-C'ed O'odham as a division of the Tohono O'odham Nation, the Zuni Tribe of the Zuni Reservation, and the Hopi Tribe are traditionally associated with the land and resources managed within the project area. They maintain long-standing cultural connections with the project area, and occasionally gather plants for food, medicine, basketry and ceremonial purposes. Specifically, the Tohono O'odham and Hia-Ced O'odham continue to view the project area as traditional home lands and use and collection of resources continues. Traditional uses include historic habitation areas, trails, resource procurement and processing sites (e.g. food, mineral, shell), ceremonial areas, agricultural areas, and graveyards.

Some cacti and other species with traditional uses would be planted or seeded as part of the restoration treatments, and invasive species would be removed. The NPS will continue to consult with tribes and copies of the EA will be forwarded to each group for review or comment. If subsequent issues or concerns are identified, appropriate consultations would be undertaken. Since treatments are designed to maintain natural conditions and improve native plant communities, ethnographic resources is not addressed as an impact topic in this document.

CHAPTER 2 ALTERNATIVES

During April 2012, an interdisciplinary team of NPS employees met for the purpose of developing project alternatives. This meeting resulted in the definition of project objectives described in Chapter 1.0 Purpose and Need, and alternatives that could potentially meet these objectives. A total of four action alternatives and the no action alternative were identified for this project. Of these, three action alternatives were dismissed from further consideration. One action alternative and the no action alternative are carried forward for further evaluation.

2.1 ALTERNATIVE 1 – NO ACTION

Under this alternative, restoration activities and invasive plant management would occur on a site by site basis. Agency resource managers would be limited to those treatment options that can be categorically excluded from further NEPA analysis under departmental categorical exclusions (43 CFR 46.210) or under agency specific exclusions. Activities analyzed by previous planning documents could continue to occur. Under categorical exclusions, minimal restoration activities would be continued across the project area in and outside of wilderness when the opportunity exists. Herbicide application or use of motorized equipment for restoration would not occur.

Necessary treatments at sites with the greatest damage would be unlikely to qualify under these categorical exclusions. A comprehensive multi-agency plan to restore native plant communities, reestablish natural surface flow patterns, stabilize soils, and restore Sonoran pronghorn and lesser long-nosed bat habitat would not occur. Limited treatments, although beneficial, would not be applied as part of a strategic plan and overall would be only slightly successful in the long term. Most cultural resources impacted by UVRs would continue to degrade through erosion and exposure. Proactive, preventative measures would not be emphasized. CBP and the three DOI agencies would not meet the terms of the Biological Opinions associated with these restoration activities..

2.2 ALTERNATIVE 2 – ECOLOGICAL RESTORATION PLAN

This alternative would implement a comprehensive ERP for the project area that would allow the use of a full range of restoration techniques and types of treatments that achieve maximum effectiveness in restoring the health of ecological communities while minimizing risks to humans and natural and cultural resources. The alternative would allow for site specific strategies and treatments that would prevent or limit further disturbance, establish plant cover, decompact soils, establish natural contours and drainage patterns, manage invasive plants, reduce visibility of disturbed areas, and restore habitat for a number of species including the endangered Sonoran pronghorn and lesser long-nosed bat. This alternative would be the most effective means of mitigating adverse effects to cultural resources by UVRs and construction of infrastructure. An integral part of the ERP is to develop work plans to guide site specific work. Since we would implement a plan and not just treat sites, we are adopting an approach that includes the following elements:

1. Communication
2. Development, Review, and Approval of Work Plans
3. Prevention
4. Inventory Disturbed Lands and Invasive Plants
5. Determine Management Priorities

6. Identify Restoration Strategies and Treatments
7. Monitor Effectiveness
8. Track Management Efforts

Not all of these steps will have an environmental effect, so the focus of this EA will be on those actions that pose potential environmental effects, primarily identifying and implementing strategies and treatments for restoration. The steps to this plan are discussed below.

2.2.1 Communication

Since this is an interagency project, communication is vital to success. The agencies will meet at least annually to discuss annual work plans. The agencies would continue to educate the public, staff, and partnering agencies about restoration activities. Some ongoing and potential future actions include:

- Partner with CBP, USFWS, and BLM to establish priority restoration projects with the main goal of benefitting and restoring Sonoran pronghorn and lesser long-nosed bat habitat and potentially stabilize affected cultural sites
- Hold informal meetings with staff and partner agencies to discuss effectiveness of treatment techniques and upcoming work plans
- Partner with neighboring agencies, tribes, and organizations in regional education and invasive species removal efforts
- Establish outreach programs with the local community
- Educate visitors, employees, and partner agencies about the need to prevent resource damage and the spread of invasive species

Ongoing collaboration with invasive plant management experts both within and outside these agencies would be conducted on a regular basis. This level of collaboration is needed to help resource managers keep informed on the latest restoration technologies available. Such collaboration would also be an opportunity for individuals to share and learn from their successes and challenges.

Cultural resource and restoration professionals will collaborate to avoid or minimize adverse effects on cultural resources. All obligations under Section 106 of the NHPA will be met, including consultations with the State Historic Preservation Officer and affiliated tribes.

2.2.2 Development, Approval, and Review of Work Plans

Work plans would be prepared for location-specific restoration projects including invasive plant management activities. For restoration projects supported by CBP mitigation funds, a work plan would be prepared. Work plans would typically be developed with input from all affected agencies and stakeholders and would include site specific restoration actions and descriptions of anticipated invasive plant management activities.

Developed work plans would be first reviewed by a three person restoration committee comprised of designated land management agency representatives to determine if the impacts of the proposed action have been appropriately assessed in this EA, and if the proposed actions would comply with pertinent federal and state laws and guidelines. In accordance with the project PA, cultural resource surveys and compliance with Section 106 of NHPA would occur prior to any ground disturbing activities or other activities that may have the potential to

adversely affect cultural resources. If it is determined that a proposed work plan exceeds the impacts described in this EA or in some way does not comply with federal or state law, the plan would be revised or additional analysis and compliance completed. Permits would be acquired as necessary. Responsibility for Section 106 consultation for individual restoration management projects that do not meet the criteria for streamlining under the PA will fall to NPS, USFWS, or BLM, dependent on jurisdiction, and will be conducted pursuant to 36 CFR Part 800.5 and 6.

Developed work plans that successfully complete the review process would then be considered for implementation by the restoration committee. Work plans that have met with restoration committee consensus would then be forwarded to designated CBP representative for review and concurrence. It is important to note that all restoration activities supported by CBP mitigation funds would require CBP concurrence prior to implementation.

Other restoration projects or programs covered under this ERP/EA may be developed that are not funded by CBP mitigation funds. Work plans associated with such projects or programs would not be subject to review by the restoration committee.

2.2.3 Prevention

This alternative stresses prevention as the most effective, economical, and ecologically sound approach to restoring disturbed lands, protecting cultural resources, and managing invasive species. Good planning and coordination can reduce or eliminate unnecessary environmental impacts or adverse effects to cultural resources. Some impacts are unavoidable, but the actions discussed below can help minimize damage. Preventing disturbance from occurring is one of the most effective treatments because of the high cost of restoration and the uncertainty of success and is noted in the 2006 MOU.

To help prevent UVRs, the partnering agencies have posted signs at public and administrative roads with unique numbers and names. These groups have cooperated in the production of a Road Atlas, which shows the location and number of each road as well as the intersection numbers. Agencies working within the project area continue to cooperate to identify methods to reduce UVR creation. These methods include placement of woody debris, wattles, or signs at the access points of UVRs to prevent further use. Agencies are working on educational programs to help reduce off-road travel.

The agencies would maintain a list of invasive species that are not currently known from the project area but have the potential to invade. This ‘watch list’ would alert staff, neighbors, collaborators and the scientific community about what species are spreading and how to identify them. The watch list currently contains just three species: African daisy, white lead tree, and giant salvinia. By its nature, the watch list will continue to change over time, as new species move into the area. Other prevention methods are being implemented, such as equipment washing and cleaning prior to entering site, which helps prevent the introduction of invasive species to a new area. Additionally, fill material used in construction and road maintenance must come from an agency approved source.

2.2.4 Inventory Disturbed Lands and Invasive Plants

Determining the status of resources and managing lands for sustainable use is a fundamental responsibility of land management agencies. The use of remote sensing has significantly improved our ability to inventory and map resources or resource damage. As technology improves and becomes affordable, resource inventories may become more frequent and accurate.

Agencies have a number of ongoing inventories to assess the presence of disturbances and invasive species. These efforts are described as follows:

The location of many UVRs throughout the project area were recently documented by the USFWS (USFWS 2011a). Digital ortho-photo quadrangles (aerial photographs) taken in 1996 provide a baseline inventory of roads, historic ranches, mines, and disturbances. Subsequent disturbance within the project area has been inventoried in various ways. Since 2002 the NPS has documented foot trail and UVR occurrences along east-west transects within OPCNM. These data are collected biennially and a summary of the results of this monitoring effort was recently produced in OPCNM's State of the Park Report (NPS 2013). In 2004, a systematic survey and mapping effort mapped the location and extent of UVRs on OPCNM (OPCNM 2005). More recently, UVRs, new construction roads, and other disturbances within the project area have been mapped using GIS technology and 2008, 2010 and 2012 aerial photography and other imagery. This UVR assessment is one of the mitigation measures called for in the SBI*net* Ajo-1 Biological Opinion (NPS 2014). UVR inventories would continue to be periodically updated and this information would be used to help identify UVR restoration opportunities throughout the project area.

Various plant checklists have been completed for the project area since 1966, which provide a useful baseline for studying the occurrence and spread of invasive plants. A checklist of OPCNM and CPNWR was recently published by Felger et al. (2012), which formed the basis for the list of invasive plants on OPCNM and CPNWR (Appendix 1). OPCNM maintains a geospatial database that contains information on the location and size of invasive plant occurrences and the management efforts performed at each site. New and potentially invasive plants are continually colonizing the project area, requiring continual surveys. Staff should be aware of potential invasives and trained to recognize them. Management actions would include:

- Creating and maintaining a geospatial database that contains information about the known locations of invasive plants and site specific management actions
- Documenting the location and level of infestation of colonizing species
- Surveying areas where new species are commonly found, such as roadways and near large source populations on neighboring lands
- Surveying areas that have never been surveyed

2.2.5 Determine Management Priorities

Pursuant to the procedures outlined in section 2.2.2, the following factors would be considered when developing and prioritizing restoration work plans:

- Restoration activity contributes to mitigation requirements in Biological Opinions on CBP funded infrastructure
- Cost effectiveness and availability of resources
- Potential effect on high value resources, such as rare biotic species or communities, cultural resource sites, or wilderness areas
- Maximize the probability of successful long term restoration
- Soil stability and ability to recover (resilience)

Restoration activities that satisfy the requirements outlined in the Biological Opinions referenced in section 1.2.2 would be prioritized for restoration when such activities would be supported by associated mitigation funds. The costs associated with conducting specific restoration actions proposed in each work plan will be considered and an assessment of each proposed restoration action conducted. The objective of this process will be to consider restoration gains against costs with the intent of maximizing efficiencies and minimizing expenses. The extent of impacts to natural and cultural resources will be considered along with the restoration potential of each site. Areas where the severity of impacts to such trust resources of the gravest concern to land managers would be identified and prioritized for restoration to the greatest extent possible. Restoration activities would be conducted at sites where they are most likely to be successful. For example, impacted areas that parallel each other or impacted areas where continued illegal activities have been prevented due to the establishment of permanent border enforcement infrastructure would be prioritized for restoration. In addition to considering the severity of impacts at each potential restoration site, soil stability and resilience would also be carefully assessed. Restoration activities would be prioritized based on the greatest likelihood for success given site specific soil properties.

Invasive plant prioritization efforts will focus on those species that have or could have the greatest ecological impacts and that are prudent and feasible to control. Prioritizing management activities by species and location will help guide the most efficient use of resources according to predetermined invasive plant management objectives. Species may be treated if resources are available or if they become established on or adjacent to restoration plots. Management priorities would be determined for each new species that invades the project area.

To set management priorities for invasive species in the project area, we developed a priority system that followed a modified version of Hiebert and Stubbendiek (1993) combined with criteria formulated by the California Exotic Pest Plant Council and the Southwest Vegetation Management Association (2003). Four criteria were used to develop our management priorities: ecological impact, distribution and abundance, feasibility of control, and urgency. Based on these criteria, each species was given a management priority of high, medium, or low (Appendix 1). Species with a high management priority are those that have or could have the potential to significantly alter the natural and physical environment on a large scale or specialized habitat, and are those for which management actions are likely to be successful, particularly with a fast response time. Species with a low priority are those that are already widespread and abundant or have limited impact on resources. Species with moderate priority are those with regional impacts and untested control methods or those for which a rapid management response is not necessary due to slow invasion rates.

Applicable Federal and State programs were considered when setting management priorities. The list of plants regulated by the Federal Noxious Weed Act of 1975 was consulted to determine if any occur within the project area. Although none exist within the project area (USDA – APHIS 2010), one noxious weed is on OPCNM's 'watch list': giant salvinia (Appendix 1). This species is an aquatic fern that is known to have significant adverse impacts on wildlands around the globe (USDA 2012).

Some invasive plants in Arizona are regulated by the Arizona Noxious Weed Law. Under this law, plants in the prohibited category are denied entry into the state. Plants in the regulated category are those that may be controlled or quarantined to prevent further infestation or contamination in the state. Restricted plants shall be quarantined to prevent further infestation or

contamination in the state. Appendix 1 provides the state rank, if any, for each invasive plant species in OPCNM and CPNWR.

2.2.6 Identify restoration strategies and treatments

Treatments and strategies used to restore disturbed lands are based on the professional experience of agency staff, input from desert restoration experts, and published scientific literature. This alternative includes an integrated approach to select a strategy(s) for restoring disturbed areas that implements the most effective treatment or combination of treatments on the ground to achieve objectives. It is intended to allow the agencies latitude in choosing a strategy or combination of treatments most appropriate and/or cost effective for each restoration site.

2.2.6.1 Treatment Types

A number of different treatments can be used to restore disturbed lands including:– behavioral, manual, chemical, and mechanical as defined below. An integral part of the preferred alternative is the use of a strategy that selects the most appropriate treatment or combination of treatments with the least environmental impact to restore a site or to control an invasive plant infestation and also considers wilderness values and recommendations. This approach is most effective when implemented according to a strategic plan that integrates the most efficient and effective treatment(s) and appropriate mitigation measures.

Behavioral treatments would consist of actions that promote native plant growth and prevent or discourage further site disturbance. Behavioral treatments can be cost effective and useful on large areas. Examples include: sign placement, fencing, road delineation, placing slash/debris, and implementation of Best Management Practices. Behavioral treatments for invasive plants might include public education and rigorous restrictions on introducing equipment or material that might contain invasive seeds into the project area.

Manual treatments would include the use of non-motorized equipment on disturbed areas to decompact soil in small areas, recontour disturbed surfaces, scarify the soil before seeding, and dig holes to install nursery grown plants. To check surface flow, wattles, rocks or other natural materials would be placed in areas undergoing accelerated erosion or deposition due to the original disturbance. Invasive species control often involves digging or pulling plants (including roots) out of the ground or topkilling to exhaust root reserves. Examples of manual treatments include: seeding, planting, hand pulling, raking, digging, picking, shoveling, and sawing.

Chemical treatments would include the use of herbicides to kill or injure invasive plants and may be applied as pre- and post-emergent. Compared with manual treatments, herbicides would help increase the amount of area that can be treated annually and would reduce soil disturbance. Herbicides are more effective than manual control for invasive plants growing on bedrock or rocky substrates where root removal is difficult, and on species where manual and mechanical methods are not effective. Chemicals proposed for use during treatment include:

1. Triclopyr

2. Glyphosate
3. Aminopyralid
4. Sethoxydim
5. Dimethylamine
6. Nonionic surfactant
7. Methylated seed oil
8. Aliphatic hydrocarbon oil
9. Hydrotreated light paraffin distillate
10. Limonene
11. Indicator dye

Mechanical treatments would include the use of mechanized equipment throughout the project area, including wilderness. This treatment is often essential for decompacting soils or site leveling in order to prepare disturbed soils for seeding and planting, particularly at large sites. Site preparation is critical to restoration success, especially the establishment and growth of plants. Examples of mechanical treatments and tools including brush cutters and yard trimmers, chain saws, augers, backhoes, road graders, and other motorized equipment.

2.2.6.2 Strategy Types

Each strategy uses a mixture of treatments and tools to restore a disturbed area. A site is defined as a single whole disturbed area, an entire UVR, a section of UVR, or a small or large area infested with invasive plants. Site strategies are differentiated based on the treatments and tools needed to discourage further disturbance and restore natural or near natural conditions on disturbed areas. A strategy would be implemented based upon the health of on site and nearby native plant communities, hydrology, soil characteristics, site accessibility, rainfall, and the presence of sensitive resources or invasive plants and the sensitivity or importance of cultural resources affiliated with the site.

More than one strategy may be deployed at one site. For example, a UVR can cross several different soil types and plant communities along its entire length or traverse through an archaeological site; therefore, a combination of strategies may be the best option for facilitating restoration. Another example would be a site that contains a cultural resource and negotiated mitigation requires that the resource be left undisturbed. In this case, restoration strategies would be different outside of the cultural site versus inside the cultural site. Three restoration strategies would be employed: passive, facilitated, and active.

The goal of a passive strategy is to prevent or discontinue further disturbance, and would rely on Behavioral treatments with some minor manual treatments. Education and compliance with area closures are the cornerstones of a passive strategy. No chemical or mechanical treatments would be prescribed. Compared with facilitated and active restoration, passive restoration involves very little physical intervention and relies on natural restoration for site recovery. If results from passive restoration are poor, the strategy would be reconsidered and transitioned to facilitated or active restoration. On some disturbed sites a passive strategy may be the only strategy applied (no facilitated or active restoration).

Facilitated restoration uses Behavioral, manual, and chemical treatments but not mechanical treatments to restore disturbed areas. Compared with a passive strategy, facilitated restoration involves more active intervention. Facilitated restoration involves activities such as manually

removing invasive plants, treating invasive plants with chemicals, seeding, planting nursery grown plants, using hand tools to decompact soils in small areas, and others.

Active restoration may be applied on moderately to severely disturbed sites with few or no remaining living plants. On these sites, intervention with all types of treatments would speed the successful recovery of the area. This strategy would use a combination of behavioral, manual, chemical and mechanical treatments. Use of mechanized equipment to decompact soils, recontour surfaces, and manage invasive plants in wilderness areas would be used only if a Minimum Requirements Analysis (MRA) determines the techniques and type of equipment necessary would minimize impacts on wilderness resources. Mechanized tools may include heavy equipment (e.g. backhoes, road graders). Past experience and evidence from historic abandoned roads has shown that restoration of native plants occurs very slowly (>100 years in some cases) where soils are compacted. Decompacting soils with mechanized equipment will promote sufficient soil air and water infiltration, which will promote plant growth and reduce runoff. Restoration activities would also include planting and seeding of native plants at most sites.

In the event a UVR passes through a cultural site, all cultural resources will be evaluated and assessed under the NHPA, Section 106 utilizing the project PA and completed prior to conducting restoration activities. Restoration on sites containing cultural resources may be accomplished pending results and findings as revealed through archaeological analysis and documentation. Restoration actions would be initiated for sites meeting the constraints of a "no historic properties affected" or "no adverse effect" finding. Should archaeological analysis reveal a site and resources warranting mitigation and protection, the Standard Four-Step process would be initiated to include SHPO/THPO concurrence up to possible National Register documentation. Responsibility for Section 106 consultation for individual restoration management projects that do not meet the criteria for streamlining under the PA will fall to NPS, USFWS, or BLM, dependent on jurisdiction, and will be conducted pursuant to 36 CFR Part 800.5 and 6. It is anticipated that archaeological findings would document that any adverse effects to cultural sites would have already occurred as a result of the UVR. Restoration of UVRs containing a cultural resource component would provide an overall benefit to the sites by providing stabilization and erosion reduction/prevention controls and mitigation to prevent further loss. In such instances, mitigation and BMPs would be employed to ensure restoration actions do not add a cumulative adverse effect component to the site.

Table 1 illustrates a combination of factors that will be considered when selecting a restoration strategy or combination of strategies. Since highly variable site conditions and disturbances are anticipated, the information in this table will be used as a guide in the decision making process. The final site prescription will be based on site specific conditions and the expertise of restoration specialists, and input from interdisciplinary teams of wildlife biologists, ecologist, and cultural resource specialists.

Table 1. Strategy Decision Guide

	PASSIVE	**FACILITATED**	**ACTIVE**
Typical Sites	A passive strategy would typically be used on sites with mostly light and	Behavioral, manual, and chemical treatments would typically be used on sites that	Behavioral, manual, chemical, and mechanical treatments would typically be used on sites

	sometimes moderate disturbance or in localized areas containing sensitive resources. Behavioral treatments will be used to remove or reduce further disturbance and minimal manual treatments would be applied.	have light to moderate disturbance. Invasive plants with a high management priority would be manually removed or treated with herbicides.	with moderate to severe disturbance. Mechanized equipment (e.g. graders and backhoes) would be used to decompact soils up to 18 inches. Mechanical equipment (e.g. chain saw) could be used to remove invasive plants.
Typical Activities & Tools	Typical restoration activities on disturbed sites would include developing educational materials, spreading slash (dead and downed wood), using hand tools to place sign posts, placing barriers (e.g. rocks, fences) to restrict access.	Typical restoration activities on disturbed sites would include seed collecting, seed application, planting nursery grown plants, and watering. Invasive plants would be controlled with manual removal and with herbicides. Tools may include rakes, shovels, backpack sprayers (for herbicides), hand held cultivators, or pruners.	Typical restoration activities would be decompacting soils using heavy equipment, using chain saws to remove tamarisk, using motorized hedge trimmers or weed whackers to topkill weeds or reduce biomass, or using truck mounted sprayers to treat roadside invasive plants with herbicides.
Native Plants	The vegetation on the restoration site is similar to the surrounding area. Less than 30 percent of the native plant cover has been lost and composition is similar. Damaged plants can recover. Sites with minor disturbance might recover naturally over time.	Native plants on the restoration site have died or have been damaged. Thirty to 80 percent of the native plant cover has been lost. Some loss of species may have occurred. Most plants have been killed by the disturbance, but some damaged ones can recover. Invasive plants are present.	The restoration site is devegetated or nearly so. More than 80 percent of the native plant cover has been lost. A loss of species may have occurred.
Invasive Plants	A passive strategy would not address invasive plants.	Manual and chemical treatments would successfully treat targeted species (e.g. buffelgrass, fountain grass).	Invasive plants may be managed with mechanical equipment (e.g. chain saws to remove large tamarisk trees, weed whackers to remove bulrush) in non-wilderness areas. Mechanical equipment would be used within wilderness only if the MRDG determined it necessary to minimize impacts on wilderness resources and accomplish the work. Using heavy equipment such as a backhoe to remove invasive plants is not proposed.
Soil	A passive strategy would be applied typically where soil compaction is low to none	Soil is lightly to moderately compacted. Changes to micro topography and accelerated	Soil is moderately to highly compacted and decompacting with heavy equipment would not

	and soil horizons remain intact. A passive strategy would be used where a facilitated or active strategy would cause additional adverse impacts or where vehicle access is distant (>1 mile).	erosion and deposition are visible in limited areas. Restoration would likely be successful without using mechanical equipment. Chemical treatments would be more likely to occur on rocky slopes or where cultural resources are present.	add adverse impacts, such as mixing of soil layers. Changes to micro topography and accelerated erosion and deposition are visible in a number of areas. Restoration would likely be most successful if soil decompaction occurred.
Safety	A passive strategy would be used if an analysis determined that facilitated or active strategies would expose workers to unacceptable risks.	A facilitated strategy would be avoided if an analysis determined that it would expose workers to unacceptable risks.	An active strategy would be avoided if an analysis determined that it would expose workers to unacceptable risks.
Access	A passive strategy would be used where a facilitated or active strategy is not possible due to access difficulties, regardless of disturbance severity. Invasive species control would occur throughout the park, regardless of access.	The types of restoration treatments and activities would depend on vehicle accessibility. For example, installing nursery grown plants would likely be concentrated within ½ mile of vehicle access but seeding could occur several miles away from vehicle access. Invasive plants would be controlled regardless of accessibility.	Large mechanized equipment can access the site without causing additional adverse impacts.
Surface Hydrology	A passive strategy could decrease or remove continuing adverse impacts but would not repair them.	Using manual, behavioral and chemical treatments could improve natural surface flow in small, localized areas.	Natural surface flow patterns could be improved in moderate to large areas by using heavy equipment to restore natural contours and direct surface flows into natural channels.
Aerial Extent	A passive strategy may prevent the expansion of an existing disturbance. Disturbed areas of all sizes would likely be passively treated in some form, such as closure signs and educational programs.	Disturbance is medium to large sized (> 0.5 acre) and may be linear. A facilitated strategy would successfully restore sites, but would be costly to apply to large areas, particularly those with limited access. A facilitated strategy would be applied to invasive species populations of all sizes.	The disturbance is found in large blocks or continues for long linear distances. An active strategy would be the most efficient and cost effective treatment. Mechanical equipment such as chain saws or weed whackers could be used to remove single individual invasive plants or large populations.
Sensitive	Sensitive cultural and	Sensitive resources are	Sensitive resources are present

Resources	natural resources may be present in the disturbed area and low impact treatments are necessary to maintain integrity. A passive strategy would be successful at removing or reducing further disturbance.	adversely affected by existing conditions in disturbed areas. Facilitating the recovery of disturbed areas and removing invasive plants would help stabilize and protect cultural sites, improve habitat quality for animals and reduce competition for plants.	such as endangered species habitat and extra measures are needed to restore, maintain, or improve their status. Cultural resources may be present on an unstable site; extra measures may be needed to stabilize the site and protect it.
Wilderness	A passive strategy would successfully remove or reduce continued man-made disturbance in wilderness areas.	A facilitated strategy would successfully restore sites in wilderness areas more quickly than if no treatments were applied. It would also successfully manage invasive plants in wilderness areas.	Mechanical tools could be used in non-wilderness areas. Mechanical tools would be considered for use in wilderness provided an MRDG determined it necessary to minimize impacts to wilderness resources.

2.2.7 Monitor effectiveness

Monitoring is the repeated collection and analysis of information to evaluate progress and effectiveness in meeting resource management objectives, and is an essential part of a restoration program. Based on inventory and ranking criteria, a good monitoring program saves time and money by telling managers which control techniques are working, which ones are not, and where efficiencies can be found. Without monitoring, there is no way of knowing whether control efforts are contributing to fulfillment of desired management objectives. Selected indicators of vegetation, soils, and disturbance would be monitored at restoration sites to evaluate effectiveness. Ongoing data collection by OPCNM, the NPS Sonoran Desert Network, and CPNWR and USFWS Inventory and Monitoring programs would provide information about climate, vegetation, herbivores, and other factors that enhance interpretation of restoration effects monitoring efforts.

Techniques used to monitor the success of disturbed lands restoration would be varied based on staff time and priorities, the original type of disturbance, accessibility of the site, and the amount of effort invested in the restoration effort. Techniques may range from taking repeat photos at permanent photopoints, plot and transect data collection, and aerial imagery. Compliance with road closures could be monitored with equipment such as traffic counters, trail cameras, and acoustic recorders. All are ongoing processes that will detect useful trends with each year of repetition.

Techniques to monitor the effectiveness of invasive plant management would include: documenting treated and untreated sites in surveyed areas using a GPS, documenting negative search results, revisiting treated sites to record and treat reinfestations, and using a geospatial database in managing and evaluating treatment success.

Since 2005, OPCNM has been using GIS to manage location information and treatment effectiveness for high priority species such as buffelgrass and fountain grass. OPCNM is also using permanent plots and photopoints to monitor effectiveness of buffelgrass treatments. Data show that manual control has been effective at treating localized and limited buffelgrass and

fountain grass at OPCNM, but herbicide applications may be more effective and efficient in the future as infestations expand (Rutman 2009, Rutman 2010, OPCNM unpublished data 2012).

2.2.8 Track management efforts

Tracking the total work effort (in hours) needed to restore or manage a site informs managers about costs and efficiencies for future projects and is also helpful to communicate progress to project partners. Individual restoration site information, including location, physical site properties, tasks completed, and other information, would be recorded on a standard form. All restoration efforts will be mapped in GIS and linked to the database containing the site specific information listed above. For CBP mitigation funded actions, OPCNM would produce annual reports on the restoration program; the report will include amount of work effort, along with other statistics. Work effort includes donated time from volunteers, staff, and contracted services.

2.3 MITIGATION MEASURES

To minimize the potential impacts from personnel and equipment, the following mitigation measures would be implemented under the action alternative.

General

- To reduce noise and emissions, vehicles would not be permitted to idle for long periods of time.
- To avoid further damage, mechanical treatment with heavy equipment would not occur when soils are wet.
- Each restoration action will have these mitigation measures incorporated into the contract stipulations and the engineering plans, as necessary.
- Erosion and sedimentation control measures such as dust suppression practices, wattles, mulches, and jute matting will be deployed as necessary and where mechanical equipment is used to decompact soils and recontour disturbed sites.
- If sites greater than 1 acre are disturbed, a National Pollution Discharge Elimination System (NPDES) permit under the Clean Water Act would be acquired.

Cultural Resources

- A project PA between the NPS, USFWS, BLM, CBP, SHPO, and associated tribes would be developed to address proposed actions within or adjacent to archeological sites, historic properties, isolated artifacts, and inadvertent discoveries. These measures would include but are not limited to requiring professional cultural resource monitors during restoration activities, avoiding archeological sites, or limiting the types of restoration treatments.
- Actions at known and documented cultural sites would be accomplished with oversight by a qualified archeologist meeting the Secretary of the Interior's Standards for Archeology.
- If previously unidentified cultural resources are encountered during construction activities, the contractor or agency staff will immediately stop work at that location. All reasonable steps to secure the preservation of the resources would be taken and appropriate agency staff will be notified immediately in order to make arrangements for the proper treatment of those resources.

- In the unlikely event that human remains are discovered during construction, provisions outlined in the Native American Graves Protection and Repatriation Act (NAGPRA) of 1990 would be followed. If human remains are found, work would immediately cease and agency law enforcement officers and cultural resources management will be immediately contacted according to NAGPRA guidelines.

Wildlife

- Care would be taken not to disturb wildlife found nesting, hibernating, or otherwise living in or immediately nearby the work sites.
- Restoration sites would be visually surveyed for desert tortoise or their shelters prior to the start of any work. Digging or excavation would be avoided near any shelters.
- If desert tortoises or shelters are encountered during restoration, workers will handle these individuals in accordance with the attached AGFD Guidelines for Handling Sonoran Desert Tortoises Encountered on Development Projects (Appendix TORT).

Threatened and Endangered Species

- No mechanical or chemical treatments will be conducted in Sonoran pronghorn habitat during the fawning season, usually mid-March to mid-July.
- A visual pre-survey would be done if behavioral or manual treatments need to occur in Sonoran pronghorn habitat where pronghorn are known to frequent and for restoration actions using the mitigation funds required from the BO. If Sonoran pronghorn are detected, no mechanical treatments will begin until Sonoran pronghorn move on their own volition to a distance greater than two miles from the activities. If manual, behavioral, or chemical treatments are proposed, a one mile radius distance from pronghorn will suffice. The Sonoran pronghorn monitoring protocols will include procedures to be followed.
- No saguaros or organ pipe cacti would be killed or disturbed by restoration activities, to protect forage resources for the endangered lesser long-nosed bat.

Chemical Treatments

- Herbicides will be applied or their application overseen by an Arizona certified pesticide applicator.
- All restrictions outlined on herbicide labels will be followed.
- Ground based equipment, including backpack sprayers and spray units on trucks will be used in low wind conditions, and only applied using coarse sprays to minimize the potential for drift.
- Pesticide applicators will receive training on identification of threatened, endangered, or candidate plants.
- Herbicides that are of low toxicity to wildlife and/or that will degrade before wildlife are likely to encounter them will be used, to the extent practicable, and applied in a manner that uses the least amount, but still remains effective.
- Only those herbicides labeled for use to the edge of water bodies of water or with aquatic labeling would be used within buffer zones and aquatic areas. Highly water-soluable herbicides would not be used near water resources.

- NPS policy requires that only herbicides that are expected to be used in a one year period can be purchased at one time. Herbicide efficacy is lost over time. Therefore, herbicides would not be stored for periods greater than one year.

Wilderness

- A Minimum Requirements Decision Guide (MRDG) will be prepared for all proposed actions in wilderness. When determining minimum requirement, potential disruptions of wilderness character will be considered along with other alternatives. Additional site specific mitigation measures may be required as determined by the MRDG analysis.

2.4 ALTERNATIVES CONSIDERED AND DISMISSED

The NPS identified four action alternatives considered for project implementation, but three were ultimately dismissed from further analysis. Reasons for their dismissal are provided in the following alternative descriptions.

1 **No use of chemical treatments for invasive plant management.** This alternative was considered and dismissed as it did not meet our objectives to effectively treat a number of invasive plants species and implement cost effective restoration management strategies. The use of herbicides is much more cost effective than manual treatments, allowing us to treat many more infested areas. Manual treatments have not been effective on some invasive species in some areas. For example, buffelgrass that grows on rocky slopes is difficult to remove manually without moving rocks, which is not safe nor always possible. Treatment of smaller areas would not preserve and protect natural conditions, ecological processes, and wilderness character across the project area.

2 **No use of mechanical treatments in wilderness.** The Wilderness Act prohibits the use of mechanized equipment in wilderness, except when the action is necessary to preserve one or more of the qualities of wilderness character including: untrammeled, undeveloped, natural, outstanding opportunities for solitude or a primitive and unconfined type of recreation, or unique components that reflect the character of this wilderness area. We conducted a MRA and determined that restoration of UVRs and other human caused disturbances met the intent of the Wilderness Act. This alternative would not help restore the characteristics of untrammeled, undeveloped, and a natural setting in the wilderness. Experts in restoration of Sonoran Desert communities have found that when soils become compacted, it is often necessary to break up that layer of compaction in order for restoration efforts to be successful. Other projects have determined that it is necessary to restore the natural topography of areas to allow for proper drainage and overland flow on restored areas. Because this alternative did not meet our wilderness character objectives, and because the results of the MRA determined mechanized equipment would be necessary to minimize impacts to wilderness resources, this alternative was dismissed.

3 **Aerial application of herbicides.** The use of aerial application of herbicides is being analyzed by Saguaro National Park (SNP), in cooperation with a number of partners in the Buffelgrass Working Group, Tucson, Arizona. Buffelgrass has spread at a rate that has outpaced their ability to effectively treat the species with ground based crews. Additionally, buffelgrass has infested areas with poor access and on very steep slopes resulting in health and safety issues for the crews. The Working Group has conducted pilot projects to test the effectiveness of using fixed wing and helicopter application methods. The results are now

becoming available and SNP is conducting an environmental analysis to determine potential beneficial and adverse impacts from the use of aerial application methods. We have dismissed this alternative until more information becomes available from the Buffelgrass Working Group and SNP. However, we may reconsider this alternative in a future environmental assessment should the SNP analysis of effects show this is an effective treatment method whose benefits outweigh potential adverse impacts.

2.5 ALTERNATIVES SUMMARY

Table 2 summarizes the major components of the No Action Alternative and the Ecological Restoration Plan Alternative, and compares their ability to meet the project objectives (the objectives for this project are identified in the Purpose and Need chapter). As shown in the following table, the ERP alternative meets each of the objectives identified for this project, while the No Action Alternative does not address all of the objectives.

Table 2. Alternatives Summary

Project Objectives	No Action Alternative. Meets Project Objectives?	Proposed Action Alternative. Meets Project Objectives?
1. Restore degraded natural areas to conditions that approximate their pre-disturbance states or alternate stable states	Our ability to restore degraded areas to desired conditions across the project area would be very limited due to the lack of ability to implement integrated restoration strategies. Implementation would be limited to small low to moderate disturbed areas due to the high cost and labor intensive treatment methods allowed.	This alternative implements a full range of integrated restoration strategies. Implementation of this alternative will achieve the desired conditions on disturbed sites across more of the project area.
2. Preserve and protect natural conditions, ecological process, and wilderness character	Our ability to preserve and protect desired conditions across the project area would be very limited due to the lack of ability to implement integrated restoration strategies. Implementation would be limited to small low to moderate disturbed areas due to the high cost and labor intensive treatment methods allowed.	This alternative implements a full range of integrated restoration strategies. Implementation of this alternative will achieve the desired conditions on disturbed sites across more of the project area.
3. Preserve archeological and historical sites and cultural landscapes	Our ability to preserve and protect desired conditions across the project area would be very limited due to the lack of ability to implement integrated restoration strategies. Implementation would be limited to small low to moderate disturbed areas due to the high cost and labor intensive treatment methods allowed.	This alternative implements a full range of integrated restoration strategies. Implementation of this alternative will achieve the desired conditions on disturbed sites across more of the project area.
4. Implement environmentally sound, cost effective restoration strategies and treatments	This alternative restricts the use of a full range of integrated restoration techniques needed to implement environmentally sound strategies. This alternative is not cost effective because of the high cost and labor intensive manual treatments	The use of integrated restoration strategies allows for the implementation of the most environmentally sound and cost effective strategies.

Table 3 summarizes the environmental impacts for the No Action Alternative and the ERP Alternative. Only those impact topics that have been carried forward for further analysis are included in this table. Chapter 3 – Affected Environment and Environmental Consequences provides a more detailed explanation of these impacts.

Table 3 – Environmental Impact Summary by Alternative

Impact Topic	No Action Alternative	ERP Alternative
Soils	Limited treatment methods would be used and heavily disturbed sites would not be treated; impacts would be minor to moderate adverse to soils.	Full use of treatment methods would allow larger and heavily disturbed sites to be treated; impacts would be minor to moderate beneficial to soils.
Surface Hydrology	Limited treatment methods would be used and heavily disturbed sites would not be treated; impacts would be negligible to minor adverse to surface hydrology.	Full use of treatment methods would allow larger and heavily disturbed sites to be treated; impacts would be minor to moderate beneficial to surface hydrology.
Vegetation	Limited treatment methods would be used and heavily disturbed sites would not be treated; impacts would be minor to moderate adverse to vegetation.	Full use of treatment methods would allow larger and heavily disturbed sites to be treated; impacts would be moderate and beneficial to vegetation.
Wilderness	Limited treatment methods would be used and heavily disturbed sites would not be treated; impacts would be minor to moderate adverse to wilderness.	Full use of treatment methods would allow larger and heavily disturbed sites to be treated; impacts would be minor to moderate beneficial to wilderness.
Special Status Species	Limited treatment methods would be used and heavily disturbed sites would not be treated; impacts would be minor to moderate adverse to special status species.	Full use of treatment methods would allow larger and heavily disturbed sites to be treated; impacts would be minor to moderate beneficial to special status species.
Wildlife Resources	Limited treatment methods would be used and heavily disturbed sites would not be treated; impacts would be minor to moderate adverse to wildlife.	Full use of treatment methods would allow larger and heavily disturbed sites to be treated; impacts would be minor to moderate beneficial to wildlife.
Archeological Resources	Limited treatment methods would be used and locations containing cultural resources would be avoided and treatments tailored to individual conditions; impacts would be negligible to moderate adverse to archeological sites in the event of severe flooding and lack of vegetative cover.	Full use of treatment methods including avoidance of archeological resources and archeological monitoring. Treatments would be tailored to each individual location and allow larger and heavily disturbed sites to be treated; impacts would be minor to moderate beneficial to archeological resources, particularly as related to erosion control.
Historic Structures	Limited treatment methods would be used and cultural features avoided; impacts would be negligible to moderate adverse to historic structures, particularly those features and structures subject to severe flooding and lack of vegetative cover on the surrounding landscape.	Full use of treatment methods would allow larger areas and heavily disturbed sites to be treated; impacts would be minor to moderate beneficial to historic structures, particularly as related to flooding and erosion control.
Cultural Landscapes	Limited treatment methods would be used and heavily disturbed sites would not be treated; impacts would be minor to moderate adverse to cultural landscapes.	Full use of treatment methods would allow larger and heavily disturbed sites to be treated; contributing factors to a landscape's eligibility would be avoided; impacts would be minor to

		moderate beneficial to cultural landscapes, particularly as related to flooding and erosion control.

2.6 ENVIRONMENTALLY PREFERABLE ALTERNATIVE

According to the CEQ regulations implementing NEPA (43 CFR 46.30), the environmentally preferable alternative is the alternative "that causes the least damage to the biological and physical environment and best protects, preserves, and enhances historical, cultural, and natural resources. The environmentally preferable alternative is identified upon consideration and weighing by the Responsible Official of long term environmental impacts against short term impacts in evaluating what is the best protection of these resources. In some situations, such as when different alternatives impact different resources to different degrees, there may be more than one environmentally preferable alternative."

The ERP Alternative is the environmentally preferable alternative for several reasons because it: 1) seeks to restore degraded natural areas to conditions that approximate their pre-disturbance states or alternate stable states; 2) improves habitat conditions for endangered species and other animals; 3) reduces or removes adverse impacts from invasive plants; 4) helps restore the characteristics of untrammeled, undeveloped, and a natural setting in the wilderness; and 5.) provides for the best options for stabilizing compromised cultural sites. For these reasons, the Proposed Action causes the least damage to the biological and physical environment and best protects, preserves, and enhances historical, cultural, and natural resources, thereby making it the environmentally preferable alternative.

By contrast, the No Action alternative is not the environmentally preferable alternative because 1) our ability to preserve and protect desired conditions across the entire project area would be very limited due to the lack of ability to implement a comprehensive restoration plan; 2) implementation would be limited to small low to moderate disturbed areas; 3) the increase in invasive plant populations would outpace our ability to manage them.

2.7 PREFERRED ALTERNATIVE

No new information came forward from public scoping or consultation in 2011 with other agencies to necessitate the development of any new alternatives, other than those described and evaluated in this document. The Proposed Action is the environmentally preferable alternative and better meets the project objectives; therefore it is also considered the NPS preferred alternative. For the remainder of the document, Alternative 2 – ERP Alternative will be referred to as the "preferred alternative."

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter describes the affected environment (existing setting or baseline conditions) and analyzes the potential environmental consequences (impacts or effects) that would occur as a result of implementing the ERP. Direct, indirect, and cumulative effects are analyzed for each resource topic carried forward. Potential impacts are described in terms of type, context, duration, and intensity. General definitions are defined as follows, while more specific impact thresholds are given for each resource at the beginning of each resource section.

Type describes the classification of the impact as beneficial or adverse, direct or indirect:

Beneficial: A positive change in the condition or appearance of the resource or a change that moves the resource toward a desired condition.

Adverse: A change that moves the resource away from a desired condition or detracts from its appearance or condition.

Direct: An effect that is caused by an action and occurs in the same time and place.

Indirect: An effect that is caused by an action but is later in time or farther removed in distance, but is still reasonably foreseeable.

- **Context** describes the area or location in which the impact would occur. Effects may be site specific, local, regional, or even broader.
- **Duration** describes the length of time an effect would occur, either short term or long term:

  Short term impacts generally resume their pre-disturbance conditions within three to five years.

  Long term impacts last beyond the restoration activities period, and the resources may not resume their pre-disturbance conditions for more than three to five years.

- **Intensity** describes the degree, level, or strength of an impact. For this analysis, intensity has been categorized into negligible, minor, moderate, and major. Because definitions of intensity vary by resource topic, intensity definitions are provided separately for each impact topic analyzed in this EA.

3.1 CUMULATIVE IMPACT SCENARIO

The CEQ regulations which implement NEPA require assessment of cumulative impacts in the decision making process for federal projects. Cumulative impacts are defined as "the impact on the environment which results from the incremental impact of the action when added to other past present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7). Cumulative impacts were determined by combining the impacts of the alternative with other past, present, and reasonably foreseeable future actions.

Prior to 2000, few people would have foreseen the impact of border-related activities in the project area. As CBP's enforcement increased to the east and west, the project area began receiving larger numbers of smugglers and migrants in the late 1990s. By the late 2000s, border-related activities had resulted in the creation of many UVRs. During this same time CBP, FWS,

and NPS responded to increased levels of illegal cross-border activities by increasing law enforcement efforts and associated infrastructure. Such projects and actions that occurred within the project area are outlined as follows:

Department of Homeland Security

- Pedestrian Fence: Approximately 5.2 miles of pedestrian fence were completed in 2008 to deter migrants from crossing the border. The fence spans east and west of the Lukeville Port of Entry. Construction activities were mostly contained within the 60-foot Roosevelt Reserve.
- Vehicle Barrier: DHS constructed approximately 46.5 miles of vehicle barrier on the international boundary at CPNWR; about 15.5 of these miles are in the project area. An existing road along the US/Mexico boundary within the Roosevelt Reserve was widened, improved, and extended. About seven miles of new roads were constructed to provide vehicle access to the barrier from the El Camino del Diablo within CPNWR.
- Pedestrian Fence Drainage Improvement Project: Due to issues with drainage of the pedestrian fence within OPCNM, drainage gates were installed on 6 drainages along the pedestrian fence. All construction was contained within the Roosevelt Reserve.
- SBI*net* Towers: In 2009 and 2010 a series of 9 surveillance towers were constructed. Four towers are in OPCNM; one is on an AZ state land inholding; two are on BLM Ajo Block immediately adjacent to OPCNM; and two are on DHS administered lands in the towns of Lukeville and Why.
- Forward Operating Bases and Camps: A DHS camp was constructed in the O'Neill Hills, CPNWR in 2004. In 2012 construction was completed on a 3-acre site for a DHS Forward Operating Base within OPCNM immediately adjacent to its western boundary with CPNWR.
- Remote Video Surveillance System: Two additional surveillance towers are under construction on OPCNM immediately adjacent to the border and within the Roosevelt Reserve. Two existing SBI*net* repeater towers will be retrofitted with additional RVSS equipment.
- Tactical Infrastructure Maintenance and Repair: The DHS has prepared an EA to maintain OPCNM roads in support of towers and other border security related infrastructure. All vehicle barrier and pedestrian fence repair activities are included, as well as a hardening of the surface along the Pozo Nuevo Road.
- Operations: Agencies of the DHS: U.S. Customs & Border Protection, Border Search and Rescue (BORSTAR), and Immigration & Customs Enforcement, among others, operate throughout the project area. Enforcing immigration and drug smuggling laws and conducting backcountry rescue operations. Such activities frequently involve administrative road and UVR vehicular travel, low level aircraft flyovers, and helicopter landings.

Department of the Interior Agencies

- Highway 85: NPS Partnered with the Arizona Department of Transportation to widen Highway 85 through OPCNM and constructed two interpretive waysides on the highway in 2004-2005.

- Vehicle Barrier: In 2006 NPS installed approximately 30 miles of vehicle barrier along the US/Mexico border to help prevent illegal cross-boundary vehicle traffic. The construction zone was 15 to 30 feet wide.
- Fiber Optic Cable: In 2010 Table Top Telephone Company of Ajo installed a fiber optic cable along Highway 85 from Why, Arizona, to OPCNM headquarters. Installation required clearing roadside vegetation, trenching, and boring.
- Radio repeaters: The radio repeaters in the Ajo Mountains are an essential element of the safety program for OPCNM and DHS. In 2011, a number of radio repeaters were removed from the mountain and replaced with a single repeater.
- Headquarters Infrastructure: In recent years, OPCNM has implemented a number of construction projects in the vicinity of NPS headquarters, including: installation of a new septic field, four new modular office buildings/visitor quarters, installation of various utilities to administrative buildings and campground, Mt. Ajo repeater, expansion of the maintenance yard and nursery, trail improvements, and campground improvements. Similarly, the headquarters area of CPNWR consists of a visitor center, residences, a shop and other supporting buildings and roads.
- Sonoran Pronghorn Recovery: A variety of active management efforts currently take place in an interagency effort to recover the endangered Sonoran pronghorn. Permanent and temporary supplemental water sites exist on CPNWR and OPCNM. All permanent water sites are on CPNWR, and consist of underground storage tanks (up to 20,000 gal) that receive water from small surface runnels and fill nearby watering troughs, man-made water catchments fed by well water or natural tinajas which capture run-off from the surrounding landscape. Within the boundary of OPCNM, temporary water sites consist of above ground plastic tanks (typically 1000 gal) that feed a small nearby trough. Several "forage enhancement plots" are also present on CPNWR. These are locations where well water is pumped through an array of surface irrigation lines, to provide surface watering of native plants, primarily along small runnels. These systems are operated during unusually dry seasons, and are not operated in periods of normal rainfall. Also, a "Sonoran Pronghorn Semi-Captive Breeding Facility" exists on eastern CPNWR. This square-mile facility is used to breed Sonoran pronghorn for release into the wild in CPNWR, OPCNM, and BLM lands. In some years, temporary holding/release pens of 5 to 10 acres are built, from which captive bred pronghorn are soft released into the wild after a brief stabilization period. One such pen exists in OPCNM.
- Camping and Motor Home Parking: Organized and dispersed camping occurs in various places throughout the project area. The Gunsight Wash long term camping area, located on the BLM Ajo Block, is a high density motor home parking area that receives heavy use during the winter season. Dispersed motor home camping occurs outside of the Gunsight Wash area throughout the rest of the BLM Ajo Block. The main campground at OPCNM has 217 sites and a small, 6 site campground is located at the mouth of Alamo Canyon in the Ajo Mountains. CPNWR has three primitive campgrounds that lack potable water and sanitary facilities. Backcountry camping at OPCNM is allowed by permit only.
- Existing roads and trails: Most of the existing public and administrative road system in the project area were originally created during the late 1800s to early 1900s to support ranching

and mining. In some areas, these roads are now contributing to accelerated soil erosion and deposition and are modifying natural drainage patterns.

- DOI law enforcement operations: Typically involves vehicular use of administrative roads, backcountry foot patrols, remote surveillance and interdiction. CBP frequently responds to DOI's requests for assistance with enforcement of immigration law, drug smuggling, and backcountry rescue operations.

SOILS

Affected Environment

The project area lies within the Basin and Range physiographic province. In this province, steep mountains formed by volcanic activity and block faulting are surrounded by gently sloping alluvial fans called bajadas. The broad valleys between mountains are filled with alluvium, often a few thousand feet thick (Richard et al. 2007). The surfaces of this alluvium support soils ranging in age from early Pleistocene to modern (Young & Pearthree 2011). Most soils in the project area are less than a few million years old, dating from the Holocene (about 12,000 years ago to the present) and Pleistocene epoch. Normal function of this system allows fine and coarse sediment to move from the mountains to the valley floors over a very long period of time. Roads and other man-made structures can interfere with downslope movement of sediment.

Information about soils in the proposed project area varies in scale. A series level survey on OPCNM was completed in 1972 (USDA SCS 1972) and geospatial data is available online (USDA NRCS 2012). Soil taxonomy has changed since the 1972 OPCNM survey, making direct comparisons between OPCNM and the Ajo Block difficult. A series level soil map for the Ajo Block was prepared by the Natural Resources Conservation Service (Johnson 1997) and is also available online. No soil surveys have been completed on CPNWR, but soil association level geospatial data is available online (Barmore 1980). Because the surveys were done on different scales and using different soil taxonomies, it is difficult to compare the effects of roads on different soil types on a regional scale.

Fine grained, moderately deep to deep Holocene aged soils generally occupy the valley floors, fan terraces, and stream terraces (Johnson 1997). Gilman, Laveen, and Antho soils are Holocene aged (less than 12,000 years old), deep fine sandy loams with little to no coarse (stony) materials, good permeability, and moderate available water capacity (SCS 1972). Together they form about 14 percent of the soils at OPCNM. These soils are vulnerable to compaction, leading to road incision followed by accelerated erosion and deposition. Some highly eroded or repeatedly used roads have captured sheet flow and have become arroyos; at times exceeding five feet in depth and receive lateral deformation of surrounding lands as new topographical lows are established.

The Dateland Cuerda complex is prevalent on BLM lands in the Valley of the Ajo (USDA NRCS 2012). These Holocene aged valley bottom soils are, like Gilman, Laveen, and Antho soils, prone to compaction and erosion.

Middle to upper bajadas are dominated by incised Pleistocene (about 12,000 to 2.5 million years ago) alluvial fan deposits with typically shallow soil development. Typical soils are gravelly or cobbly loams, such as Gunsight, Growler, and Harqua. Near the mountain fronts, soils tend to contain more rock fragments, which help resist soil compaction and erosion. Shallow soils near mountain fronts also often have calcium carbonate enriched soil horizons that inhibit water

infiltration. Drainages on middle to upper bajadas are generally steeply incised, and often limit perpendicular cross country vehicle travel. A number of UVRs are located on the tops of ancient terraces covered with desert pavement.

The Growler series is an old soil with well developed soil horizons, often with dark, varnished pebbles crowded together to form a flat 'desert pavement' surface. Water holding capacity is low and effective rooting depth is shallow, making these soils naturally very unproductive. Driving on wet or dry pavements can mix upper and lower surface horizons, leading to soil conditions that most desert plants cannot tolerate and recovery actions cannot mitigate in a reasonable timeframe. Given their flat surface and low plant density and cover, desert pavements are often used by off-road vehicle travelers. The Growler series is common in the project area. A complex matrix of Growler and Antho soils covers much of the Growler and San Cristobal valleys, where several wide, heavily used UVRs are located.

Sand dunes and sand sheets cover large expanses of CPNWR. These areas are the northernmost extension of the vast Gran Desierto, a large dune system located to the north of the Gulf of California in Sonora, Mexico, and Arizona. Little vehicle traffic occurs on the dunes but considerable cross country vehicle traffic occurs on the flat sand sheets and ancient playas.

Denure series soils are common on CPNWR, and form flat expanses in the valley bottoms and alluvial fans surrounding the granite bedrock of the Cabeza Prieta, Tule, Agua Dulce, Sierra Pinta, and Granite mountains. These soils are characterized by a surface of coarse white sand and rich biological soil crusts. Like other Holocene aged surfaces, Denure soils are prone to compaction. Thousands of miles of vehicle tracks on CPNWR are located on Denure soils (CPNWR 2011).

Environmental Consequences of Alternatives

Methodology and Intensity Thresholds

Analyses of the potential intensity of impacts to soils were derived from scientific literature on soils, impact of human activities on soil characteristics, and desert restoration. In addition, OPCNM's unpublished data on the effects of off-road vehicle traffic on soils, data on invasive plant management (BWG, 2008; Marshal et.al. 2012; Stevens and Falk 2008), and staff experience with desert restoration contributed to the impact analysis. The thresholds of change for the intensity of an impact are defined as follows:

Intensity Level Definitions

Negligible Impacts to soils and biological crusts would not be perceptible or measurable. Any changes to soil productivity, integrity, stability, or fertility would be imperceptible.

Minor Impacts to soils and biological crusts would be barely perceptible or measurable. Changes to soil productivity, integrity, stability, or fertility would be small. If mitigation was needed to offset adverse effects, it would be relatively simple to implement and would likely be successful.

Moderate Impacts to soils and biological crusts would be readily perceptible and measurable. Changes to soil productivity, integrity, stability, or fertility would

be readily apparent, and would result in a change to the soil character. Mitigation measures would be necessary to offset adverse effects and would likely be successful.

Major Impacts to soils and biological crusts would be readily perceptible, measurable, and constitute a change from natural conditions. Changes to soil productivity, integrity, stability, or fertility would be readily apparent or measurable, and would change the soil character. Mitigation measures to offset adverse effects would be needed, would be extensive, and their success would be unlikely.

No Action Alternative

Restoration would occur on a site by site basis. This alternative would implement behavioral and manual treatments; no chemical or mechanical treatments would be used. The benefits of implementing a restoration plan using the most effective strategies and treatments would not be realized under this alternative.

Behavioral treatments include preventative measures such as closing UVRs, posting signs to discourage UVR activity, seeding, installing nursery plants, and mulching. These treatments would have a beneficial impact on the soil resource by helping prevent further disturbances and allow areas to recover naturally. However, where sites are eroding or compacted they are not effective unless used in combination with other restoration treatments.

Manual treatments include hand tools to conduct site preparation, seeding, planting of nursery stock, and invasive plant removal. Manual treatments would reduce compaction on disturbed sites where soil structure and porosity has been lost. Soil decompaction would help increase water infiltration and aeration of the soils restoring more natural properties. Decompaction or scarification of the soil surface also helps prepare a more favorable site for natural seed establishment and survival of nursery plantings. These treatments would resolve some accelerated erosion and sedimentation issues on disturbed sites. Stabilized surfaces would be less prone to wind erosion and could be recolonized by soil crust organisms. Manual site preparation treatments are effective on low to medium disturbed soils where you can dig deep enough with hand tools to break up the layer of compaction. Where soils are medium to heavily compacted or the compaction layer lies deeper in the soil profile, manual treatments may not be sufficient to adequately decompact the soils. Manually pulling or digging up invasive plant species results in initial disturbance of the upper soil profile. Crews working in treatment areas could temporarily impact the soil resource while implementing treatments. These impacts would not be measurable. Manual treatments are labor intensive, which would limit the amount of areas that could be restored or treated for invasive species.

Larger and heavily disturbed sites would not be treated effectively using behavioral and manual treatments. There would be a temporary direct disturbance of the soils from manual treatments. Since treatments would be implemented on previously disturbed or infested sites, restoration would result in short term negligible to minor beneficial impacts from improved soil conditions on treatment sites. In the long term treatment sites would continue to stabilize and improve productivity, however, soil condition on untreated sites would continue to deteriorate resulting in minor to moderate adverse impacts across the project area.

Cumulative Impacts of the No Action Alternative

Several projects identified in the cumulative scenario are having impacts on the soil resource. CBP and DOI projects (including Sonoran pronghorn infrastructure) are resulting in limited, site specific soil disturbances on the construction areas. The elimination of livestock grazing across much of the project area has helped stabilize the soil resource over time. Soil disturbance is evident from past livestock grazing, within active grazing allotments, and in the vicinity of dispersed camping areas. Increased use of existing roads is resulting in expansion of the existing road footprint and soil destabilization adjacent to road beds especially as parallel road developments proliferate due to fear of getting stuck in the mud and dust pits. The presence of UVRs is widespread across the project area and is resulting in soil erosion, capturing of sheet flow, compaction, loss of biological soil crusts, fragmentation of critical pronghorn habitat and destruction of cultural sites that have never received documentation or evaluation. The no action alternative would improve the soil resource on treatment areas, but the extent of the treatments and areas would be limited resulting in a beneficial but negligible contribution to offset the impacts from past, present and foreseeable future projects.

Conclusion of the No Action Alternative

The overall impacts of the no action alternative would be minor to moderate and adverse to soils across the project area, as limited treatment methods would be used and larger heavily disturbed sites would not be treated. The cumulative impact to soils from the no action alternative is negligible and beneficial.

Preferred Alternative

Behavioral and manual treatments under the preferred action are similar to the no action alternative but they are expected to be more effective under the preferred alternative because they would be implemented as part of a comprehensive plan and across larger areas, and this alternative would allow for the use of mechanical and chemical treatments.

Chemical treatments would be used to manage invasive plants. Soil disturbance would be reduced in areas where chemical treatments would be used, as compared to manual methods. Chemical treatments are more effective on large areas of invasive plant species as they can be implemented more efficiently.

Mechanical treatments may be implemented at larger and more seriously degraded sites where decompaction and/or reseeding are necessary to achieve restoration goals, and may be implemented where it is more efficient and effective than manual treatments. Decompacting soils to improve water infiltration, soil aeration, restoring natural contours, and stabilizing the surface for revegetation increase the chances of successful restoration. These treatments promote natural soil conditions favorable to plant growth. Mechanical treatments result in a temporary, direct adverse impact to the soils by creating additional ‘disturbance’. Since mechanical treatments would be implemented on medium to heavily disturbed sites, in the short term they would result in an overall beneficial impact to the soil resource by restoring more natural soil conditions and helping stabilize the site.

Although soil recovery is a slow process, the impacts of restoring more natural conditions to the soil resources would have a short term minor to moderate beneficial impact to the soil resource as integrated restoration treatments would be applied across larger areas. In the long term treated

sites would continue to stabilize and increase in productivity across larger areas in the project area and the impacts would be minor to moderate and beneficial.

Cumulative Impacts of the Preferred Alternative

The cumulative impacts of past and present and foreseeable future actions under the preferred alternative are similar to those described under the No Action Alternative. The preferred alternative; however, would use a coordinated, planned approach and would be more efficient and effective at restoring large and severely disturbed sites, so more disturbances would be treated. This alternative would result in greater beneficial impacts to the soil resources than the no action alternative. The proposed action contribution to the cumulative scenario is beneficial and negligible to minor.

Conclusion of the Preferred Alternative

The overall impacts of the preferred alternative would be minor to moderate and beneficial to soils across the project area, as full use of treatment methods would be used and larger heavily disturbed sites would be treated. The cumulative impact to soils from the preferred alternative is negligible to minor and beneficial.

SURFACE HYDROLOGY

Affected Environment

Most of the project area lies within the Gila River watershed, but the southernmost portion of CPNWR and OPCNM drains into the Sonoyta River and the Gulf of California in Sonora, Mexico. Drainage patterns are dendritic, with smaller drainages merging into gradually larger drainages. Drainage channels range from very shallow (less than 1 foot) to deeply incised (tens of feet). Valley floors tend to have shallow, braided channels. A few drainages empty into playas, or dry lakes, located in valley floors. Distributary areas occur along the larger washes on the middle to lower bajadas and valley floors. Distributary areas occur where a single channel distributes into a number of small channels or into non-channelized flow, which then reorganizes into a new channel or channels.

The project area contains several large, very low gradient valleys with reticulate (not dendritic) drainage systems. Some areas (e.g. Growler Valley) are characterized by a mosaic of soils, where plant communities vary greatly according to soil type and where rainfall runoff or runon occurs. In these areas, very slight changes in surface elevation (a few inches) can adversely affect surface hydrology. This ecosystem function depends on uninterrupted flow of water, in channels or as sheet flow, from high elevation to low elevation.

Changes to surface hydrology can be caused by excessive runoff, which can cause channel downcutting, channel development, or incised roads that capture sheet flow. Excessive runoff on wildlands is often triggered by reduction or loss of plant cover or by soil compaction or both. Compacted soils also cause excessive runoff because they absorb less moisture than undisturbed soils. Compacted soils are effectively drier and plant productivity is lower.

The degree to which invasive plants affect surface hydrology is unknown. Buffelgrass and fountain grass are two species that, if left unmanaged, could affect surface hydrology. Large, dense populations could slow water flow but no data exists to support this hypothesis. Currently, no dense populations of buffelgrass or fountain grass larger than one acre occur in the project

area. Similarly, Sahara mustard, which is now a dominant plant on sand dunes and sand flats on CPNWR, could be affecting surface hydrology but no data supports this hypothesis.

Environmental Consequences of Alternatives

Methodology and Intensity Thresholds

Analyses of the impacts to surface hydrology were derived from scientific literature, interpretation of aerial imagery, and the documented impact of historic human activities on surface hydrology. In addition, OPCNM's data on the effects of off road vehicle traffic on soils, data on invasive plant management (BWG, 2008; Marshal et.al. 2012; Stevens and Falk 2008), and staff experience with desert restoration contributed to the impact analysis.

The thresholds of change for the intensity of an impact are defined as follows:

Intensity Level Definitions

Negligible	There would be no observable or measureable impacts to surface hydrology. Impacts would be well within natural fluctuations.
Minor	Impacts would be detectable and/or localized, but they would not be outside of the natural range of variability. Mitigation measures, if needed to offset adverse effects, would be simple and successful.
Moderate	Impacts would be readily apparent and result in a change over a relatively wide area. Mitigation measures would be required to offset adverse effects and would be extensive, time consuming, and likely successful.
Major	Impacts would be readily apparent and substantial over a wide area. Mitigation measures required to offset adverse effects would be extensive and their success could not be guaranteed.

No Action Alternative

Restoration would occur on a site by site basis. This alternative would implement behavioral and manual treatments; no chemical or mechanical treatments would be used. The benefits of implementing a restoration plan using the most effective strategies and treatments would not be realized under this alternative.

The condition of surface hydrology is tied to the soil resource. Disturbed soils are more likely to also have impacts to surface hydrology. Treatments that help stabilize and restore the soil resource often have beneficial impacts to the surface hydrology.

Behavioral treatments such as closing UVRs, posting signs to discourage UVR activity, and mulching could be used. These treatments would have a beneficial impact on the surface hydrology by helping prevent further disturbances and allow areas to recover naturally. However, where surface hydrology has been disturbed and the natural drainage patterns have been disrupted by entrenchment and artificial capture of the natural surface flow, they are not effective unless used in combination with other restoration treatments.

Manual treatments would be used to restore more natural drainage patterns where the surface has become entrenched and disturbances are preventing downslope water movement, unnaturally channelizing sheet flow, or redirecting streamflow. Manual treatments use hand tools such as rakes and shovels to restore natural contours and drainage patterns. Seeding and planting of nursery stock also helps stabilize sites and surface hydrology. Restoration of more natural surface flows helps improve infiltration and reduce erosion/sedimentation from disturbed sites. Stabilized sites would be less prone to continued entrenchment and incision. Manual site preparation treatments are effective on low to medium disturbed sites where hand tools are sufficient to restore natural contours, and the area of disturbance is small. Where the surface hydrology has been medium to heavily disturbed, manual treatments may not be sufficient to adequately restore the natural contours. Manual treatments very labor intensive and would limit the amount of areas that could be restored or treated for invasive species. Invasive plants would be managed by hand pulling or using hand tools. If invasive plants are affecting surface hydrology, manual removal would have beneficial impacts.

Larger and heavily disturbed sites would not be treated effectively using behavioral and manual treatments. There would be a temporary direct disturbance of surface hydrology from manual treatments. However, treatments would be implemented on previously disturbed or infested sites and restoration treatments would result in short term negligible to minor beneficial impacts from restoring more natural contours and drainage pattern on treated sites. Long term treated sites would continue to improve and stabilize; however, there would be negligible to minor adverse impacts within the project area as few areas would be treated due to the limitations posed with only behavioral and manual treatments. Degradation on severely disturbed areas could accelerate.

Cumulative Impacts of the No Action Alternative

Several projects identified in the cumulative scenario are having impacts on surface hydrology. CBP infrastructure projects such as the pedestrian fence construction and roads to surveillance towers have adversely impacted surface hydrology, particularly in channels crossing the pedestrian fence. DOI construction projects have been on a much smaller scale on previously disturbed areas. These projects may have temporarily disrupted drainage patterns; however, mitigation measures required restoration of original contours. The elimination of livestock grazing has helped stabilize the soil resources and consequently surface hydrology over time. Areas with active grazing and dispersed recreation continue to have impacts to the soil resource and subsequent impacts to surface hydrology from livestock trailing and dispersed camping. Existing roads have contributed to the capture and redirection of surface flows throughout the project area. Increased use of these roads for interdiction efforts are contributing to this impact. UVR's and particularly frequently used/entrenched UVRs are contributing adverse impacts to surface hydrology across the project area by diverting surface/stream flow. The no action alternative would improve surface hydrology on treatment areas, but the extent of the treatments would be limited resulting in negligible beneficial cumulative effects.

Conclusion of the No Action Alternative

The overall impact of the no action alterative would be negligible to minor and adverse to surface hydrology across the project area, as limited treatment methods would be used and larger heavily disturbed sites would not be treated. The cumulative impact to surface hydrology from the no action alternative is negligible and beneficial.

Preferred Alternative

Behavioral and manual treatments under the preferred action are similar to the no action alternative but they are expected to be more effective under the preferred alternative because they would be implemented as part of a comprehensive plan and across larger areas, and this alternative would allow for the use of mechanical and chemical treatments.

Chemical treatments would be used to control invasive plants under this alternative. If invasive species are adversely affecting surface hydrology, then eliminating or managing the populations with herbicide and mechanical treatments would have beneficial impacts.

Mechanical treatments may be implemented at larger and more seriously degraded sites where natural contours and drainage patterns are needed to achieve restoration, and may be implemented where it is more efficient and effective than manual treatments. Direct adverse impacts would include using heavy equipment to improve infiltration rates and restore natural contours and drainage to the area. There would be a temporary increase in disturbances to surface hydrology from the treatments.

In the short term treatment sites would stabilize and have a minor to moderate benefit from restoration of more natural drainage conditions. In the long term, treated sites would continue to stabilize across larger areas in the project area and the impacts would be minor to moderate and beneficial.

Cumulative Impacts of the Preferred Alternative

The cumulative impacts are similar to the no action alternative. However, the preferred alternative would implement a coordinated, planned approach and would be more efficient and effective at restoring surface hydrology on large disturbed areas and long linear UVRs that disrupt surface hydrology. This alternative would result in greater beneficial impacts to surface hydrology than the no action alternative, but would not result in measureable changes in cumulative effects.

Conclusion of the Preferred Alternative

The overall impacts of the preferred alternative would be minor to moderate and beneficial to surface hydrology across the project area, as full use of treatment methods would be used and larger heavily disturbed sites would be treated. The cumulative impact to surface hydrology from the preferred alternative would not result in measureable changes.

VEGETATION

Affected Environment

The project area is located in the northwestern part of the Sonoran Desert, one of four deserts in North America. The Sonoran Desert is distinguished from the other deserts by its bimodal annual rainfall pattern (summer and winter), spring and fall dry periods, hot summer temperatures, and infrequent freezing temperatures. Summer daytime temperatures are highest in the lower elevations, which is where the coldest winter daytime temperatures occur. The vegetation in this ecosystem is determined by these and other environmental characteristics, such as rainfall amount and distribution, temperature, soil type, substrate, topography, elevation, slope, and aspect. Vegetation is described along topographic features including: mountains, bajadas, valley floors, xeroriparian areas, and playas.

Mountains. The mountains in the eastern part of the project area receive the highest rainfall amounts (8 to 15 inches per year). The substrate is bedrock or very rocky soil, with little water holding capacity and rainfall runs off quickly. Plants of the mountain slopes are therefore adapted to drought conditions. Typical plants of the eastern mountains are organ pipe and saguaro cacti, foothills paloverde, jojoba, ocotillo, Mexican jumping bean, bursage species, brittlebush, and Parish goldeneye, as well as a varied mix of grasses (e.g. bush muhly, three awn, gramma grass). Unusual plant associations occur in microhabitats such as high elevations, north facing slopes, slot canyons, or other shady areas. Sonoran rosewood and Arizona juniper grow above 3,500 feet in the Ajo Mountains. Few populations of this plant community are found elsewhere in the United States.

Plant density, cover and diversity in the western mountains of CPNWR are much lower than in eastern mountains due to generally warmer and drier conditions. Vegetation here is controlled by the limited amount of precipitation, which averages four inches per year. Dominant species include: limber bush, creosote bush, foothills paloverde, elephant tree, Mormon tea, turpentine broom, globemallow, brittlebush, saguaro, and bursage. Because of the steep terrain on many of these sites, and low plant densities in many areas due to rocky soils, these areas are less vulnerable to disturbance than some other topographic locations.

Bajadas and Valley Floors Bajadas (alluvial fans and terrace deposits) surround the mountain ranges and compose the largest portion of the project area. Bajada vegetation is determined by the frequency of freezing temperatures, soil type, geologic source materials, and surficial age (age of the alluvial deposit). On the middle to upper bajada, dominant species include creosote bush, white bursage, triangle-leaf bursage, ironwood, foothills paloverde, Mexican jumping bean, velvet mesquite, tree-form chollas (especially chain-fruit cholla, buckhorn cholla, and pencil cholla), white ratany, saguaro, and senita cactus. Brittlebush is dominant on well drained soils. Desert pavements occur on bajadas and generally support only low stature, sparse creosote bush. Approaching the valley floor, soils become less rocky and the frequency of freezing temperatures drops, causing a change in vegetation. Species that are sensitive to freezing temperatures (e.g. organ pipe, senita, and ironwood) or species that need well drained soils are absent. Where saline or hypersaline soils occur, desert saltbush and linear-leaved saltbush are the dominant species.

In comparison to the bajadas of OPCNM, lower gradient bajadas surround the relatively young granite mountains of CPNWR. Drought tolerant species of creosote, bursage species, and white ratany are typically dominant, along with various species of cacti. Rattlesnake cholla can be dominant here, but is absent from OPCNM.

Biological soil crusts are an important part of the vegetation of the bajadas. Plants rely on the lichens, cyanobacteria, and algae in the crust to provide a number of ecosystem services, such as producing critical nutrients, providing seed germination niches, retaining soil moisture, and protecting soil from wind erosion.

The relatively flat valley floors are characterized by deep, fine grained alluvium that has good moisture holding capacity to support plant growth. Valley floors receive less summer rainfall and are drier than mountains slopes, so plant density and cover are low. Creosote, white bursage, and triangle-leaf bursage are some of the few plant species that can tolerate the dry conditions.

Xeroriparian Areas When compared with surrounding vegetation, xeroriparian vegetation has higher plant species richness (number of species), plant density and cover. The runoff received

from the mountain slopes, supplements rainfall and enhances plant growth. Xeroriparian corridors serve as important habitat for wildlife.

Vegetation along the broad and often braided drainages is dominated by taller stature trees, including ironwood, mesquite, blue paloverde, cat-claw acacia, and crucifixion thorn; as well as mid-sized shrubs (e.g. canyon ragweed, wolfberry), subshrubs, and a prominent component of vines (e.g. Virgin's bower, coyote melon) and annuals. In xeroriparian areas on the drier granite derived soils of CPNWR, trees are uncommon and wolfberry and other mid-sized shrubs are dominant.

Drainage channels on the middle bajadas are generally incised, with xeroriparian vegetation composed of smaller stature trees, mid-sized shrubs such as white-thorn acacia and wolfberry, and many sub-shrubs. Along minor channels of the lower bajada, grasses can become important, especially big galleta, bush muhly, and a wide variety of summer annual grasses.

Xeroriparian vegetation on the mountain slope drainages are highly variable, and often is not strongly differentiated from surrounding vegetation because moisture holding capacity is low and runoff occurs quickly. However, major drainages are the exception. Examples include Alamo, Pitahaya, Boulder, Arch, and Estes canyons in the Ajo Mountains. These drainages support tall stature trees with several understory layers forming a complex structure.

Sand Sheets Sand sheets are flat areas of sand that cover extensive areas in the basins of CPNWR, including the western part of the project area. Creosote, bursage, and big galleta are dominant but at very low densities. Vehicle traffic will readily deflate this substrate, which disrupts surface flows, plant density and cover. The long term impact of vehicles is quickly but superficially covered by wind blown sand.

Playas CPNWR contains a number of playas, or basins that have no water outlet (e.g. Pinta Sands). Playas receive rainfall that runs off the mountains, so they are intermittently wet and can support a diverse annual flora. As the playa water evaporates, it leaves behind minerals and salts and creates a delicately balanced environment that few plants can tolerate. Queen's root (*Stillingia linearifolia*) is one of the few perennials present.

Unique Habitats A series of springs that emanate from the Quitobaquito Hills give rise to unique plant associations and plant and animal species rarely found in the Sonoran Desert. Quitobaquito, Aguajita, and Williams springs are the most productive of the group. The spring water passes through the porous granite rock of the Quitobaquito Hills, picks up sodium and other mineral salts, and deposits them in the wetland area. Only those plant species that will tolerate hypersaline, seasonally wet soil conditions will grow in the area. The pond is surrounded by a bosque (forest) of velvet mesquite, screwbean mesquite, graythorn, Fremont cottonwood, and the very rare desert caper. Saltgrass, goldenbush, desert saltbush, and linear-leaved saltbush dominate the outlying areas. Bulrush, which normally grows in a relatively thin area around the perimeter of the pond in shallow water, has been encroaching into the pond in response to a recent decline in the pond level. Bulrush is changing the aquatic habitat of the pond by increasing evapotranspiration and decreasing water depths, reducing the open water surface and total water volume. However, bulrush also provides important habitat for Quitobaquito pupfish and Sonoyta mud turtles. Consequently, bulrush may be treated, but not eliminated from the pond in order to maintain habitat for these species and others.

Invasive Plants A brief explanation of the distribution and relative ecological impacts of each of the non-native plants in the project area is included in Appendix 1. Of special note are buffelgrass and fountain grass, which have been the focal point because both species are able to colonize disturbed and undisturbed sites at all elevations and substrate types in the project area, even on the western edge of the project area where annual rainfall amounts are lowest

Environmental Consequences of Alternatives

Methodology and Intensity Thresholds Definitions

Analyses of the potential intensity of impacts to plants and plant communities were derived from scientific literature on plants, impact of human activities on soil characteristics, and desert restoration (BWG, 2008; Marshal et.al. 2012; Stevens and Falk 2008). In addition, OPCNM's data on invasive plant management and staff experience with desert restoration contributed to the impact analysis (NPS 2013). The thresholds of change for the intensity of an impact are defined as follows:

Intensity Level Definitions

Negligible	Changes to native vegetation would be so small it would not be measureable or perceptible
Minor	Changes to native vegetation would be measureable and perceptible but small, localized, and of little consequence. Any adverse effect can be effectively mitigated
Moderate	Change to native vegetation would be measurable and perceptible, but large and of consequence. Mitigation could be extensive, but most likely effective
Major	Change to native vegetation would be measurable and perceptible, large and/or widespread, and could have permanent consequences for the resource. Mitigation to offset adverse impacts may be extensive and success is not assured

No Action Alternative

Under this alternative, restoration would be completed using manual and behavioral treatments on a site by site basis. No chemical or mechanical treatments would be used, nor would treatments be implemented in a comprehensive integrated manner. The condition of the vegetation is tied to the soil resources and surface hydrology. Disturbed soils and surface hydrology are more likely to have impacts on vegetation. Treatments that help stabilize and restore soils and surface hydrology often has beneficial impacts on the vegetation.

Behavioral treatments include vertical mulching, spreading slash, and posting signs to discourage UVR activity. These treatments would have a beneficial impact by preventing further disturbances, discourage the spread of invasive plant species, and allow areas to recover naturally.

Manual treatments use hand tools to conduct site preparation, seeding, planting of nursery stock, and invasive plant removal. Manual vegetation planting of disturbed sites has beneficial impacts on disturbed areas, and has been very effective on treatment of small populations of invasive plant species. Without sufficient decompaction on moderately to heavily impacted sites, seeding and planting would not be successful due to the lack of sufficient moisture infiltration and rooting depth. The spread of highly invasive plant species could outpace the ability to effectively treat populations using manual treatments.

Implementation of manual restoration and invasive plant treatments would continue on a site by site basis. Agencies would continue to remove invasive plants by hand pulling or with hand tools. Manual removal on OPCNM and CPNWR has been successful in many habitats and on small populations of invasive plant species.

Short term impacts to vegetation from the no action alternative would be negligible to minor and beneficial from implementation behavioral and manual treatments on previously disturbed or infested sites. In the long term, untreated sites would be prone to accelerated erosion, the disturbance process would continue and natural revegetation would be delayed. Long term impacts would be minor to moderate and adverse across the project area.

Cumulative Impacts of the No Action Alternative

Several projects identified in the cumulative scenario are having impacts on the vegetation resource. CBP and DOI projects (including Sonoran pronghorn infrastructure) are resulting in limited, site specific vegetation removal on the construction areas. The elimination of livestock grazing across much of the project area has helped stabilize and improve plant community composition over time. Vegetation consumption and disturbance continues in some areas within the active grazing allotment and in the vicinity of dispersed camping areas. Increased use of existing roads is resulting in expansion of the existing road footprint and loss of vegetation adjacent to road beds. The presence of UVRs is widespread across the project area and is resulting in damage, loss of vigor, and mortality of disturbed vegetation. The disturbance of soils and surface hydrology from roads and UVRs is having a corresponding adverse impact on the vegetation resource. Soil compaction and erosion result in an indirect loss of vegetation. Dewatering adjacent to and ‘downstream’ from roads and UVRs, is resulting in mortality of mesic species, and changes in plant community composition to more xeric species. The no action alternative would improve the vegetation resource on treatment areas, but the extent of the treatments would be limited resulting in a negligible cumulative effect.

Conclusion of the No Action Alternative

The overall impacts of the no action alternative would be minor to moderate and adverse to vegetation across the project area, as limited treatment methods would be used and larger heavily disturbed sites would not be treated. The cumulative impact to vegetation from the no action alternative is negligible and beneficial.

Preferred Alternative

Behavioral and manual treatments are similar to the no action alternative, but they are expected to be more effective under the preferred alternative because they would be implemented as part of a comprehensive plan across larger areas, and this alternative would allow for the use of mechanical and chemical treatments. Restoration activities are intended to restore normal

function to ecosystem process, mitigate damage to native plant communities, and reduce invasive plant species populations.

Chemical treatments allow for larger areas to be treated each year and would be more successful at treating invasive plants growing on bedrock or rocky soils where roots are hard to extract. Chemical treatments have the potential to injure or kill non-target species. These potential adverse impacts are minimized by the use of best management practices. Backpack sprayers would be the primary method of application, and these can target specific plants with little drift. Overall, native plants and plant communities would benefit from chemical treatments because larger areas would be treated effectively. As invasive plants decline, the native plants would benefit from the lack of competition and the decreased chance of fire. Chemical treatments would have beneficial impacts from the removal/control of invasive plant species and corresponding increase in native species following treatments.

Mechanical treatments will be implemented to prepare the site for seeding and planting. Using equipment to decompact soils will make seeding and planting more successful due to increased moisture infiltration and rooting depth. Mechanical equipment such as drilling or augers may be used in planting operations allowing vegetation of much larger areas compared with manual methods. Some damage to plants may occur as a direct result of using heavy equipment to decompact, but this would be offset by improved growing conditions. Other mechanical treatments such as mowing and the use of chainsaws would be used when they are the most effective treatment method for invasive plant species.

Short term impacts to vegetation would be minor to moderate and beneficial from the implementation of integrated restoration and invasive plant species treatments on larger areas. In the long term, more efficient and effective restoration and invasive plant treatments would result in larger treatment areas and moderate beneficial impacts.

Cumulative Impacts of the Preferred Alternative

The cumulative impacts are similar to the no action alternative. However, the preferred alternative would implement a coordinated, planned approach and would be more efficient and effective at restoring native vegetation to larger and more severely disturbed sites. This alternative would result in greater beneficial impacts to the vegetation resource, but would not result in measureable changes to the overall cumulative effects.

Conclusion of the Preferred Alternative

The overall impacts of the preferred alternative would be moderate and beneficial to vegetation across the project area, as full use of treatment methods would be used and larger heavily disturbed sites would be treated. The cumulative impact to vegetation from the preferred alternative would not result in measureable changes.

WILDERNESS

Affected Environment

The project area includes approximately 649,440 acres of wilderness. Organ Pipe Wilderness Area was designated in 1978 (Public Law 95-525) and includes approximately 311,440 acres, all of which is within the project area. The Cabeza Prieta Wilderness (803,418 acres) was designated to preserve the Sonoran Desert ecosystem, About 338,000 acres of Cabeza Prieta

wilderness are within the project area. No wilderness has been designated within the BLM Ajo Block.

Wilderness character is defined by the following five qualities:

Untrammeled: Wilderness is essentially unhindered and free from modern human control or manipulation. This quality pertains to actions that manipulate or control ecological systems within the wilderness.

Natural: Ecological systems in wilderness areas are substantially free from the effects of modern civilization. In the context of restoration, this quality pertains to planned and unplanned human caused effects on natural and cultural resources conditions.

Undeveloped: Wilderness retains its primeval character and influence and is essentially without permanent improvement or modern human occupation. This quality pertains to the presence of infrastructure within or adjacent to wilderness.

Solitude or Primitive and Unconfined Recreation: Wilderness provides outstanding opportunities for solitude or primitive and unconfined recreation. This quality pertains to visitor opportunities to experience a primitive setting that may include solitude and adventure.

Other Unique Features: Wilderness may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value.

These five qualities are used to assess the impacts of action on wilderness. The MRDG is designed to assist wilderness managers in making appropriate decisions affecting wilderness. The MRDG is a process to identify, analyze, and select management actions that are the minimum necessary for wilderness management. It applies a two-step process to first determine if the administrative action is necessary in wilderness; and if so, provides guidance for determining the techniques and types of equipment necessary to minimize impacts on wilderness resources in order to meet the actions objectives. An MRDG that covers the activities in this ERP is included in Appendix 3.

Environmental Consequences of Alternatives

Methodology and Intensity Thresholds

Analysis of the potential intensity of impacts to wilderness includes park staff knowledge of resources and sites, review of existing published literature and park studies, information provided by specialists in the NPS and USFWS, and professional judgment. Additional sources of information on wilderness character used as a basis for this evaluation are as described above in the affected environment section. The thresholds of change for the intensity of an impact are defined as follows:

Intensity Level Definitions

Negligible	Impacts to wilderness characteristics would not be detectable or barely detectable. Natural conditions would prevail.
Minor	Impacts to wilderness characteristics would be very small and detectable within limited areas of the wilderness. Natural conditions would predominate. Any

impacts to wilderness characteristics can be easily mitigated.

Moderate Impacts to wilderness characteristics would be small to medium in scale and intensity, and readily apparent within limited areas of the wilderness. Mitigation measures to reduce the evidence of human activities in wilderness characteristics would be successful.

Major Impacts would substantially alter the wilderness characteristics throughout larger portions of the wilderness area. Mitigation measures would not be able to successfully restore all aspects of wilderness characteristics. Signs of human intervention would continue to be visible.

No Action Alternative

While wilderness character remains in some areas, wilderness character is affected by border-related activities. Under this alternative, restoration would implement behavioral and manual treatments; no chemical or mechanical treatments would be used.

Behavioral treatments such as closing UVRs, seeding, installing nursery plants, and mulching could be used in wilderness. Signs would not be placed in wilderness areas, but could be installed adjacent to wilderness in order to discourage UVR activity. These treatments are in line with the intent of wilderness characteristics and legislation to minimize evidence of human activities. These treatments would be more effective when used in combination with other restoration treatments.

Manual treatments using hand tools would prepare sites for replanting/seeding and to remove invasive plants. Manual site preparation treatments are effective on low to medium disturbed sites where hand tools are sufficient to remove evidence of human disturbances, and where the area of disturbance is small. In areas where medium to heavy disturbances are present, manual treatments may not be sufficient to adequately restore wilderness character. Manual treatments are labor intensive and would limit the amount of areas that could be treated for invasive species. These treatments best achieve the wilderness characteristics of untrammeled and undeveloped because no mechanized equipment would be used. However, because fewer areas would be restored to natural conditions, evidence of UVRs and human activities would still be evident in many areas, detracting from wilderness characteristics of untrammeled, natural, undeveloped and the opportunity for solitude and primitive recreation.

The presence of restoration workers in wilderness would impact the solitude of visitors; however, these impacts would be temporary lasting only during implementation. Since treatments would be implemented on previously disturbed or infested sites and restoration treatments would result in short term negligible to minor beneficial impacts from restoring wilderness character and minimize the evidence of human intervention on the landscape. Long term treated sites would continue to improve and stabilize. However, larger and heavily disturbed sites would not be treated effectively using behavioral and manual treatments resulting in minor to moderate adverse impacts within the project area.

Cumulative Impacts of the No Action Alternative

Several projects identified in the cumulative scenario are having impacts to wilderness characteristics of: untrammeled, natural, undeveloped, and primitive/solitude wilderness experiences. CBP construction of surveillance towers, Camp Grip and the Ajo Forward Operating Base (FOB), and the pedestrian fence has occurred adjacent to wilderness boundaries. Wilderness within the project area has experienced increased levels of border-related activities (NPS 2013, NPS 2014). DOI pronghorn infrastructure construction has impacted small areas of wilderness. Increased use of existing roads adjacent to wilderness areas has resulted in a decline in primitive experience/solitude. The wide spread presence of UVRs throughout the project area has degraded the untrammeled, natural, and undeveloped character of wilderness. Vehicles present in wilderness result in a decline in the primitive/solitude recreational experience. The no action alternative would produce a very limited treatment of human disturbances, cumulatively resulting in a negligible beneficial impact to wilderness characteristics.

Conclusion of the No Action Alternative

The overall impact of the no action alternative would be minor to moderate and adverse to wilderness across the project area, as limited treatment methods would be used and larger heavily disturbed sites would not be treated. The cumulative impact to wilderness from the no action alternative is negligible and beneficial.

Preferred Alternative

Behavioral and manual treatments under the preferred action are similar to the no action alternative but they are expected to be more effective under the preferred alternative because they would be implemented as part of a comprehensive plan and across larger areas, and this alternative would allow for the use of mechanical and chemical treatments. The strategy(s) that are most effective in terms of cost and results with the least adverse impacts would be determined through the use of the MRDG. Restoration activities are intended to reduce the evidence of adverse human impacts, manage invasive plants, and restore wilderness character.

Treating invasive plants with chemicals would result in less disturbance of the natural and undeveloped character of wilderness. Chemical treatments are more efficient over large areas, inaccessible areas, and on steep rocky slopes. They also reduce the need for ground disturbing activities such as the manual pulling of plants in wilderness areas. Although chemical treatments would introduce herbicides into a wilderness area, the benefits of treating larger areas and preserving natural biotic communities and wilderness characteristics would be in keeping with wilderness management principles and would offset the temporary adverse impact of trammeling wilderness.

Mechanical treatments would be implemented in wilderness when the MRDG determines that mechanized equipment is necessary to minimize the impacts on wilderness resources and to successfully meet restoration objectives. The MRDG would guide the selection of the appropriate techniques for the specific wilderness area. Mechanized equipment is the most effective treatment for decompacting moderately and severely compacted soils and recontouring disturbed surfaces, particularly on large and severely disturbed sites. The use of mechanized equipment is often the most effective treatment method for many invasive species. Mechanical treatments would allow for restoration on more acres of than would be possible under the No Action Alternative. Noise from mechanized equipment and the presence of work crews would temporarily impact solitude but conditions would return to ambient levels immediately after treatment.

In the short term, there would be minor adverse impacts from the visibility of mechanized site preparation treatments and the visibility of newly restored vegetation. Over the long term the visibility of restoration treatments will be reduced as the treated areas stabilize and vegetation matures. Long term impacts would be minor to moderate and beneficial as restoration will enhance and improve wilderness characteristics.

Cumulative Impacts of the Preferred Alternative

The cumulative impacts are similar to the no action alternative. However, the preferred alternative would implement a coordinated, planned approach and would be more efficient and effective at restoring large and more severely disturbed sites in wilderness. Although this alternative would allow for mechanized equipment use in wilderness provided the MRDG results found it to be the most effective treatment method, the long term impacts would be beneficial as wilderness characteristics would be restored across larger areas compared to the no action alternative. The contribution to cumulative effects is negligible to minor in the context of ongoing disturbances.

Conclusion of the Preferred Alternative

The overall impacts of the preferred alternative would be minor to moderate and beneficial to wilderness across the project area, as full use of treatment methods would be used and larger heavily disturbed site would be treated. The cumulative impact to wilderness from the preferred alternative is negligible to minor and beneficial.

SPECIAL STATUS SPECIES

Affected Environment

The Endangered Species Act of 1973 requires federal agencies to preserve and recover federally threatened and endangered species. If a federal action is expected to have adverse impacts, Section 7 of the Endangered Species Act requires all federal agencies to consult with the U.S. Fish and Wildlife Service to ensure that any action authorized, funded, or carried out by the agency does not jeopardize the continued existence of listed species or critical habitats. In addition, the NPS *Management Policies 2006* and Director's Order 77 Natural Resources Management Guidelines require the National Park Service to examine the impacts on federal candidate species, as well as state-listed threatened, endangered, candidate, rare, declining, and sensitive species (NPS 2006). The Ecological Services branch of USFWS has the responsibility (along with NOAA-Fisheries in the Dept. of Commerce) of administering the Endangered Species Act. Any actions undertaken on USFWS units undergo the same consultation process as required for other entities, but also include the consideration of candidate species (USFWS 1998). Likewise, BLM is required to undertake Section 7 consultations, and maintains a list of species in each state that includes all federally designated candidate species, proposed species, and delisted species in the 5 years following their delisting which are conserved as BLM sensitive species (BLM 2008). There are several plant and animal species with special status present in the project area, listed below.

Taxonomic group	Species common name	Status

Plants	Acuña cactus	Federal Candidate* (proposed for listing)
Animals	Quitobaquito pupfish	Federally Endangered with Critical Habitat
	Sonoran desert tortoise	Federal Candidate*
	Sonoyta mud turtle	Federal Candidate*
	Cactus ferruginous pygmy-owl	Sensitive (Recently de-listed)
	Lesser long-nosed bat	Federally Endangered
	Sonoran pronghorn	Federally Endangered

*A candidate for listing under the ESA indicates consideration of this species as threatened or endangered has been precluded by higher priority species

Sonoran desert tortoise (Gopherus morafkai)

The desert tortoise was recently split into two distinct species: the Sonoran and Mojave (*G. agassizii*) desert tortoises. Although the Mojave population (now species) is listed as threatened, the Sonoran desert tortoise is still a candidate for listing. Sonoran desert tortoises in the project area differ from the Mojave species by their preference for rocky slopes and bajadas rather than fine-textured alluvial soils in valley bottoms. Tortoises are vulnerable to threats such as disease, poaching, off-road vehicle use, highway mortality, drought, habitat loss, and habitat modification (e.g. buffelgrass infestation). Because of their preference for rocky slopes, impacts from UVRs are relatively limited within their habitat. However, rocky slopes and bajadas are vulnerable to buffelgrass infestations.

Cactus ferruginous pygmy-owl (Glaucidium brasilianum cactorum)

The cactus ferruginous pygmy-owl is found primarily in middle to upper bajadas and xeroriparian systems, where vegetation is relatively dense and diverse in structure and species composition. The pygmy-owl was removed from the list of endangered species in 2006. In response to a petition to relist the species, the USFWS determined in 2011 that the Arizona population did not contribute significantly to the subspecies as a whole and did not constitute a Distinct Population Segment. It is still considered a sensitive species by managers due its relative rarity and because OPCNM is one of the few places in the U.S. where the species is reliably found. The pygmy-owl is somewhat vulnerable to disturbance by human activity. Its habitat may be degraded by loss of vegetation due to disturbance, fire, or invasive plant species.

Lesser long-nosed bat (Leptonycteris curasoae yerbabuanae)

The lesser long-nosed bat is migratory and vulnerable to disturbance in the other portions of its range including southeastern Arizona, where it spends late summer, and Mexico, where it spends the winter. At OPCNM and CPNWR, bats rely on fruit and nectar from saguaro and organ pipe cactus for food, large stands of which are protected in the project area. To a lesser extent, this species also feeds on montane agaves in the project area. Several roosting sites for lesser long-nosed bats occur in the project area, the largest of which is located in OPCNM. More than

40,000 female bats use the roost in OPCNM to nurse and raise their young every year. This species is considered vulnerable because of the concentration of individuals at roost sites: any disturbance or catastrophic event would have the potential to harm a large proportion of the population. This species forages primarily on bajadas and in mountain habitats. Bajada habitats are somewhat subject to degradation by human activities (loss of food plants), while montane habitats are less vulnerable.

Sonoran pronghorn (Antilocapra americana sonoriensis)

The current range of the Sonoran pronghorn in the U. S. occurs almost entirely on OPCNM, CPNWR, BLM lands, and the Barry M. Goldwater Range. CPNWR serves as the lead agency in the Sonoran pronghorn recovery efforts. CPNWR and OPCNM provide winter and summer habitat, and are particularly important for the latter. In OPCNM, pronghorn occur primarily west of Highway 85. Occurrences east of Hwy 85 are rare but have been more frequent in recent years. Pronghorn inhabit valley bottoms in the winter and move between areas where annual plant production is high following favorable winter rains. In the summer, they generally move upslope into bajada areas which provide greater diversity of plant forage species, and thermal cover in the increased density of trees. Sonoran pronghorn also occur in Sonora, Mexico, but are physically separated from the U.S. population by Mexican Highway 2 and associated fences and other infrastructure. The U.S. population experienced severe declines in the early 2000s, reaching an all-time low of about 22 animals in 2002 (NPS 2010). A recovery program has focused on using a semi-captive breeding facility located on CPNWR to supplement the wild, free ranging population, and providing water and forage sources. Pronghorn numbers have increased significantly since 2002, but they are still low and considered vulnerable to further disturbance and habitat impacts. Pronghorn are particularly sensitive to human presence including vehicle traffic and appear to avoid heavily used areas.

Environmental Consequences of Alternatives

Methodology and Intensity Thresholds

For this analysis, impact intensities of impacts on special status species were derived from a review of the scientific literature, NPS and USFWS specialists, recovery team findings for the Sonoran pronghorn, and professional judgment.

Intensity Level Definitions

Negligible	Impacts on special status species are insignificant and discountable, at the individual and population levels.
Minor	Impacts on special status species are small, localized, affect one or very few individuals, or very small areas of habitat, and have little potential consequence. Mitigation measures, if needed, would offset adverse effects, would be simple and successful.
Moderate	Impacts on special status species are small, localized, affect few individuals, or small areas of habitat, and have little potential consequence at the population level. Mitigation measures, if needed, would offset adverse effects.

Major The action would have significant adverse effects on multiple individuals and/or a population, and/or would adversely affect a habitat area that is significantly important to multiple individuals and/or a population. Extensive mitigation measures are needed to offset adverse effects.

No Action Alternative

Under this alternative, restoration would be completed using behavioral and manual treatments on a site by site basis. No chemical and mechanical treatments would be used, nor would integrated restoration treatments be implemented under a comprehensive plan. The condition of special status species habitat is tied to the vegetation resources. Disturbed areas that lack native plant communities have a corresponding lack of quality habitat. Treatments that help stabilize sites and enhance vegetation also have a beneficial impact on special status species habitats.

Behavioral treatments such as vertical mulching, spreading slash, and posting signs to close UVRs would help reduce vehicle traffic and reduce harassment from off-road travel and fragmentation of habitat. If areas lack forage and habitat resources, then behavioral treatments are not effective unless used in combination with other treatments.

Manual treatments using hand tools to restore more natural soil and vegetation resources result in improved foraging, nesting and fawning habitat, and hiding cover. Manual removal of invasive plant species has a beneficial impact as native plants would be planted or would recolonize treated sites resulting in improved special status species habitats. Buffelgrass and fountain grass do not provide substantial forage or shelter for special status species and outcompete native plant species which perform this function. Invasive plants can increase the risk of fire, which is naturally very rare in the project area and to which species and communities in the project area are not adapted. Manual treatments are effective on low to medium disturbed sites, and on small areas where hand tools are sufficient to restore more natural conditions and remove invasive plants. On large, medium to heavily disturbed areas, manual treatments may not be sufficient to remove invasive plants, restore native plant communities and special status species habitats.

The presence of work crews and vehicles could create a temporary disturbance to some special status species. To reduce temporary adverse impacts from restoration work, sites far from roads will not be treated during the pronghorn fawning season until the estimated US population of free ranging Sonoran pronghorn exceeds 140 individuals. This population number has been selected because it is the most recent population ‘high point’ identified in litigation and settlement conservation measures from Defenders of Wildlife v. Babbitt et.al.

Each special status species will be impacted differently by the no action alternative. Generally, all species will benefit from reduced off-road traffic, removal of invasive plant species, and restoration of native plant communities; therefore, the short term impacts are negligible to minor and beneficial as areas of habitat will be restored. In the long term special status species habitat is predicted to continue to degrade from lack of large restoration treatments and the continued spread of invasive plant species resulting in a minor to moderate and adverse impact.

Cumulative Impacts of the No Action Alternative

Several projects identified in the cumulative scenario are having impacts on special status species. CBP and DOI construction projects result in site specific impacts to special status species from the presence of construction workers, construction traffic, and the routine presence

of maintenance workers and traffic throughout special status species habitats. Camp Grip and the Ajo Forward Operating Base result in increased traffic and the presence of CBP agents in important special status species habitat. Elimination of livestock grazing across much of the project areas has resulted in improved forage availability for special status species. Active grazing allotments and dispersed camping resulted in competition and human presence in special status species habitat. Increased use of existing roads (USFWS 2011b) and UVRs result in increased noise and human presence and fragmentation in special status species habitats through soil disturbance and loss of native plant communities. The no action alternative will improve habitat on limited areas, resulting in a beneficial impact. The benefits will be limited and will not contribute measurably to the overall cumulative effects that are minor to moderate and adverse from ongoing disturbances.

Conclusion of the No Action Alternative

The overall impacts of the no action alternative would be minor to moderate and adverse to special status species across the project area, as limited treatment methods would be used and larger heavily disturbed sites would not be treated. The cumulative impact to special status species from the no action alternative is negligible and beneficial.

Preferred Alternative

Behavioral and manual treatments under the preferred action are similar to the No Action Alternative, but they are expected to be more effective under the preferred alternative because they would be implemented as part of a comprehensive plan across larger areas, which integrate all treatment methods including mechanical and chemical. Chemical treatments would allow for larger areas to be treated. Direct exposure to herbicides to special status species would be extremely unlikely, as areas would be pre-surveyed for the presence of special status species. Toxic dietary thresholds would not be expected to occur for special status species because desert tortoises are not known to commonly consume targeted species with any frequency, Sonoran pronghorn are not known to consume any of the invasive plant species under consideration (USFWS 1998), and the remaining species do not consume targeted plant species. Additionally, application rates are many times below the toxic thresholds for animals.

Mechanical treatments using motorized tools and heavy equipment would temporarily increase noise levels and potentially disturb special status species. Mechanical treatments are being considered on medium to heavily disturbed areas where intact special status species habitat would be limited or absent. In order to prevent unintended impacts to special status species, the area would be surveyed for the appropriate species prior to project implementation. Larger areas and more severely disturbed areas would be restored, resulting in greater benefits to special status species, particularly the Sonoran pronghorn.

Each special status species will benefit from the removal of invasive plant species, reduced off-road travel, restoration of native plant communities and improved habitat conditions. The short term impacts are minor to moderate and beneficial from habitat restoration and invasive plant removal. In the long term impacts to special status species habitat would be minor to moderate and beneficial as larger areas would be restored, particularly in Sonoran pronghorn habitat.

Cumulative Impacts of the Preferred Alternative

The cumulative impacts are similar to the no action alternative. However, the preferred alternative would implement a coordinated, planned approach and would be more efficient and

effective at restoring large and more severely disturbed sites, including more areas within special status species habitats. Initial treatments would be focused on habitat improvements for the Sonoran pronghorn, lesser long-nosed bat and would result in beneficial impacts. The contribution to cumulative effects is negligible in the context of ongoing disturbances.

Conclusion of the Preferred Alternative

The overall impacts of the preferred alternative would be minor to moderate and beneficial to special status species across the project area, as full use of treatment methods would be used and larger heavily disturbed sites would be treated. The cumulative impact to special status species from the preferred alternative is negligible and beneficial.

WILDLIFE RESOURCES

Affected Environment

NPS strives to maintain all components and processes of naturally evolving park unit ecosystems, including the natural abundance, diversity, and ecological integrity of animals (NPS 2009). The primary management goal of USFWS National Wildlife Refuge System is to conserve and protect wildlife species (USFWS 2006). The BLM's Ajo Block also functions as a conservation agent for wildlife habitat, in part due to its undeveloped status, proximity to other large protected areas, and conservation goals of the managing agency (BLM 2011).

A diverse group of wildlife species inhabit the area, from insects and other invertebrates such as scorpions, ants, and spiders, to small and large vertebrates such as reptiles, fishes, amphibians, birds, and mammals. The high diversity of wildlife is the result of the high diversity in plant species, elevations, substrates, and other habitat components in the project area. A brief overview of wildlife diversity follows:

Insects & Other Invertebrates

This diverse group of animals function both as prey for other organisms and as important functional parts of ecosystem processes including moving nutrients through the desert food web and acting as pollinators of plant species. Termites play critical roles in decomposing and returning organic material to soils which is used in turn by other organisms. Many plant species have only one species of pollinator (often moths, bees, and butterflies), which they rely on for successful reproduction. Other insects such as ants play important roles as prey for reptiles and other predators and in dispersing plant seeds.

Reptiles & Amphibians

Lizards and snakes are common in essentially all habitats in the affected area and are important predators and prey for other animals. Common lizards include whiptails, desert iguanas, horned lizards, and side-blotched lizards. Common snakes include several rattlesnake species, whipsnakes, gophersnakes, and rarer species such as the Desert rosy boa and Organ Pipe Sand Snake. Desert amphibians live most of the year in estivation and then emerge from the ground when the summer monsoon creates flooding and temporary shallow pools for breeding opportunities.

Birds

Approximately 280 species of birds occur in the project area, which includes both residents and migrants (Groschupf et al. 1988, and NPS data). About 75 species breed in the project area. The

highest density and diversity of birds occurs along intermittent drainages or arroyo habitats (xeroriparian areas). Common resident species include cactus wren, verdin, phainopepla, red-tailed hawk, curve-billed thrasher, Gila woodpecker, and Gambel's quail. Valley bottoms can provide good wintering habitat for mixed species songbird flocks (sparrows, buntings, etc). Birds serve ecosystem functions that include pollination, seed dispersal, predation, prey, cavity excavation, and others.

Small & Large Mammals

Rodents and lagomorphs (rabbits) are abundant in the area and serve as important prey resources for other animal species. Major rodent groups include kangaroo rats, pocket mice, and larger species like white-throated wood rat. Their ecological roles include nutrient cycling, creating soil fertility, and seed consumption and dispersal. They are capable of changing the physical structure of soils through burrowing and tunneling activities. Medium sized mammals such as the bobcat, grey fox, kit fox, badger, and four species of skunks are common, but are not frequently seen. Large mammals such as javelina, coyote, and mule deer are also common, while other rarer mammals such as mountain lion and desert bighorn sheep mainly inhabit mountain ranges. Like birds, mammals serve a wide range of ecosystem functions that include pollination, seed dispersal, predation, herbivory, prey, burrow excavation, and others.

Environmental Consequences of Alternatives

Methodology and Intensity Thresholds

For this analysis, impact intensities of impacts on wildlife were derived from a review of the scientific literature, NPS specialists, and professional judgment.

Intensity Level Definitions

Negligible	An action that could result in a change to a population or individuals of a species, but the change would be so small that it would not be of any measurable or perceptible consequence to wildlife populations or supporting habitat.
Minor	An action that could result in a change to a population or individuals of a species or their habitat. The change would be small and localized and would be of little consequence to wildlife populations or supporting habitat.
Moderate	An action that would result in some change to a population or individuals of a species or their habitat. The change would be measurable and of consequence to the species or their supporting habitat in a small geographic area.
Major	An action that would have a noticeable change to a population of a species. The change would be measurable and would result in a major adverse or beneficial impact, and possible permanent consequence, on the species or supporting habitat over broad geographic areas.

No Action Alternative

Under this alternative, restoration would be completed using behavioral and manual treatments on a site by site basis. No chemical and mechanical treatments would be used, nor would integrated restoration treatments be implemented under a comprehensive plan. The condition of wildlife is tied to the health of the vegetation resource. Disturbed areas that lack native plant communities have a corresponding lack of quality wildlife habitat.

Behavioral treatments such as vertical mulching, spreading slash, and posting signs to close roads would help reduce vehicle traffic and reduce harassment to wildlife species and fragmentation of habitat. If areas lack forage and habitat resources, then behavioral treatments are not effective unless combined with other treatments.

Manual treatments using hand tools to restore more natural soil and vegetation resources result in improved foraging, nesting and fawning habitat, and hiding cover. Groups of restoration workers using transport vehicles and hand tools will create a temporary disturbance and increase noise and dust levels. Avoidance of restoration sites by large vertebrates may occur but is not expected to have a measurable impact. Large vertebrates are very mobile and those that avoid restoration sites will likely move back into restored habitat once work is completed. Impacts to migratory birds would be negligible as restoration activities would not remove or alter potential nesting sites (restoration areas would be pre-surveyed for nesting sites). Other wildlife groups such as rodents, ants, and termites will likely remain in or recolonize degraded sites. They would aid soil health by opening soil structure through burrowing activities and create soil fertility, yet expected natural recovery rates would be on the order of decades to centuries. Some wildlife populations will remain outside larger untreated areas of low quality habitat and seek other more favorable areas until habitat conditions improve.

Manual removal of invasive plant species has a beneficial impact as native plants would be planted or would recolonize treated sites resulting in improved wildlife habitats. Invasive plants interfere with animal activities. Some observed examples of interference include the inability of ground foraging birds, such as Gambel's quail, to penetrate dense buffelgrass stands, while other animals such as lizards may not be able to thermoregulate properly in infested habitats. In addition, the basal leaves of Sahara mustard block trails and interfere with the foraging behavior of kangaroo rats. Invasive plant management would restore native plant communities and improve wildlife habitat.

Implementation of the No Action Alternative would restore small areas, and reduce some invasive plant populations but overall, invasive plants would increase and expand. The short term impacts to wildlife would be negligible to minor and beneficial from behavioral and manual treatments. The rate of increase and spread of managed invasive plants would be greater under this alternative than it would be under the preferred alternative. Several medium to heavy degraded areas would not be treated and in these untreated areas, wildlife habitat would con continue to deteriorate. Long term impacts would be minor to moderate and adverse.

Cumulative Impacts of the No Action Alternative

Several projects identified in the cumulative scenario are having impacts on wildlife species. CBP and DOI construction projects result in site specific impacts to wildlife habitat from the presence of construction workers, construction traffic, and the routine presence of maintenance workers and traffic throughout special status species habitats. Camp Grip and the Ajo Forward Operating Base result in increased traffic and the increased presence of CBP agents in the vicinity of these installations (USFWS 2011b). Land management administrative traffic may also

disrupt wildlife. The pedestrian fence has limited the migration corridors for many species. Elimination of livestock grazing across much of the project areas has resulting in improved forage availability for wildlife species. Active grazing allotments and dispersed camping results in competition and human presence in wildlife habitat. Increased use of existing roads and UVRs result in increased noise and human presence in wildlife habitat. UVRs are fragmenting and degrading habitat quality for a number of wildlife species through soil disturbance and loss of native plant communities as well as destruction of burrows or death of the animals that use them. The preferred action alternative will improve habitat on larger areas compared to the no action alternative, resulting in a negligible to minor beneficial impact.

Conclusion of the No Action Alternative

The overall impacts of the no action alternative would be minor to moderate and adverse to wildlife across the project area, as limited treatment methods would be used and larger heavily disturbed sites would not be treated. The cumulative impact to special status species from the no action alternative is negligible to minor and beneficial.

Preferred Alternative

Behavioral and manual treatments under the preferred action are similar to the no action alternative, but they are expected to be more effective under the preferred alternative because they would be implemented as part of a comprehensive plan and across larger areas, and this alternative would allow for the use of mechanical and chemical treatments.

Chemical treatments would be used to manage invasive plants and have the potential to injure or kill non-target species. These potential adverse impacts are minimized by mitigation measures discussed at the beginning of this chapter. Backpack sprayers would be the primary method of application, and these can target specific plants with little drift. The main targeted invasive species may be eaten by wildlife or the seeds may be collected by ants, but are not a primary food source for any wildlife group. Toxic dietary thresholds would not be expected to occur because herbicides will be strictly applied according to manufacturer's label specifications; these application rates are many times below toxic thresholds for animals. Snakes and other reptiles may seek shelter in buffelgrass patches; however, alternative habitat is readily available throughout the project area and direct exposure to herbicide spray would be extremely unlikely. Overall, wildlife habitat would benefit from chemical treatments because larger areas would be treated effectively. As invasive plants decline, native plants would increase in dominance and provide more opportunities for forage and shelter for wildlife.

Mechanical treatments involve the use of mechanized tools and equipment and will be necessary on medium and heavily disturbed sites to properly prepare the site for seeding and planting. Without sufficient decompaction on moderately to heavily impacted sites, habitat improvement would not be as successful. Mechanical equipment allows for treatment on much larger areas than using manual methods. Groups of restoration workers using transport vehicles and heavy equipment will create a temporary disturbance and increase noise and dust levels. Mechanical restoration treatments could potentially collapse burrows and tunnels created in UVRs, but these cases are expected to be rare. Mechanical treatments could also cause mortality in local populations of animals dwelling underground (insects, invertebrates, possibly reptiles and small mammals). Affected wildlife groups have very high reproductive capacities and should readily recover from these temporary disturbances and recolonize restored habitats. These short term

adverse impacts would be offset by the overall improvement in habitat quality over large areas for a diverse set of wildlife species.

Short term impacts from the use of integrated restoration and invasive plant treatments would be minor to moderate and beneficial to many wildlife species as native habitats would be restored using the most effective treatment methods. Long term impacts would be moderate and beneficial from restoration of larger blocks of native habitat.

Cumulative Impacts of the Preferred Alternative

The cumulative impacts are similar to the no action alternative. However, the preferred alternative would implement a coordinated, planned approach and would be more efficient and effective at restoring large and more severely disturbed sites, including more areas wildlife habitats. The contribution to cumulative effects is negligible in the context of ongoing disturbances.

Conclusion of the Preferred Alternative

The overall impacts of the preferred alternative would be minor to moderate and beneficial to wildlife across the project area, as full use of treatment methods would be used and larger heavily disturbed sites would be treated. The cumulative impact to special status species from the preferred alternative is negligible and beneficial.

ARCHEOLOGICAL RESOURCES

Affected Environment

The project area is included in the western section of an area known as the Papaguería. Straddling the international boundary between Arizona in the United States and Sonora in Mexico, the Papaguería is the hottest and driest section of the Sonoran Desert. Within the project area, cultural resources represent long, widespread and diverse occupations of cultural sites that date back thousands of years; to at least 12,000 years ago, possibly to 16,000 B.C. or perhaps even to 30,000–40,000 years ago. Research is continuing at archeological sites in North America that indicate various entry points for humans into North America in addition to the Bering land bridge. Evidence for a Pre-Paleoindian (pre-Clovis) Tradition and for Western Stemmed Technology (WST) overlapping early Clovis presence is accumulating at archeological sites in southern California, Oregon, Nevada, Utah, and Arizona (Beck and Jones 2010; Jenkins et al. 2012). Clovis technologies are seen as more adapted to hunting of megafauna on the Plains; whereas WST is viewed as an alternative technology more adapted to the Pacific coast and western mountains of California, Nevada, Oregon, Utah, and Arizona. A WST presence is evident at OPCNM based upon the presence of WST projectile points (Gibson 2012).

The land within the project area is believed to be among the earliest lands in North America to adopt maize agriculture and beans, squash, cotton, and tobacco crops from Mesoamerica. In addition to the Hohokam culture, past Patayan and Trincheras cultures are represented in the park. Many present-day tribes claim cultural affiliation with these lands, including the Four Southern O'odham tribes, the Hopi Nation, and the Zuni Pueblo of New Mexico, who all claim descendency from the Hohokam cultural group. The Colorado River Tribes are believed to be descended from the Patayans. The Trincheras culture was centered in Sonora and Chihuahua states in present-day Mexico, but remains of Trincheras sites extend far into present-day Arizona.

Organ Pipe Cactus National Monument

Southwestern Arizona has a powerful and vivid history and prehistory that goes back thousands of years. Human occupations left traces of their culture history as material remains in archaeological and historical sites throughout what is now OPCNM land. Less than 5 percent of OPCNM lands have been surveyed for cultural resources, and there is a conservative estimate of 1,000 archaeological sites that have not yet been recorded, most consisting of rock shelters, caves, ephemeral and subtle lithic scatters, early ak-chin floodwater farming fields and water control devices, and earthen features. Most prehistoric archeological sites are subtle and ephemeral upon the landscape.

OPCNM has minimally recorded 300 prehistoric archeological sites and 60 historic structures and features, some recorded in the 1950s by Paul Ezell, William Supernaugh, and Stan Olsen. Mallouf (1980) recorded 46 new sites along the Ajo Mountain Crest in a survey of approximately 750 acres. The most comprehensive cultural resources survey was performed in 1989–1991 by Adrianne Rankin et al. (1995), of 7,675 acres within OPCNM. The Rankin survey recorded 173 new archeological sites and updated another 5 sites. One hundred acres were surveyed in the Bates Well Ranch compound area in 2010 (Jelinek & Cutright-Smith) and a large archeological survey was completed more recently by the University of Arizona, where nearly 700 acres were surveyed in Diablo Canyon and the San Cristobal area resulted in the recording of 15 new archeological sites (Hopkins & Milliken 2011). Various other smaller archeological surveys have been performed.

Cabeza Prieta National Wildlife Refuge

The Cultural Resources Overview and Assessment for CPNWR (2001) compiled the site data and proposed a scenario for the prehistoric and historic use patterns of the refuge at a time when less than one percent of the refuge had been surveyed. The reports used in the 2001 assessment included those by Ezell 1954, Fontana 1965, and Keane 1994. Surveys, recording projects, and a single limited excavation have been completed by the Arizona Archaeological Society and Arizona Site Stewards since 2001. This has resulted in an inventory of 57,260 acres, or 6.7 percent of the refuge (Davis 2006; Martynec 2005, 2006, 2011, 2013).

Ajo Block – Bureau of Land Management

Two large-scale cultural resource surveys have been completed in the last seven years that will add a great deal to our understanding of the cultural history of the Ajo area. The first was a volunteer project by the Ajo Chapter of the Arizona Archaeology Society and the work was completed in stages beginning in 1999 and ended in 2002. The report, documenting a pedestrian inventory of 1,860 acres of BLM land was completed in 2005. This report was published by the Arizona Archaeological Society as Archaeology Series, Number 1 (Martynec 2005). These volunteers coordinated closely with BLM archaeologist (Cheryl Blanchard) during this work to assure that the inventory met BLM and Arizona State Museum standards for survey. A total of 32 sites were documented during the course of the project.

The second project in the Ajo area resulted in a survey focused on parcels of BLM lands that contain old and abandoned mining features, otherwise known as AML features. This survey resulted in the documentation of 43 newly recorded cultural sites. There are four sites within these parcels that had been previously recorded. A total of 26 of the sites are recommended by the recorder as having the characteristics that would make them eligible for the National Register

(Hooper 2012). The purpose of the survey was to allow the mining company to design a program to fill in or fence the AML features, since some may be unsafe to the public.

Prehistoric sites fall into categories that are limited to the surface and suggest ephemeral use or occupation of locations by widely dispersed, small groups of prehistoric hunter-gatherers. These site types are: low density artifact scatters of lithic material and ceramics, fire-burned rock and hearths, trails, bedrock mortars, rock alignments, stone piles or cairns, stone windbreaks, sleeping circles, shallow rock shelters, and rock art sites.

Environmental Consequences of Alternatives

Methodology and Intensity Thresholds

Analyses of the impacts to archeological resources were derived from scientific literature, law enforcement case incidents, field observations, intensive archeological surveys, periodic archeological field condition assessments, OPCNM's data on off-road vehicle routes, and the documented impact of human activities on prehistoric archeological sites. Thresholds of change for the intensity of an impact are defined as follows:

Intensity Level Definitions

Negligible	Impact is at the lowest levels of detection with no perceptible consequences to archaeological resources and no loss of research potential.
Minor	Impact results in little, if any, loss of significance or integrity and the National Register eligibility of the resource is unaffected. For purposes of Section 106 of the NHPA the determination of effect would be no adverse effect. Artifacts or features are affected and there may be a small loss of research potential.
Moderate	Impact results in some loss of significance or integrity and the National Register eligibility of the resource is jeopardized. Artifacts or features are affected to the point of moderate to severe loss of research potential. For purposes of Section 106 of the NHPA, the determination of effect would be 'adverse effect.' Mitigation measures would reduce the intensity of the impact.
Major	Impact results in destruction of the site, moderate to severe loss of significance or integrity to the extent that the resource is no longer eligible to be listed in the National Register or the NPS List of Classified Structures. For purposes of Section 106 of the NHPA, the determination of effect would be 'adverse effect.' Significant research potential is destroyed and lost forever. Damage to archaeological resources cannot be mitigated.

No Action Alternative

Under the No Action Alternative, only manual and behavioral treatments would be used to restore disturbed areas. Chemical and mechanical treatments would not occur. Behavioral treatments such as UVR closures, signage, and other techniques to discourage UVR traffic would help to reduce the amount of damage caused over the short and long term.

As determined by site-specific plans developed by restoration ecologists and archeologists, manual treatments might include planting nursery-grown plants, smoothing out vehicle ruts with hand tools, spreading seeds and then raking them into the soil, and using hand tools to decompact small areas. These treatments would help stabilize small cultural sites by protecting them from accelerated erosion or sedimentation. Invasive plant management would continue to use manual treatments. Hand-pulling plants generally do not displace artifacts and therefore would result in negligible impacts.

Cultural resource surveys would be conducted prior to restoration actions. Where archeological sites have been adversely affected by prior activity, archeologists and restoration ecologists would collaborate on reasonable actions (including avoidance, re-routing, or more intensive mitigation strategies in consultation with the Arizona State Historic Preservation Office (SHPO)) that would help stabilize the site and reduce or stop further damage.

In areas where archeological resources are present, treatment will be conducted with hand tools, will not exceed the depth of the existing disturbance, and will include the presence of an archeological monitor when holes are dug for planting. Mitigation measures, including consultation and communication with appropriate archeological resource specialists will minimize impacts to archeological resources.

Cumulative Impacts of the No Action Alternative

Cumulative impacts on archeological resources were determined by combining the impacts of the no action alternative with other past, present, and reasonably foreseeable future actions. Most past construction actions have had no direct impact to less than minor adverse impacts to small areas and archeological resources. Road construction creates direct and indirect adverse impacts on archeological resources, although these have not been quantified. Roads dating to the historic era were located without knowledge of cultural resources; many of these roads now form the road network used today. Some official roads and UVRs have direct adverse impacts to archeological sites and many have indirect adverse impacts due to erosion or sedimentation. No adverse impacts to archeological resources have resulted from the limited ongoing invasive plant management efforts and restoration activities. The No Action Alternative would implement a limited range of treatments to offset the adverse impacts of past and future damage. Treatments would be designed to protect and stabilize archeological sites on relatively small areas. Overall, cumulative impacts of the no action alternative are minor and adverse in the short term, and regional in extent.

Conclusion of the No Action Alternative

The No Action Alternative would add negligible impacts to archeological resources in the short term. The treatment areas would be small and archeological surveys will be conducted prior to restoration actions. Overall, the No Action Alternative would implement recovery treatments that would offset some of the adverse impacts due to past, present and future actions but would not provide for large scale site stabilization and erosion control and prevention. Site restoration would not be as effective as in the preferred alternative.

Preferred Alternative

Under this alternative, an ERP would be implemented, allowing a full range of integrated strategies including all treatments: behavioral, manual, chemical, and mechanical. The treatments or combination of treatments that are most effective in terms of cost and results without causing

adverse impacts and/or mitigating already existing impacts would be determined on a site by site basis. Restoration activities would be specifically designed for each individual cultural resource occurrence and would protect and stabilize disturbed areas that contain archeological resources. Tenets of the project PA designed for this restoration work would be applied and implemented as protocol for performance of this project. Responsibility for Section 106 consultation for individual restoration management projects that do not meet the criteria for streamlining under the PA will fall to NPS, USFWS, or BLM, dependent on jurisdiction, and will be conducted pursuant to 36 CFR Part 800.5 and 6.

Behavioral and manual treatments under the preferred action are similar to the no action alternative. However, since these treatments would be implemented as part of a comprehensive plan and across larger areas, we anticipate behavioral and manual treatments to be more effective under the preferred action alternative. An integrated strategy would provide the most effective means to restore habitat while providing the best possible mechanism to stabilize the sites and reduce or eliminate effects of erosion. Chemical and manual treatments would be used to control invasive plants. Chemical treatments would not disturb soil and therefore would have less impact on cultural resources than manual treatments. The greatest potential for adverse effects is on areas of undiscovered archeological features. Archeological surveys will be conducted prior to restoration activities; ground disturbing activities will require an archeological monitor to be present.

Mechanical treatments will be implemented to prepare the site for seeding and planting. With equipment used to decompact soils, seeding and planting would be more successful due to increased moisture infiltration and rooting depth. Mechanical equipment such as drilling or augers may be used in planting operations allowing vegetation of much larger areas compared with manual methods. These areas may be in the vicinity of archeological resources; however, mitigation measures will be implemented to minimize the impacts to negligible. Where restoration occurs within a feature, mitigation may include full data recovery but only after the NHPA standard four-step process and consultation is completed.

Cumulative Impacts of the Preferred Alternative

Cumulative impacts on archeological resources were determined by combining the impacts of the no action alternative with other past, present, and reasonably foreseeable future actions. Most past construction actions have had no direct impact to less than minor adverse impacts to small areas and archeological resources. Road construction creates direct and indirect adverse impacts on archeological resources, although these have not been quantified. Roads dating to the historic era were located without knowledge of cultural resources; many of these roads now form the road network used today. Some official roads and UVRs have direct adverse impacts to archeological sites and many have indirect adverse impacts due to erosion or sedimentation. No adverse impacts to archeological resources have resulted from the limited ongoing invasive plant management efforts and restoration activities. The Preferred Alternative would implement a full range of treatments to offset the adverse impacts of past and future damage. Treatments would be designed to avoid adverse effects to archeological resources or, where sites have been adversely impacted, site-specific restoration plans would be designed to protect and stabilize disturbed sites on small and large areas. Mechanical treatments would be used only if approved through the NHPA section 106 process. Overall, cumulative impacts of the no action alternative are minor, adverse, and long term.

Conclusion of the Preferred Alternative

The Preferred Alternative would add negligible to minor adverse impacts to archeological resources but these would offset existing direct and indirect, significant and long term adverse impacts. The Preferred Alternative would treat large and small areas, and would be more efficient and effective at offsetting adverse impacts than the limited range of treatments afforded by the No Action Alternative. It is anticipated that determination of effect in most instances would be 'no historic properties affected' or 'no adverse effect', which would meet the standards for a streamlined review in accordance with the PA designed for this project. Restoration activities that result in a determination of effect of "adverse effect" on archeological resources, the standard four-step process would be implemented prior to the initiation of restoration activities.

HISTORIC STRUCTURES

Affected Environment

The historic structures of the project area tell the rich history of cultural contact and mixing, the development of socioeconomic networks, and the building of modern America, evidenced by water control, frontier mining and early cattle ranching on the Sonoran Desert. There are approximately 60 extant historic structures on OPCNM, all dating to the late nineteenth century and early twentieth century. Forty-three structures are included in the NPS's List of Classified Structures. OPCNM has identified and recommended an additional 17 structures to be added. Three other historic structures were burned down or otherwise found to have no integrity and were moved to 'shadowed' status in 2012. All have state or local significance, many are already listed on the National Register of Historic Places, and many others are considered eligible.

Beginning in 2009, a series of historic Ruins Preservation Field Schools were held in collaboration with the University of Arizona School of Architecture and Landscape Architecture. Several historic structures on OPCNM were stabilized and repaired to an interpretable or "good" condition, including the main ranch house, cowboy bunkhouse, hay barn, tack barn, and sandwich-style corral fences at Bates Well Ranch; the Armenta Ranch house and *ramada*; the Gachado adobe structure; and in 2012, M.G. Levy's house at the Victoria Mine was rescued from complete collapse and stabilized. Stabilization and preservation work will continue on these and other historic structures at OPCNM. Some of these are gold, silver, and copper mines, including the Victoria Mine, which is nearly 400 feet deep with horizontal drifts. Vernacular Sonoran Desert architecture is frequently represented by adobe structures with earthen floors, scavenged building materials including railroad ties, and by sandwich-style corral fences with trigger gates. *Ramadas* are common, constructed of mesquite Y-posts and logs. The historic adobe and masonry houses, windmills, wells, corrals, charcos, mining-related structures such as ore-cart runouts, ore-loading platforms, leaching vats, mine shafts, arrastra, and historic ore-cart roads and horse trails all tell the story of OPCNM's history, and they deserve to be preserved for the enjoyment and benefit of future generations.

Many of these historic structures are in disrepair or are being vandalized. In recent years, several structures on OPCNM have been lost due to arson. Wood has been removed from stacked-mesquite corrals and from *ramadas* located near the border. Metal has been taken from the Gray Ranch house at Dos Lomitas. A flood in September 2012 severely damaged a rock corral and well in Alamo Canyon. UVRs skirt historic structure sites and damages can result from increased

erosion around foundations due to roads capturing sheet flow and vibration damage from increased traffic.

Environmental Consequences of Alternatives

Methodology and Intensity Thresholds

Analyses of the impacts to historic structures were derived from scientific literature, law enforcement case incidents, periodic cultural resources condition assessments, and the documented impact of historic human activities on historic structures. The thresholds of change for the intensity of an impact are defined as follows:

Intensity Level Definitions

Negligible	The impact would be at the lowest level of detection or barely perceptible and not measurable. The character-defining features and historic fabric would remain unaffected; there would be no loss of research potential.
Minor	The impact would be noticeable or measureable but would not affect the character defining features or historic fabric of a structure or building listed on or eligible for the National Register of Historic Places immediately or in the foreseeable future; there would be a minor loss of research potential.
Moderate	The impact would alter a character defining feature(s) or historic fabric of the structure or building and potentially diminish the integrity of the resource to the extent that its National Register listing, 'contributing' status, or eligibility could be jeopardized; its setting, workmanship, location, materials, feeling, design, or association is affected and there is a moderate loss of research potential.
Major	The impact would alter a character defining feature(s) of the structure or building or greatly affect the historic fabric, diminishing the integrity of the resource to the extent that it destroys its 'contributing' status to the National Register listing and will have to be removed from the listing; affecting its location, setting, feeling, design, materials, or association to the extent it is no longer eligible to be listed on the National Register. There is an extreme loss of research potential.

No Action Alternative

The No Action Alternative would implement manual and anthropic treatments, such as installing signs to close UVRs, placing slash (dead and down wood) on UVRs to discourage traffic, using hand tools to dig holes and install nursery-grown plants. These treatments could reduce or stop vehicle traffic on historic roads that were closed by wilderness legislation but have been re-opened and are being used routinely (e.g. Victoria Mine Road, Lost Cabin Mine Road). Treatments could have a minor to moderate beneficial impact over the short and long term.

Off-road vehicle travel can adversely impact historic structures by direct impacts (e.g. vehicle contact and vibration) or by indirect impacts such as increased erosion. Deeply incised roads and UVRs often capture and channelize runoff, which can trigger accelerated erosion and

sedimentation. Historic structures can be threatened by accumulating sediment or by undermined foundations. Manual restoration treatments are generally unable to repair significant changes in surface drainage or natural contours. The impact of the No Action Alternative for restoration, therefore, is minor to moderate and adverse over the short and long term.

Invasive plants near historic structures would be manually removed under compliance with NHPA. More soil disturbance would occur around structures than would occur if chemical treatments could be used. Invasive plants are not currently a threat to structures, however. Some beneficial impact could occur if invasive plants were removed from historic structures that were being harmed by them. Overall, the No Action Alternative for invasive plants would have less than minor adverse impacts to historic structures over the short and long term.

Cumulative Impacts of the No Action Alternative

Cumulative impacts on historic structures were determined by combining the impacts of the no action alternative with other past, present, and reasonably foreseeable future actions (see Chapter 3.1). Historic structures have been lost or damaged due to past or present actions. The NPS removed historical adobe buildings at Quitobaquito in the 1960s and razed ranching structures in the vicinity of the Growler Area Mine Group on Bates Well Road. Many historical structures associated with past mining and ranching at OPCNM are declining, have collapsed, or have been vandalized or destroyed by arsonists. The NPS has been working to stabilize historic structures through cooperative agreements and ruins preservation field schools each year during 2009–2012 and two new field schools will be held in 2013. A few UVRs are located near historic structures, and nearly all historic roads are being used. The number of UVRs is expected to increase, having potential adverse impacts. Historic structures have not been adversely impacted by invasive plant removal. The No Action Alternative would offset some of the adverse actions of past, present and future adverse impacts to historic structures by restoring some disturbed areas, but would be less efficient and effective than the Preferred Alternative.

Conclusion of the No Action Alternative

The No Action Alternative would reduce or stop off-road vehicle traffic but would be less efficient and effective than the Preferred Alternative at restoring natural contours, improving soil infiltration rates, and mitigating accelerated erosion and sedimentation, particularly at larger and more seriously degraded sites. Correcting these issues would have long and short term impacts that would be minor to moderate and beneficial as traffic is controlled and sites stabilize.

Preferred Alternative

The Preferred Alternative would implement manual, anthropic, chemical and mechanical treatments under a multi-agency comprehensive plan. The beneficial effects of using manual and anthropic treatments (discussed under the No Action Alternative) would be more effective under the Preferred Alternative because they would be part of a fuller range of treatment alternatives. Restoration activities would be specifically designed for each individual historic structure and would protect and stabilize disturbed areas that contain historic structures. Tenets of the project PA designed for this restoration work would be applied and implemented as protocol for performance of this project. Responsibility for Section 106 consultation for individual restoration management projects that do not meet the criteria for streamlining under the PA will fall to NPS, USFWS, or BLM, dependent on jurisdiction, and will be conducted pursuant to 36 CFR Part 800.5 and 6.

Under the Preferred Alternative, mechanical treatments would be used to decompact soils, recontour surfaces, and mitigate changes to surface hydrology channeling water away from structures. These treatments will not pose any adverse effect to historic structures or associated features, but would be more efficient and effective at offsetting adverse impacts to historic structures by treating larger and more severely disturbed areas, particularly in preventing sheetflow flooding where structural foundations are at risk.

Under the Preferred Alternative, chemically treating invasive plants would be an option. Chemical treatments would have negligible to no impact on historic structures.

Cumulative Impacts of the Preferred Alternative

Cumulative impacts to historic structures were determined by combining the impacts of the no action alternative with other past, present, and reasonably foreseeable future actions (see Chapter 3.1). The impacts of past, present and future actions under the Preferred Alternative are similar to those described under the No Action Alternative. The Preferred Alternative, however, would use a coordinated, planned approach and would be more efficient and effective at restoring large and severely disturbed sites, so more sites would be treated. Overall, the Preferred Alternative would implement recovery treatments that would offset more adverse cumulative impacts than the No Action Alternative.

Conclusion of the Preferred Alternative

The Preferred Alternative would reduce or stop off-road vehicle traffic and be more efficient and effective than the No Action Alternative at restoring natural contours, improving soil infiltration rates, and mitigating accelerated erosion and sedimentation, particularly at larger and more severely degraded sites. Correcting these issues would have long and short term impacts that would be minor to moderate and beneficial as vehicle traffic is controlled and sites stabilize.

CULTURAL LANDSCAPES

Affected Environment

A ‘cultural landscape,’ is a term recognized by NPS and is defined in the 1996 *Secretary of the Interior’s Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes,* as a geographic area (including both cultural and natural resources and the wildlife or domestic animals therein) associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values. There are four general types of cultural landscapes, not mutually exclusive: historic sites, historic designed landscapes, historic vernacular landscapes, and ethnographic landscapes. A cultural landscape is broadly defined as "a reflection of human adaptation and use of natural resources and is often expressed in the way land is organized and divided, patterns of settlement, land use, systems of circulation, and the types of structures that are built.” The character of a cultural landscape is defined both by physical features, such as roads, buildings, walls, and vegetation, and by use reflecting cultural values and traditions (NPS Director's Order 28). The Secretary’s Standards state the importance of identifying, retaining, and preserving historic features and materials when performing vegetation restoration, including utilizing methods which will not destroy or degrade topography, such as using heavily weighted equipment on steep or vulnerable slopes or failing to perform preventive maintenance of vegetation. Cultural landscapes in the project area are varied (both prehistoric and historic) and although many are visible on aerial photographs, most are not yet well documented. Three cultural landscape inventories have been completed for Victoria Mine, Dos

Lomitas, and Quitobaquito. At least 8 other incomplete inventories for cultural landscapes are known to exist within OPCNM. Cultural landscapes do not exists on CPNWR or the BLM Ajo-block.

Known types of prehistoric cultural landscapes include permanent and temporary village habitation areas, trails, trade routes, lithic tool manufacturing sites or quarries, resource procurement and processing sites (e.g. food, mineral, shell), ceremonial areas, prehistoric ak-chin farming fields, represos, charcos, and cemeteries. Some of these known prehistoric cultural landscapes in the project area include: Quitobaquito Springs area, the ak-chin farming fields near Dos Lomitas, Armenta Ranch, the confluence of the Cuerda de Leña and Cherioni washes, along the Growler Wash, the Alamo Canyon archeological district (OPCNM), the Lost City (CPNWR), the Charlie Bell Well area (CPNWR), the saguaro/organ pipe fruit harvesting area at Cement Tank (OPCNM), and the ancient Old Salt Trail (OPCNM and CPNWR). Further survey and research would enable the documentation of additional prehistoric landscapes.

Historic cultural landscapes are better known due to their more recent age. Many of these landscapes are associated with mining activity dating to the mid-to-late 1800s and early 1900s. The Growler Pass Mining District (east of Bates Well) and the Growler Area Mine Group (west of Bates Well) include mine adits and shafts, multiple prospect pits, mining camps, ore-cart roads and trails, and associated structures in the eastern Growler Mountains and western Bates Mountains of CPNWR and OPCNM. The Victoria (aka Montezuma) Mining District includes the best example of a deep-shaft silver mine with horizontal drifts in the Southwest, adits and shafts, ore-cart runouts, waste rock piles, historic ore-cart roads and stone-and-mud-masonry structures in the Sonoyta Hills of the Puerto Blanco Mountains. The latter cultural landscape was connected to the cultural landscapes of Dowling Well (OPCNM), the Santo Domingo hacienda in Sonora, Mexico, and Quitobaquito. The O'Neill Hills on CPNWR contains the cultural landscapes of the Papago Mine and the Bell Mine. BLM Ajo District contains a network of roads once associated with Old Ajo, now obliterated by the mine pit. Lastly, the Gunsight Mining District was concentrated in the eastern Gunsight Hills, but included roads, pipelines, and other features located on OPCNM.

Frontier ranching-related cultural landscapes are scattered throughout the project area. The Havins family maintained a line camp at Papago Well, and at one time raised chickens there. The Gray family had ranch headquarters at Dos Lomitas, Dowling Well, Bates Well, and Alamo Canyon, each a cultural compound and part of the overall frontier ranching landscape. These and other cultural landscapes associated with the Gray's headquarters include Gachado Well and Line Camp's adobe house, corrals, windmill and well; Bonita Well and associated corrals, windmill and line shack; Pozo Nuevo and associated corrals, line shack, windmill, and jacal; the Alamo, a ranch headquarters with two adobe buildings, historic roads and trails, two corrals (one made of stacked boulders), cistern, windmill, and well; and Bates Well Ranch with residential and vernacular Sonoran Desert architecture, including 'sandwich' corrals, 'trigger' gates, several wells, and two corral complexes, a site shared proto-historically and historically with Hia C'ed O'odham. Armenta Ranch was used for a few years by the Armenta family, who floodwater-farmed several acres in the Valley of the Ajo. Later, Armenta ranch was used as a line camp and storage area by the Gray family.

Environmental Consequences of Alternatives

Methodology and Intensity Thresholds

Analyses of the impacts to cultural landscapes were derived from scientific literature, law enforcement case incidents, NPS archeological and architectural condition assessments, and the documented impact of historic human activities on historic structures through oral histories and newspaper articles. The thresholds of change for the intensity of an impact are defined as follows:

Intensity Level Definitions

Negligible Impact is at the lowest levels of detection with neither adverse nor beneficial consequences. There is little to no impact on the cultural landscape integrity, character-defining features, and no effect on any of its 'contributing' features to the National Register. For purposes of Section 106, determination of effect would be "no historic properties affected" or "no adverse effect."

Minor Adverse: A character-defining pattern(s) or feature(s) of the landscape would be altered, but would not diminish the overall integrity of the landscape to the point of its removal from the National Register listing or negate its 'contributing' status. For purposes of Section 106, determination of effect would be "no adverse effect."

Beneficial: Preservation of landscape patterns and features in accordance with the Secretary of the Interior's Standards for the Treatment of Historic Properties with guidelines for the treatment of cultural landscapes.

Moderate Adverse: A character-defining pattern(s) or feature(s) of the landscape would be altered and the alternation could potentially diminish overall integrity of the landscape causing a greater degree of impact on the cultural landscape integrity, character-defining features, and one or more of its 'contributing' features to the National Register; its design, materials, location, setting, feeling, workmanship, or historic association, to the extent that its National Register eligibility or 'contributing' status could be jeopardized, either immediately or in the foreseeable future.

Beneficial: Rehabilitation of a landscape or its patterns and features in accordance with the Secretary of the Interior's Standards for the Treatment of Historic Properties with guidelines for the treatment of cultural landscapes.

Major Adverse: A character-defining pattern(s) or feature(s) of the landscape is altered and the alteration would diminish overall integrity of the landscape and jeopardize its eligibility for listing in the National Register. Measures to minimize or mitigate adverse impacts cannot be met.

Beneficial: Rehabilitation of a landscape or its patterns and features in accordance with the Secretary of the Interior's Standards for the Treatment of Historic Properties with guidelines for the treatment of cultural landscapes.

No Action Alternative

The No Action Alternative would use manual and behavioral treatments but no chemical treatments to manage invasive plants and restore disturbed lands. Invasive plants can change landscapes by changing the vegetation type and general landscape characteristics. Management of invasive plants can repair the visual appearance of the landscape and also reduce the chance of fire ignitions, fire spread, and fire return periods. Management of invasive plants using hand tools would have a short and long term, minor to moderate beneficial impact on cultural landscapes.

Cumulative Impacts of the No Action Alternative

Cumulative impacts on cultural landscapes were determined by combining the impacts of the no action alternative with other past, present, and reasonably foreseeable future actions. Cultural landscapes have been lost or severely damaged due to past or present actions. The NPS removed historical adobe buildings at Quitobaquito in the 1960s and has only been partially successful at preventing other historic structures from deteriorating due to lack of maintenance. Some UVRs are located within cultural landscapes, and have been reported on the ancient Salt Trail (Gibson 2011c). Under the No Action Alternative, UVRs are expected to increase in number and extent as border-related activities continue. The No Action Alternative would offset some of the adverse actions of past, present and future adverse impacts to historic structures by restoring some disturbed areas, but would be less efficient and effective than the Preferred Alternative.

Conclusion of the No Action Alternative

The No Action Alternative would implement a restricted set of treatments to stabilize cultural landscapes. These treatments are less efficient and effective at treating disturbed areas than the Preferred Alternative, but would somewhat offset the disturbances caused by invasive species and UVRs. The landscape or its patterns and features would be restored in accordance with the Secretary of the Interior's Standards for the Treatment of Historic Properties with guidelines for the treatment of cultural landscapes.

Preferred Alternative

Under this alternative, the ERP would be implemented, allowing a full range of integrated strategies including all treatments: behavioral, manual, chemical, mechanical. The strategy or strategies that are more effective in terms of cost and results with the least adverse impacts to cultural landscapes would be determined on a site by site basis. Restoration activities are intended to stabilize normal function to ecosystem process, mitigate damage to native plant communities, and reduce invasive plant species populations. Restoration activities that occur within a cultural landscape would be specifically designed to protect and stabilize disturbed areas. Tenets of the project PA designed for this restoration work would be applied and implemented as protocol for performance of this project. Responsibility for Section 106 consultation for individual restoration management projects that do not meet the criteria for streamlining under the PA will fall to NPS, USFWS, or BLM, dependent on jurisdiction, and will be conducted pursuant to 36 CFR Part 800.5 and 6.

Behavioral and manual treatments under the preferred action are similar to the no action alternative. However, under the preferred action, these treatments would be part of a comprehensive plan that sets priorities and allows the use of the most effective treatment(s).

Under the Preferred Alternative, chemicals would be used to treat invasive plants. Because herbicide use can be more efficient than manual removal, larger areas would be treated.

Mechanical treatment would be used to restore UVRs and other severe landscape disturbances. Mechanical treatments are the most efficient and effective at decompacting soils, preparing disturbed sites for revegetation, and restoring natural contours, particularly on severely disturbed areas. An appropriate strategy and treatment for use in a cultural landscape would be designed with the assistance of cultural resource specialists and would be compliant with section 106 of the NHPA.

Cumulative Impacts of the Preferred Alternative

Cumulative impacts on cultural landscapes were determined by combining the impacts of the No Action Alternative with other past, present, and reasonably foreseeable future actions (see Cumulative Impact Scenario, Chapter 3.1). The impacts of past and present actions under the Preferred Alternative are similar to those described under the No Action Alternative. The Preferred Alternative, however, would use a coordinated, planned approach and would be more efficient and effective at restoring large and severely disturbed sites, so more sites would be treated. Overall, the Preferred Alternative would implement recovery treatments that would offset more cumulative impacts than the No Action Alternative.

Conclusion of the Preferred Alternative

The Preferred Alternative would implement a full range of treatments to restore more ecologically healthy conditions within cultural landscapes. NHPA Section 106 compliance would be conducted for treatments within all eligible and potentially eligible cultural landscapes, and treatments would be implemented in accordance with the Secretary of the Interior's *Standards* for the Treatment of Historic Properties, with Guidelines for Cultural Landscapes. These restoration treatments are more efficient and effective at treating disturbed areas than the No Action Alternative, and would offset more of the disturbances caused by invasive species and UVRs.

CHAPTER 4 CONSULTATION AND COORDINATION

4.1 INTERNAL SCOPING

Scoping is a process to identify the resources that may be affected by a project proposal, and to explore possible alternative ways of achieving the proposal while minimizing adverse impacts. Internal scoping was conducted on several occasions by an interdisciplinary team of professionals from OPCNM and CPNWR, NPS, and environmental groups. Various combinations of the Interdisciplinary Team met on February 7, 2012, March 7, 2012, April 2, 2012, as well as, on May 9 and 10, 2012 to discuss the purpose and need for the project; various alternatives; potential environmental impacts; past, present, and reasonably foreseeable projects that may have cumulative effects; and possible mitigation measures. The team also gathered background information and discussed public outreach for the project. The results of the all four meetings are documented in this EA.

4.2 EXTERNAL SCOPING

External scoping was conducted to inform public agencies about the proposal to conduct ecological restoration and restore disturbed lands to generate input on the preparation of this EA. The effort was initiated with the distribution of a scoping letter, which was mailed to 77 addresses including federal delegates, state and local agencies, interested parties, NGOs and the Media/Public Access. These parties were given 45 days to comment on the project. During the external scoping period, no responses were received.

On May 20, 2012, an individual response was received from Roger McManus, who is generally in support of this EA. On March 28, 2012 and May 14, 2012, responses were received from an Ajo Wilderness Group, Desert Protectors. These responses are generally in support of this EA. Full comments are available for review on the PEPC website.

4.3 AGENCY SCOPING

In accordance with the Endangered Species Act, NPS contacted the U.S. Fish and Wildlife Service with regards to federally listed special status species, and in accordance with National Park Service policy, NPS also contacted the Arizona Division of Wildlife with regards to state-listed species.

In accordance with §106 of the National Historic Preservation Act, NPS has coordinated with the Arizona State Historic Preservation Office and associated Native American tribes to develop a PA regarding treatment of historic properties that might be subject to effect resulting from the ERP. No action relevant to NHPA would be undertaken in accordance to this EA until the PA is finalized.

Federal Consultation

- Bureau of Indian Affairs
- Bureau of Land Management
- United States Customs and Border Protection
- Cabeza Prieta National Wildlife Refuge
- United States Air Force

- United States Marine Corps
- Luke Air Force Base
- United States Fish and Wildlife Service
- Department of Homeland Security

State Consultation

- Arizona Game and Fish Department
- Arizona Department of Environmental Quality
- Arizona State University
- The Honorable Raul Grijalva
- The Honorable Jon Kyl
- The Honorable John McCain
- The Honorable Gabrielle Giffords

Local Consultation

- Pima County office of Conservation
- Phoenix Zoo

Non-Government Organizations

- Wildlands Network
- Arizona Public Service Company
- Arizona Wilderness Coalition
- Earthjustice
- National Parks and Conservation Association
- Yuma Archeology Society
- Center for Biological Diversity
- Audubon Society, Tucson Chapter
- Friends of Cabeza Prieta
- The Wilderness Society
- Arizona Nature Conservancy
- Yuma Valley Rod and Gun Club
- Sierra Club, Grand Canyon Chapter
- Cabeza Prieta Natural History Association
- Desert Botanical Garden
- Public Lands Foundation
- Yuma Audubon Society

- Arizona Desert Bighorn Sheep Society, Inc
- International Sonoran Desert Alliance
- Defenders of Wildlife

Media/Public Access

- Ajo Copper News
- Yuma County Library
- Gila Bend Public Library
- Ajo Public Library
- Tucson/Pima Library
- Editor of The Runner

Seven Native American tribes were consulted to determine if there were any ethnographic resources in the project area and if they wanted to be involved in the environmental compliance process, including:

- Ak-Chin Indian Community
- Cocopah Indian Tribe
- Hopi Tribe
- Pascu Yaqui Tribe
- Salt River Pima-Maricopa Indian Community
- Tohono O'odham Nation
- Zuni

Responses from three tribes were received. On December 14, 2011, The Cocopah Indian Tribe made no comment on the development of this project and deferred to more local tribes. On December 8, 2011, the Hopi Tribe requested that OPCNM address the identification and protection of the cultural resources in the proposed EA so they are not inadvertently impacted during restoration activities. The Hopi Tribe also requested that they be provided with a copy of the EA for comment and review. On January 17, 2012 the Ak-Chin Indian Community stated that they would defer comments to the Tohono O'odham National Tribal Historic Preservation Office.

In June 2013, NPS initiated formal consultation in accordance with Section 106 of the NHPA with tribes and SHPO. It was determined that a project PA would be prepared to outline management and restoration activities that would occur as a result of this project. SHPO and eleven tribes have been invited to participate.

4.4 ENVIRONMENTAL ASSESSMENT REVIEW AND LIST OF RECIPIENTS

The EA will be published for public review for 30 days. In order to inform the public, an NPS letter will be distributed to various agencies, tribes, and members of the public and available on the Planning, Environment, and Public Comment website along with the EA. Copies of the document will also be available to interested individuals and organizations who have requested in writing to the NPS to be notified of the distribution. During this time, the public is encouraged to submit their written comments to the NPS address provided at the beginning of this document.

The NPS will issue responses to substantive comments received during the public comment period, and the NPS will make appropriate changes to the EA as needed.

4.5 LIST OF PREPARERS

Lee Baiza, Superintendent, Organ Pipe Cactus National Monument

Cheryl Blanchard, Cultural Resources, Ajo Block, BLM

Jim Bradford, Archeologist, Intermountain Region, NPS

Kate Connor, Restoration Ecologist, Organ Pipe Cactus National Monument

Laurie Domler, NEPA Compliance, Intermountain Regional Office, NPS

Cheryl Eckhardt, NEPA Compliance, Intermountain Regional Office, NPS

Connie Gibson, Cultural Resources Lead, Organ Pipe Cactus National Monument

Michele Girard, Ecologist, Southern Arizona Office, NPS

Peter Holm, Biologist, Organ Pipe Cactus National Monument

Sarah Howard, Biologist, Organ Pipe Cactus National Monument

Duane Hubbard, Archeologist, Southern Arizona Office, NPS

Mary Kralovec, Cabeza Prieta National Wildlife Refuge, USFWS

Stephanie MacDonald, NEPA Compliance, Southern Arizona Office, NPS

Rijk Morawe, Resource Management Lead, Organ Pipe Cactus National Monument

Ami Pate, Organ Pipe Cactus National Monument

Sue Rutman, Ecologist and Project Leader, Organ Pipe Cactus National Monument

Sid Slone, Cabeza Prieta National Wildlife Refuge, USFWS

Mark Sturm, Natural Resources, Intermountain Regional Office, NPS

Tim Tibbitts, Biologist, Organ Pipe Cactus National Monument

Ryan Tietjen, Ecologist, Organ Pipe Cactus National Monument

Ron Tipton, Ajo Block, BLM

Kim Ververka, Cabeza Prieta National Wildlife Refuge, USFWS

REFERENCES

Anderson T.H., Rodrîguez-Castañeda, J.L., and Silver, L.T., 2005, Jurassic rocks in Sonora, Mexico—relations to Mojave-Sonora megashear and its inferred northwestward extension, *in* Anderson, T.H., Nourse, J.A., McKee, J.W., and Steiner, M.B., eds., The Mojave-Sonora megashear hypothesis—Development, assessment, and alternatives: Geological Society of America Special Paper 393, p. 51–95.

Arizona Desert Wilderness Act of 1990. Available online at http://www.wilderness.net/NWPS/documents/publiclaws/PDF/101-628.pdf. Accessed 19 July 2012

Barrow, J., Skeirik, R.A., Kennedy, A. *Emergency Stabilization Final Report, Bates Well Ranch, Organ Pipe Cactus National Monument*. December 2010. University of Arizona, Cornerstones Community Partnerships, The National Park Service Vanishing Treasures Program. NPS Cultural Resource Report No. ORPI 2010A.4. On file at the Organ Pipe Cactus National Monument Cultural Resources Office, Ajo, Arizona.

Beck, Charlotte and George Jones. 2010. Clovis and Western Stemmed: Population Migration and the Meeting of Two Technologies in the Intermountain West. *American Antiquity* 75(1), pp. 81–116. Society for American Archaeology, Washington, DC.

Bryan, K. 1922. Routes to desert watering places in the Papago country, Arizona. Water-Supply Paper 490-D, U.S. Geological Survey, Washington, D.C.

BWG (Buffelgrass Working Group). 2008. Southern Arizona Buffelgrass Strategic Plan. 52pp.

Bureau of Land Management (BLM). 2011. Lower Sonoran and Sonoran Desert National Monument Draft Resource Management Plan and Environmental Impact Statement. Available at http://www.blm.gov/az/st/en/prog/planning/son_des.html (accessed 2 February 2012).

BLM. 2008. Special status species management manual for the Bureau of Land Management. BLM Manual 6840. Available at: http://www.blm.gov/wo/st/en/info/regulations/Instruction_Memos_and_Bulletins/blm_manual.html. Accessed 19 July 2012.

BLM. 2011. NEPA Web Guide, Chapter 4: Categorical Exclusions. Accessed 28 Sep 2012 at http://www.blm.gov/wo/st/en/prog/planning/nepa/webguide/chapter4.html

Bowers, JE. 1980. Flora of Organ Pipe Cactus National Monument. Journal of the Arizona-Nevada Academy of Science 15: 1–11, 33–47.

California Exotic Pest Plant Council and Southwest Vegetation Management Association. 2003. Criteria for categorizing invasive non-native plants that threaten wildlands. Available online at http://www.cal-ipc.org/ip/inventory/pdf/Criteria.pdf. Accessed 5 Jul 2012.

Cowardin, L M, V Carter, F C Golet, E T LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. Document number FWS/OBS-79/31, U.S. Fish and Wildlife Service, Washington D.C. Printed by US Government Printing Office, Washington, DC.

DiTomaso, J. 2000. Invasive weeds in rangelands: species impacts and management. Weed Science 48:255-265.

Felger, RS. 1990. Non-native plants of Organ Pipe Cactus National Monument. Cooperative National Park Resource Studies Unit Technical Report No. 31, University of Arizona, Tucson.

Felger, R. S., P. L. Warren, S. A. Anderson, & G. P. Nabhan. 1992. Vascular Plants of a Desert Oasis: Flora and Ethnobotany of Quitobaquito, Organ Pipe Cactus National Monument, Arizona. Proceedings of the San Diego Society of Natural History 8:1-39.

Felger, R.S., S Rutman, T.R. Van Devender, and S.M Buckley. 2012. Checklist of vascular plants of Organ Pipe Cactus National Monument, Cabeza Prieta National Wildlife Refuge, and Tinajas Altas, Arizona. Canotia 8:1-53.

Gibson, C.T. 2010. *A Class III Archeological Survey of a Proposed New Location for a U.S. Customs and Border Protection (Border Patrol) Forward Operating Base, Organ Pipe Cactus National Monument, Pima County, Arizona.* NPS Cultural Resources Report No. ORPI No. 2010M. On file at the Organ Pipe Cactus National Monument Cultural Resources Office, Ajo, Arizona.

Gibson, C.T. 2011a. *Prehistoric Artifacts Collected from Bates Well Ranch, AZ Z:13:39(ASM), Organ Pipe Cactus National Monument, Pima County, Arizona.* NPS Cultural Resources Report No. 2010A.1. On file at the Organ Pipe Cactus National Monument Cultural Resources Office, Ajo, Arizona.

Gibson, C.T. 2011b. *A Class III Intensive Archeological Survey and Recording of the Rock Shelter and Pictographs at Wild Horse Tanks, AZ Z:14:8(ASM), Organ Pipe Cactus National Monument, Pima County, Arizona*. NPS Cultural Resources Report No. ORPI No. 2010M. On file at the Organ Pipe Cactus National Monument Cultural Resources Office, Ajo, Arizona.

Gibson, C.T. 2011c. A Class II Archeological Reconnaissance Survey of AZ Y:16:2(ASM) and Surrounding Sites for NAGPRA Repatriation, Organ Pipe Cactus National Monument, Pima County, Arizona March 2011. NPS Cultural Resources Survey Report No. ORPI 2011K. On file at the Organ Pipe Cactus National Monument Cultural Resources Office, Ajo, Arizona

Gibson, C.T. 2012a. *Archeological Survey of a Prehistoric Village Site in the Diablo Mountains, the Glory Site AZ Z:14:162(ASM), Organ Pipe Cactus National Monument, Pima County, Arizona*. NPS Cultural Resources Report No. ORPI 2012B. On file at the Organ Pipe Cactus National Monument Cultural Resources Office, Ajo, Arizona.

Gibson, C.T. 2012b. *An Archeological Reconnaissance Survey of the U.S. Customs and Border Protection Ajo Forward Operating Base Installation of an Underground Cable from the Headquarters Building to the SBInet Border Surveillance Tower 302.* NPS Cultural Resources Report No. ORPI 2012P. On file at the Organ Pipe Cactus National Monument Cultural Resources Office, Ajo, Arizona.

Gibson, C. and B. Houston. 2012. *Organ Pipe Cactus National Monument List of Classified Structures (LCS) Update 2012*. NPS Cultural Resources Report No. 2012C. On file at the Organ Pipe Cactus National Monument Cultural Resources Office, Ajo, Arizona.

Groschupf, K.D., B.T. Brown, and R. R. Johnson. 1988. An annotated checklist of the birds of Organ Pipe Cactus National Monument, Arizona. Cooperative National Park Studies Unit, University of Arizona, Tucson. 45 pp.

Halvorson, W. and P. Guertin. 2003. USGS Weeds in the West: Status of Introduced Weeds in Southern Arizona Parks. U.S. Geological Survey-Southwest Biological Science Center, Sonoran Desert Field Station, University of Arizona, Tucson.

Haxel, G. 2006. Geologic units of the Organ Pipe—Pinacate region. Unpublished report, U.S. Geological Survey, Flagstaff, Arizona.

Hervert, J.J., J.L. Bright, M.T. Brown, L. A. Piest, and R.S. Henry. 2000. Sonoran pronghorn population monitoring: 1994-1998. Nongame and Endangered Wildlife Program Technical Report 162. Arizona Game and Fish Department, Phoenix, Arizona.

Hooper. 2012. *Archaeological Resources of the Ajo Region: A Cultural Resources Inventory of 2,928 Acres of BLM Land in Western Pima County, Arizona*.

IPCC (International Panel on Climate Change). 2007. Summary for Policymakers. In: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M.Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

Jenkins, D.L., L.G. Davis, T.W. Stafford, Jr., P.F. Campos, B. Hockett, G.T. Jones, L.S. Cummings, C. Yost, T.J. Connolly, R.M. Yohe II, S.C. Gibbons, M. Raghavan, M. Rasmussen, J.L.A. Paijmans, M. Hofreiter, B.M. Kemp, J.L. Barta, C. Monroe, M.T.P. Gilbert, E. Willerslev. Clovis Age Western Stemmed Projectile Points and Human Coprolites at the Paisley Caves. *Science*, Vol. 337, July 2012.

Kennedy, A., Gibson, C., Skeirik, R., Barrow, J. *Document, Assess, Stabilize and Repair Cultural Resources Impacted by Border Activities, Part 3: Bates Well Ranch Corrals Work Summary Report*. 2011. Heritage Conservation-Drachman Institute, College of Architecture & Landscape Architecture, University of Arizona. NPS Cultural Resources Report No. ORPI 2010A.2, on file at the Organ Pipe Cactus National Monument Cultural Resources Office, Ajo, Arizona.

Landres, P., M. B. Hennessy, K. Schlenker, D. N. Cole, and S. Boutcher. 2008. *Applying the Concept of Wilderness Character to National Forest Planning, Monitoring, and Management*. Fort Collins, CO: General Technical Report RMRS-GTR-217WWW. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Marshall, V.M., M.M. Lewis, and B. Ostendorf. 2012. Buffelgrass (Cenchrus ciliaris) as an invader and threat to biodiversity in arid environments: A review. Journal of Arid Environments 78:1-12. (Australia but GREAT overview).

Martynec. 2005. *Ajo's Earliest Visitors, Based on the Black Mountain Survey* was edited by Rick Martynec and Jane Thompson.

NPS. 1996. Invasive species management: A strategic plan for managing invasive nonnative plants on National Park System lands. Available online at http://www.nature.nps.gov/biology/invasivespecies/strat_pl.cfm

NPS. 2006. Management Policies 2006: The guide to managing the National Park System. Available online at http://www.nps.gov/policy/mp/policies.html#_Toc157232715

NPS. 2009. Environmental Assessment: fiber optic line SR85-Why to Organ Pipe Cactus National Monument Headquarters. Organ Pipe Cactus National Monument, Ajo, AZ.

NPS. 2010. Superintendent's 2010 report on natural resource vital signs. Organ Pipe Cactus National Monument, Ajo, AZ.

NPS. 2013. State of the park report for Organ Pipe Cactus National Monument. State of the Park Series No. 3 National Park Service, Washington, D.C.

NPS. 2014. DRAFT. Inventory and assessment of undesignated vehicle routes on Department of the Interior lands in the *SBInet* project area and vicinity, southwestern Arizona. Organ Pipe Cactus National Monument, Ajo, AZ. Final NPS report anticipated March 2014.

OPCNM. 2005. A foundation for collecting, managing and integrating information on U.S./Mexico international border activities. Unpublished report. Organ Pipe Cactus National Monument, Ajo, Arizona.

OPCNM. 2006. Organ Pipe Cactus National Monument Ecological Monitoring Program: Summary Report, 1997-2005.

OPCNM. 2008. Foundation for Planning and Management. Unpublished report, OPCNM, Ajo, AZ. 18pp.

Parker, P.L. and King, T.E. 1998. Guidelines for evaluating and documenting traditional cultural properties. Available at http://www.nps.gov/nr/publications/bulletins/nrb38/

Rankin, Adrianne G. 1995. Archaeological Survey at Organ Pipe Cactus National Monument, Southwestern Arizona: 1989–1991[Draft]. Western Archaeological and Conservation Center, National Park Service, Tucson.

Rutman, S. 2009. Buffelgrass and fountaingrass management program: Field Season report, fall 2008-Spring 2009, Organ Pipe Cactus National Monument. Unpublished report, OPCNM, Ajo, Arizona. 9pp.

Rutman, S. 2010. Buffelgrass and Fountaingrass Management Program: Field Season report, fall 2009-Spring 2010, Organ Pipe Cactus National Monument. Unpublished report, OPCNM, Ajo, Arizona. 8pp.

Rutman, S. 2012. Draft individual species accounts for non-native plants at OPCNM. Organ Pipe Cactus National Monument, Ajo.

Skinner, L.A., G. Haxel, and P.J. Umhoefer. 2006. Geological report on Organ Pipe Cactus National Monument, ORPI, and surrounding region. Unpublished report, U.S. Geological Survey, Flagstaff, Arizona.

Simmons, NM. 1966. Flora of the Cabeza Prieta Game Range. Arizona Academy of Science 4: 93–104.

Stevens, J. and D.A. Falk. 2008. Can buffelgrass invasions be controlled in the American Southwest? Using Invasion Ecology Theory to understand buffelgrass success and develop comprehensive restoration and management. Ecological Restoration 27:417-427.

Stone, Bradford W. 1996. A Class III Cultural Resources Survey of a 33.8 Mile Long Segment of Arizona Department of Transportation Right-of-Way and Easement for State

Route 85, Between Ajo and Lukeville (Mileposts 45.8–79.6), Western Pima County, Arizona. Archaeological Research Services Inc., Tucson.

Turner, R. M. 1990. Long-term vegetation change at a fully protected Sonoran Desert site. Ecology 71: 464-477.

USDA- Animal and Plant Health Inspection Service (APHIS). 2010. Federal noxious weed list. Available online at http://www.aphis.usda.gov/plant_health/permits/organism/federal_noxious_weeds.shtml

USDA-Natural Resources Conservation Service. 2012. PLANTS database. Available online at http://plants.usda.gov/java/ (accessed 10 Sep 2012).

USFWS. 1998. Final revised Sonoran Pronghorn recovery plan. Southwest Regional Office, Albuquerque, NM. 55 & 70 pp.

USFWS. 1999. National Environmental Policy Act Reference Handbook. Available online at: http://wsfrprograms.fws.gov/subpages/toolkitfiles/fwsnepa.pdf Accessed online 26 Sep 2012.

USFWS. 2006. CPNWR Comprehensive Conservation Plan, Wilderness Stewardship Plan and Environmental Impact Statement. Unpublished document. U.S. Fish and Wildlife Service, Southwest Region, Albuquerque, NM.

USFWS. 2008. Biological Opinion for the Proposed Installation of 5.2 Miles of Primary Fence near Lukeville, Arizona.

USFWS. 2009. Biological Opinion on SBI*net* Ajo-1 Tower Project, Ajo Area of Responsibility, U.S. Border Patrol, Tucson Sector, Arizona

USFWS. 2011a. Vehicle trails associated with illegal border activities on Cabeza Prieta National Wildlife Refuge. Cabeza Prieta National Wildlife Refuge, Ajo, Arizona.

USFWS. 2011b. AESO/SE 22410-2009-F-0089-R3, 224101989-F-0078-R7, Reinitiation of Formal Consultation on the SBInet Ajo-1 Tower Project, Ajo Area of Responsibility, U.S. Border Patrol, Tucson Sector, Arizona; Proposed Construction, Operation, and Maintenance of a Forward Operating Base, Organ Pipe Cactus National Monument, Pima County, Arizona

Walker, L.R. and S.D. Smith. 1997. Chapter 5: Impacts of invasive plants on community and ecosystem processes. *In* Luken, J.O. and J.W. Thieret (eds.), Assessment and Management of Plant Invasions. Springer-Verlag, New York. 324pp.

Webb, RH; TC Esque, KE Nussear, and M Sturm. 2012 . Disruption Rates for One Vulnerable Soil in Organ Pipe Cactus National Monument. US Geological Survey, Tucson, Arizona.

Weiss, J L and J T Overpeck. 2007. Is the Sonoran Desert losing its cool? Global Change Biology 11: 2065-2077.

Wright, R.L. and J.C. deVos. 1986. Final report on Sonoran pronghorn status in Arizona. Arizona Game and Fish Department. Phoenix, AZ. 132 pp.

Wilderness Act of 1964, 88th Cong. 1964. Available from http://www.wilderness.net/index.cfm?fuse=NWPS&sec=legisAct (accessed 19 July 2012).

APPENDIX 1.

LIST OF INVASIVE PLANTS IN THE PROJECT AREA

List of non-native plant species recorded from OPCNM and CPNWR, and their current status and management priorities.

Scientific Name [Family]	Family	Land Management Unit	English & Spanish common names	Management Priority	Ecological Impacts, Status, and Recommended Treatment	Arizona State Noxious Status
Aloe sp.	Liliaceae	OPCNM	Aloe	Low	Known only from residences at OPCNM. Clonal groups expand into neighboring wildlands but manual control is effective.	
Amaranthus albus L.	Amaranthaceae	OPCNM	Pigweed	Low	Common in urban and agricultural areas in the Sonoyta region, and occasionally spreading into the border region of OPCNM east of Lukeville and rarely elsewhere in disturbed places in OPCNM. No treatment recommended unless status changes.	
Anagallis arvensis L. subsp. *arvensis*	Primulaceae	OPCNM	Scarlet pimpernel	Low	Only known from residential lawns at OPCNM, this species is unlikely to spread outside of irrigated areas. No treatment necessary.	
Argemone ochroleuca Sweet subsp. *ochroleuca*	Papaveraceae	OPCNM	Mexican prickly-poppy	Low	Native to the Sonoran Desert but not native to the project area. Not expected to have significant ecological impacts. A few plants found once in the wash bed of Growler Wash west of Bates Well and not seen since. No treatment necessary.	
Avena fatua Linnaeus	Poaceae	OPCNM	Wild oats	Low	Widespread and common at OPCNM, from low to high elevations. Impacts could be significant but the feasibility of control at this time is low. Distribution at CPNWR unknown, but abundance probably declines from the east to the western and drier margins of the refuge. Treatment not currently prudent or feasible.	
Bassia hyssopifolia (Pallas) Kuntze	Amaranthaceae	OPCNM	Smotherweed	Low	Bassia has appeared in OPCNM on construction sites on State Route 85, apparently from seeds transported by construction equipment or straw. These plants were manually removed. Not known from CPNWR. Continue surveys and manually remove plants.	
Boerhavia coccinea Miller	Nyctaginaceae	OPCNM, CPNWR	Red spiderling	Low	Widespread in the project area but nowhere abundant. Often found in disturbed areas. Treatment not currently prudent or feasible.	
Brassica nigra (L.) W.D.J. Koch	Brassicaceae	OPCNM	Black mustard	Low	Marginally successful in the low, dry portions of the Sonoran Desert. Only two occurrences recorded from OPCNM in 1941 and 2003. Roadways should be surveyed during the spring, especially years with above-average moisture. Manually remove all plants before seeds are dispersed. If status changes, consider herbicide treatments.	

List of non-native plant species recorded from OPCNM and CPNWR, and their current status and management priorities.

Scientific Name [Family]	Family	Land Management Unit	English & Spanish common names	Management Priority	Ecological Impacts, Status, and Recommended Treatment	Arizona State Noxious Status
Brassica tournefortii Gouan	Brassicaceae	OPCNM, CPNWR	Sahara mustard	Low-High (Site Dependent)	Currently widespread and common throughout OPCNM, and capable of increasing. Manual removal might be effective in small areas of prominence (e.g. Visitor Center area) or exceptional habitat value (e.g. Quitobaquito), but only if the effort is sustained long enough to suppress the seed pool. At CPNWR, where large populations have persisted for many years, no management action is recommended until an effective and cost-efficient method of control is developed.	
Bromus rubens (Linnaeus) Duvin	Poaceae	OPCNM, CPNWR	Red brome, foxtail brome	Low	Species is widespread and abundant in some areas of OPCNM and CPNWR. Abundance declines from the eastern to the western part of the project area, where it poses little ecological risk. Treatment not currently prudent or feasible.	
Bromus tectorum Linnaeus	Poaceae	OPCNM	Cheatgrass, downy chess	Low	An infrequent and probably non-reproductive visitor to ORPI, documented only twice, in 1986 and 1998. Not likely to persist in the project area. No treatment necessary.	
Carthamus tinctorius Linnaeus	Asteraceae	OPCNM	Safflower	Low	Plants occasionally occur along the southern margin of OPCNM. Self-reproducing populations are not expected to occur. No treatment necessary.	
Cenchrus ciliaris Linnaeus (syn. = *Pennisetum ciliare* (L.) Link)	Poaceae	OPCNM, CPNWR	Buffelgrass	High	One of the most ecologically disruptive invasive plants in the Sonoran Desert ecosystem. Distribution and abundance have rapidly widened and increased during the past two decades throughout southern Arizona and Mexico. The ecological impacts of this species at OPCNM and CPNWR are currently low to moderate but the potential impacts are significant. The feasibility of manual control has been moderate but manual control will become difficult and expensive if population increases continue. A combination of manual and chemical treatments is recommended.	PNW, RGNW
Cenchrus echinatus Linnaeus	Poaceae	OPCNM	Southern sandbur	Low	Occasional escapee from fields in Sonora into the southern margin of OPCNM east of Lukeville. The species is not expected to become invasive in OPCNM or CPNWR due to the lack of suitable habit. No treatment necessary.	PNW, RGNW
Cenchrus setaceus (Forsskål) Morrone (syn. = *Pennisetum setaceum* (Forsskål) Chiovenda)	Poaceae	OPCNM, CPNWR	Fountain grass, plume grass	High	This species has the potential for becoming widespread and abundant, with significant ecological effects. It is currently scarce and localized on OPCNM. Large populations existed on Childs Mountain; although CPNWR's management efforts were successful, they rely on continuing effort. Early observation and treatment are crucial to successful management. Mechanical removal and herbicide treatments are recommended.	

List of non-native plant species recorded from OPCNM and CPNWR, and their current status and management priorities.

Scientific Name [Family]	Family	Land Management Unit	English & Spanish common names	Management Priority	Ecological Impacts, Status, and Recommended Treatment	Arizona State Noxious Status
Cenchrus spinifex Cavanilles	Poaceae	CPNWR	Common sandbur	Low	A well established population extends northward from Mexico into the U.S. on Pinta Sands, CPNWR. No treatment necessary.	RGNW
Centaurea melitensis Linnaeus	Asteraceae	OPCNM, CPNWR	Malta star-thistle	High	Known from a single small and managed population at Quitobaquito, OPCNM and a population at Jose Juan Charco, CPNWR. The species may have the potential to spread throughout the eastern part of the project area. Manual control has been effective but chemical control may be necessary if population expansion occurs.	
Chenopodium murale Linnaeus	Amaranthaceae	OPCNM, CPNWR	Netleaf goosefoot	Low	Species is widespread in CPNWR and OPCNM, usually only in disturbed areas and mesic microsites. It has been in the project area for many years and its ecological impact remains low. No treatment necessary.	
Cyclospermum leptophyllum (Pers.) Sprague ex Britt. & P. Wilson	Apiaceae	OPCNM	Marsh parsley	Low	Species colonized OPCNM in 2005, on construction sites on State Route 85, possibly from seed transported by construction equipment or straw. The population has not persisted. No treatment necessary.	
Cynodon dactylon (Linnaeus) Persoon var. *dactylon*	Poaceae	OPCNM, CPNWR	Bermuda grass	Low	Known from xeroriparian areas, disturbed sites, wetlands, and swales, and occasionally in xeric uplands throughout the project area. Bermuda grass is a tenacious plant that is difficult to remove from wildlands. Manual removal is only feasibly for small infestations (<10 square feet). Chemical treatment is recommended only if native plants would not be affected.	
Dactyloctenium aegyptium (Linnaeus) Willdenow	Poaceae	OPCNM	Crowfoot grass	Low	Once found at Quitobaquito. A few plants might occasionally colonize the southern margin of OPCNM near farm fields. They are not likely to persist. No treatment necessary.	
Dimorphotheca sinuata DeCandolle	Asteraceae	None	African daisy, Cape marigold	High/Watch	Not known from the project area. The species has escaped from cultivation and invaded desert wildlands in southern California and Arizona (Pima, Maricopa and Yuma counties). During the past 15 years, scattered plants have been observed in favorably wet winters on the road shoulders of State Route 85 between Ajo and Why. Early detection is important, as this species is likely to become invasive in Sonoran Desert wildlands.	
Echinochloa colona (Linnaeus) Link	Poaceae	OPCNM, CPNWR	Junglegrass	Moderate	Found in wet or damp places or microsites in wildlands and developed areas. Ecological impacts are low outside of specialized habitat. Manually remove from ecologically sensitive areas, as needed.	

List of non-native plant species recorded from OPCNM and CPNWR, and their current status and management priorities.

Scientific Name [Family]	Family	Land Management Unit	English & Spanish common names	Management Priority	Ecological Impacts, Status, and Recommended Treatment	Arizona State Noxious Status
Enneapogon cenchroides (Lichtenstein ex Roemer & J.A. Schultes) C.E. Hubbard	Poaceae	OPCNM	Soft feather pappusgrass	High	Species has been rapidly expanding in wildlands of southern Arizona since the 1980s. Current feasibility of control at OPCNM is high because the plants are known from only a few locations. Hand-pulling will be effective if maintained until the seed bank is depleted. If this species is not detected early and controlled, it will have a significant ecological impact, at least in the eastern part of the project area. A combination of manual and chemical treatments are recommended.	
Eragrostis barrelieri Daveau	Poaceae	OPCNM	Mediterranean love grass	Low	Found in disturbed lands in the Lukeville area, and not known to have spread into OPCNM wildlands. No treatment necessary.	
Eragrostis cilianensis (Allioni) Vignolo ex Janchen	Poaceae	OPCNM, CPNWR	Stinking lovegrass	Low	Widespread and common throughout OPCNM and CPNWR. Feasibility of control is low due to its abundance (including the soil seed bank) and the extensive amount of occupied habitat. Treatment not prudent or feasible.	
Eragrostis lehmanniana Nees	Poaceae	OPCNM, CPNWR	Lehmann's lovegrass	High	Currently scarce and localized, with the potential for expansion and significant ecological impacts in the Ajo Mountains. Feasibility of control is currently high; manual removal has been effective. If status changes, a combination of manual and chemical treatments may be necessary.	
Erigeron canadensis Linneaus	Asteraceae	OPCNM, CPNWR	Horseweed	Low	Naturalized and widespread in OPCNM and CPNWR. Ecological impact is minor. Treatment not currently prudent or feasible.	
Eriochloa acuminata (J. Presl) Kunth var. *acuminata*	Poaceae	OPCNM	Southwestern cupgrass	Low	In temporarily moist soil in disturbed habitats in OPCNM next to developed and agricultural lands in the Sonoyta area. Possibly occurring elsewhere in OPCNM. No treatment necessary.	
Erodium cicutarium (Linnaeus) L'Heritier ex Aiton	Geraniaceae	OPCNM, CPNWR	Filaree, storksbill	Low	Widespread and abundant (naturalized) for over a century in the project area. Treatment is not prudent or feasible.	
Eruca vesicaria (Linneaus) Cavanilles subsp. *sativa* (Miller) Thellung	Brassicaceae	OPCNM	Garden rocket	High	Currently rare, the species has the potential to expand into OPCNM and CPNWR wildlands, where it could have significant environmental impacts. Early detection and treatment is important. Manual control is recommended at first; herbicides should be considered for populations up to one acre.	
Euphorbia prostrata Aiton	Euphorbiaceae	OPCNM	Prostrate sandmat	Low	Known from a single plant at Armenta Ranch, OPCNM. No treatment necessary.	
Ficus carica Linnaeus	Moraceae	OPCNM	Mission fig	Low	A non-native agricultural species that should be managed as part of the cultural landscape of Quitobaquito. Figs were once kept as garden plants at Quitobaquito but are no longer extant.	

List of non-native plant species recorded from OPCNM and CPNWR, and their current status and management priorities.

Scientific Name [Family]	Family	Land Management Unit	English & Spanish common names	Management Priority	Ecological Impacts, Status, and Recommended Treatment	Arizona State Noxious Status
Glinus lotoides Linneaus	Molluginaceae	CPNWR	Damascisa, lotus sweetjuice	Low	Seasonally and locally abundant in the drying mud of charcos and similar habitats in washes in CPNWR. No treatment necessary.	
Helianthus annuus Linnaeus	Asteraceae	OPCNM	Common sunflower	Low	An abundant agricultural weed in Arizona and Sonora. Plants can be found occasionally along State Route 85. The species is not expected to become invasive due to the lack of suitable habitat. Manual removal is recommended.	
Herniaria hirsuta Linnaeus var. *cinearea* (de Candolle) Loret & Barrandon	Caryophyllaceae	OPCNM	Burstwort, driveway weed	Low	Rare and localized, usually in disturbed areas. Unlikely to become invasive. No treatment necessary.	
Hordeum murinum Linnaeus subsp. *glaucum* (Steudel) Tzvelev	Poaceae	OPCNM, CPNWR	Wild barley	High	Well established along major washes in the eastern part of the Cabeza Prieta. Uncommon in Organ Pipe washes and canyons, increasing small populations along State Route 85. Manual and chemical treatments recommended.	
Lactuca serriola Linnaeus	Asteraceae	OPCNM, CPNWR	Prickly lettuce	Low	The species widespread in the project area, appears to have a minor ecological impact, and is perhaps a native species. No treatment necessary.	
Lantana camara Linnaeus	Verbenaceae	OPCNM	Lantana	High	Plants have escaped residential gardens at OPCNM, possibly via seed spread by birds. Cultural and manual treatments are recommended.	
Leucaena leucocephala (Lam.) de Witt subsp. *glabrata*	Fabaceae	None	White lead tree	High/Watch	This species is used in agroforestry throughout the world. In the Ajo area, it has colonized roadsides and disturbed areas, and could become invasive. Watch for and remove plants if they begin to spread into OPCNM or CPNWR.	
Malva parviflora Linnaeus	Malvaceae	OPCNM	Cheeseweed	Low	Widespread in the project area, but scarce in undisturbed wildlands. Populations will decline with no intervention as disturbed sites recover. No treatment necessary.	
Matthiola longipetala (Ventenat) De Candolle	Brassicaceae	OPCNM	Night-scented stock	Low	Known from one sighting on State Route 85 in OPCNM. Watch for other colonizers. Manual removal recommended.	
Medicago polymorpha Linnaeus	Fabaceae	OPCNM	Bur-clover	Low	Locally rare and, because it depends on supplemental watering, this species is unlikely to spread from residential lawns in the OPCNM headquarters area. The species will decline when residents discontinue supplemental watering of bermuda-grass lawns. No treatment necessary.	PNW, RGNW
Melilotus indicus (Linnaeus) Allioni	Fabaceae	OPCNM	Sour-clover	Low	Widespread but not common in the project area, usually found in areas receiving supplemental water. Treatment is not prudent or feasible.	

List of non-native plant species recorded from OPCNM and CPNWR, and their current status and management priorities.

Scientific Name [Family]	Family	Land Management Unit	English & Spanish common names	Management Priority	Ecological Impacts, Status, and Recommended Treatment	Arizona State Noxious Status
Mesembryanthemum crystallinum Linnaeus	Aizoaceae	OPCNM	Crystal iceplant	Moderate	Widespread on saline soils in neighboring Sonora, extending into OPCNM and CPNWR. Number and extent of populations is unknown. Manual control is not prudent or feasible; chemical control is effective. Whether or not treatment is prudent is unknown.	
Mesembryanthemum nodiflorum Linnaeus	Aizoaceae	OPCNM, CPNWR	Slenderleaf iceplant	Moderate	Widespread on saline soils in neighboring Sonora, extending into OPCNM and CPNWR along the U.S./Mexico border. Plants modify soil chemistry by concentrating salt on the soil surface. Manual control is not prudent or feasible; chemical control is effective. Whether or not treatment is prudent is unknown.	
Mollugo cerviana (Linnaeus) Seringe	Molluginaceae	OPCNM, CPNWR	Threadstem carpetweed	Low	Low priority due to its limited distribution and abundance. Given its small size, it is unlikely this species will ever have a significant adverse ecological impact. No treatment proposed.	
Nasturtium officinale W.T. Aiton	Brassicaceae	OPCNM	Watercress	Low	Historically known from Williams Spring and Dripping Springs, according to oral histories of local ranchers. Manual control is effective, if the species were to re-appear.	
Nicotiana glauca Graham var. *glauca*	Solanaceae	OPCNM	Tree tobacco	Low	Known from a single record along State Route 85 in OPCNM. Potential ecological effects in the project area are probably low. The comparatively slow rate of expansion allows for a moderately long window of opportunity to remove plants by hand.	
Oncosiphon piluliferum (Linneaus f.) Källersjö	Asteraceae	OPCNM	Stinknet	High	The species has colonized and is rapidly expanding into wildlands in other areas of Arizona. Known from a few post-construction disturbance sites along State Route 85 in OPCNM. Manual treatment is recommended.	
Opuntia engelmannii var *linguiformis* (Griffiths) B.D. Parfitt & Pinkava	Cactaceae	OPCNM	Cow-tongue prickly pear	Low	The species is currently localized in the Lukeville area, generally within 1/4 mile of the U.S./Mexico border. Plants that occur 60ft or more north of the international boundary should be removed by hand.	
Opuntia santa-rita (Griffiths & Hare) Rose	Cactaceae	OPCNM	Purple prickly-pear	Low	A 1939 collection from Quitobaquito was likely taken from a cultivated plant. No treatment necessary.	
Panicum antidotale Retzius	Poaceae	OPCNM	Blue panicgrass	High	Clones are found in xeroriparian areas and swales within about 1/4 mile of the U.S./Mexico border, between Dos Lomitas and Lukeville. Suitable habitat usually occurs in small patches (less than a hectare). Control is feasible with herbicides, but treatment has been precluded by border safety issues.	
Parkinsonia aculeata Linnaeus	Fabaceae	OPCNM	Mexican paloverde	Moderate	Several plants recorded from OPCNM, mostly in the Lukeville area. Population expansion occurs slowly. Chemical treatment (cut-stump treatment) has been successful. Mechanical control has been unsuccessful.	

List of non-native plant species recorded from OPCNM and CPNWR, and their current status and management priorities.

Scientific Name [Family]	Family	Land Management Unit	English & Spanish common names	Management Priority	Ecological Impacts, Status, and Recommended Treatment	Arizona State Noxious Status
Phalaris minor Retzius	Poaceae	OPCNM, CPNWR	Little-seed canary grass	Low	Feasibility of control is low because this species is widespread and abundant in the project area in the spring. Treatment is not currently prudent or feasible.	
Poa annua Linnaeus	Poaceae	OPCNM	Annual bluegrass	Low	Known from a single record on moist soil near Quitobaquito Pond in 1945, it has not been seen since. No treatment necessary.	
Polanisia dodecandra (Linnaeus) de Candolle subsp. *trachysperma* (Torrey & A. Gray) H.H. Iltis	Cleomaceae	OPCNM	Western clammyweed	Low	Known from a several-mile stretch of Alamo Canyon, above State Route 85 in OPCNM. A persistent population, consisting of scattered individuals. Not known as an invasive elsewhere; no treatment necessary.	
Polygonum argyrocoleon Steudel ex Kunze	Polygonaceae	OPCNM, CPNWR	Silversheath knotweed	Low	A widespread agricultural pest, this species was introduced to OPCNM in 2005 through straw spread after construction along State Route 85. Also known from Jose Juan Charco, CPNWR. Manual or chemical treatment could be used, but management priority is low.	
Polypogon monspeliensis (Linnaeus) Desfontaines	Poaceae	OPCNM, CPNWR	Rabbit's-foot grass	Moderate	The species is locally common in high-value wetland habitats, such as the spring channels at Quitobaquito, OPCNM, and temporal pools and tinajas in the mountains. Manual control only.	
Polypogon viridis (Gouan) Breistroffer	Poaceae	OPCNM	Water bentgrass	Low	Known only from Quitobaquito. Ecological impacts are localized and minor. Manual control only.	
Portulaca oleraceae Linnaeus	Portulacaceae	OPCNM, CPNWR	Purslane	Low	Widespread summer annual found throughout OPCNM and CPNWR. Treatment would not be prudent or feasible.	PNW, RGNW
Punica granatum Linnaeus	Lythraceae	OPCNM	Pomegranate	Low	A non-native agricultural species that should be managed as part of the cultural landscape of Quitobaquito. Pomegranates were maintained at Quitobaquito during the early 20th century and perhaps earlier as part of a subsistence farm. Six plants were alive in 2012.	
Ricinus communis Linnaeus	Euphorbiaceae	None	Castor bean	Low	The single record is a black and white photograph taken at Quitobaquito in about the 1940s, showing a single castor bean plant growing in front of a house. No treatment necessary.	
Salsola tragus Linnaeus	Amaranthaceae	OPCNM, CPNWR	Russian thistle, tumbleweed	Low	Colonizes and sometimes dominates disturbed sites, but declines as native plants once again dominate the site. Accumulations of dried tumbleweeds pose a fire risk; manual removal of dead plants in these areas is recommended.	
Sambucus cerulea Rafinesque	Adoxaceae	OPCNM	Blue elderberry	Low	A single plant was recorded from the Ajo Mountains. Possibly a cultivar that may have been planted in the area. No treatment necessary.	

List of non-native plant species recorded from OPCNM and CPNWR, and their current status and management priorities.

Scientific Name [Family]	Family	Land Management Unit	English & Spanish common names	Management Priority	Ecological Impacts, Status, and Recommended Treatment	Arizona State Noxious Status
Schismus arabicus Nees AND *Schismus barbatus* (Loefling ex Linnaeus) Thellung	Poaceae	OPCNM, CPNWR	Arabian grass	Low	Widespread and abundant, especially during winter/springs with above-average rainfall. Stands can be dense enough to carry fire. Ecological impacts can be high but treatment is not prudent or feasible.	
Salvinia molesta Mitchell	Salviniaceae	None	Giant salvinia, water fern	High/Watch	It is not currently known from the project area, but it is spreading rapidly through the lower Colorado River system and interfering with irrigation systems there. This species has the potential to significantly affect open waters. If established at Quitobaquito or the Rio Sonoyta, it could cause the extirpation of aquatic wildlife (e.g. Quitobaquito pupfish, Sonoran mud turtle) and plants. Manual removal is recommended.	PNW, RGNW
Sisymbrium altissimum Linnaeus	Brassicaceae	OPCNM	Tumble mustard, Jim Hill mustard	High	First recorded in 2005 from OPCNM along State Route 85, in a construction zone. Since then individual plants have appeared sporadically along the highway. Manual removal is recommended. Chemical control may be needed if species expands from the highway.	
Sisymbrium irio Linnaeus	Brassicaceae	OPCNM	London rocket	Low	Abundant and widespread in the project area. No treatment recommended; not prudent or feasible.	
Sisymbrium orientale Linnaeus	Brassicaceae	OPCNM, CPNWR	Indian hedge-mustard, Asian rocket	High	Species has infested the Ajo area and has appeared sporadically along State Route 85 in OPCNM, and has the potential for being invasive. Early detection is important. Control is currently feasible, but control will be difficult once wildlands are invaded.	
Solanum americanum Miller	Solanaceae	OPCNM	Black nightshade	Low	Naturalized in mountain canyons and cooler microsites of the mountains in the eastern part of the project area. No treatment necessary.	
Sonchus asper (Linnaeus) Hill subsp. *asper*	Asteraceae	OPCNM, CPNWR	Spiny sowthistle	Low	Naturalized and widespread in OPCNM and CPNWR, nowhere reaching a high density. No treatment proposed.	
Sonchus oleraceus Linnaeus	Asteraceae	OPCNM, CPNWR	Common sowthistle	Low	Naturalized and widespread in OPCNM and CPNWR, nowhere reaching a high density. No treatment proposed.	
Sorghum halepense (Linnaeus) Persoon	Poaceae	OPCNM, CPNWR	Johnson grass	Low	Species is uncommon in the project area. Colonists appear periodically along State Route 85 but do not persist. No treatment proposed.	
Tamarix aphylla (Linnaeus) H. Karston	Tamaricaceae	OPCNM, CPNWR	Athel cedar, salt cedar	High	Species not known to sexually reproduce in western Pima County. Single plants were planted near historical houses, outbuildings and corrals on OPCNM and some are still alive; these individuals may be considered features in a cultural landscape.	

List of non-native plant species recorded from OPCNM and CPNWR, and their current status and management priorities.

Scientific Name [Family]	Family	Land Management Unit	English & Spanish common names	Management Priority	Ecological Impacts, Status, and Recommended Treatment	Arizona State Noxious Status
Tamarix ramosissima Ledebour	Tamaricaceae	OPCNM, CPNWR	Salt cedar, tamarisk	High	Occurs in rare wetland habitats, tinajas, or drainage bottoms, all of which are important desert resources. The rate of spread and potential for significant ecological impact is high. Annual surveys of permanent or seasonal wetlands, including mountain tinajas, should occur. Manual control is ineffectual; chemical control is recommended.	
Thlaspi arvense Linnaeus	Brassicaceae	OPCNM	Field pennycress	Low	This species has not been seen in OPCNM since 1972, the only record for the project area. Treatment not necessary.	
Tribulus terrestris L.	Zygophyllaceae	OPCNM, CPNWR	Puncturevine	Low	Plants generally occur in disturbed areas. It seems unlikely this species will have a significant ecological impact in natural areas in OPCNM or CPNWR. Site-specific manual or chemical treatment may be needed in areas of concentrated human use.	PNW, RGNW
Triticum aestivum L	Poaceae	OPCNM	Common wheat	Low	Plants appear periodically along the southern boundary of OPCNM, the result of seeds dropping off trucks on adjacent Mexico highway 2. Treatment is not necessary.	
Verbena sp.	Verbenaceae	OPCNM	Verbena (cultivated)	Low	Plants grow amid bermuda grass in residential lawns in OPCNM headquarters area. This species is unlikely to spread from cultivated areas that receive supplemental water. Treatment not necessary.	
Verbesina encelioides (Cavanilles) Bentham & Hooker f. ex A. Gray subsp. *exauriculata* (B.L. Rob. & Greenm.) J. R. Coleman	Asteraceae	OPCNM	Golden crownbeard	Low	Known from a single record at Quitobaquito, OPCNM, in 1939. Native to Arizona but not native to Quitobaquito. Treatment not necessary.	
Washingtonia filifera (Linden ex André) H. Wendland	Arecaceae	OPCNM	California fan palm	Low	A nursery-grown plant discovered at Quitobaquito in 1882 is the only record for the project area. A management plan for the Quitobaquito wetlands should determine the appropriate treatment if *Washingtonia* establishes from seed or if it is once again planted.	

APPENDIX 2.

ARIZONA GAME AND FISH DEPARTMENT'S GUIDELINES FOR HANDLING SONORAN DESERT TORTOISES

GUIDELINES FOR HANDLING SONORAN DESERT TORTOISES ENCOUNTERED ON DEVELOPMENT PROJECTS

Arizona Game and Fish Department
Revised October 23, 2007

The Arizona Game and Fish Department (Department) has developed the following guidelines to reduce potential impacts to desert tortoises, and to promote the continued existence of tortoises throughout the state. These guidelines apply to short-term and/or small-scale projects, depending on the number of affected tortoises and specific type of project.

The Sonoran population of desert tortoises occurs south and east of the Colorado River. Tortoises encountered in the open should be moved out of harm's way to adjacent appropriate habitat. If an occupied burrow is determined to be in jeopardy of destruction, the tortoise should be relocated to the nearest appropriate alternate burrow or other appropriate shelter, as determined by a qualified biologist. Tortoises should be moved less than 48 hours in advance of the habitat disturbance so they do not return to the area in the interim. Tortoises should be moved quickly, kept in an upright position parallel to the ground at all times, and placed in the shade. Separate disposable gloves should be worn for each tortoise handled to avoid potential transfer of disease between tortoises. Tortoises must not be moved if the ambient air temperature exceeds 40° Celsius (105° Fahrenheit) unless an alternate burrow is available or the tortoise is in imminent danger.

A tortoise may be moved up to one-half mile, but no further than necessary from its original location. If a release site, or alternate burrow, is unavailable within this distance, and ambient air temperature exceeds 40° Celsius (105° Fahrenheit), the Department should be contacted to place the tortoise into a Department-regulated desert tortoise adoption program. Tortoises salvaged from projects which result in substantial permanent habitat loss (e.g. housing and highway projects), or those requiring removal during long-term (longer than one week) construction projects, will also be placed in desert tortoise adoption programs. *Managers of projects likely to affect desert tortoises should obtain a scientific collecting permit from the Department to facilitate temporary possession of tortoises.* Likewise, if large numbers of tortoises (>5) are expected to be displaced by a project, the project manager should contact the Department for guidance and/or assistance.

Please keep in mind the following points:

- These guidelines do not apply to the Mojave population of desert tortoises (north and west of the Colorado River). Mojave desert tortoises are specifically protected under the Endangered Species Act, as administered by the U.S. Fish and Wildlife Service.

- These guidelines are subject to revision at the discretion of the Department. We recommend that the Department be contacted during the planning stages of any project that may affect desert tortoises.

- Take, possession, or harassment of wild desert tortoises is prohibited by state law. Unless specifically authorized by the Department, or as noted above, project personnel should avoid disturbing any tortoise.

APPENDIX 3.

MINIMUM REQUIREMENTS DECISION GUIDE

ARTHUR CARHART NATIONAL WILDERNESS TRAINING CENTER

MINIMUM REQUIREMENTS DECISION GUIDE

WORKSHEETS

". . . except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act..."

– the Wilderness Act, 1964

Please refer to the accompanying MRDG *Instructions* for filling out this guide.
The spaces in the worksheets will expand as necessary as you enter your response.

The MRDG Instructions may be found at: http://www.wilderness.net/mrdg/

Project Title: Ecological Restoration Plan on DOI lands in western Pima County, Arizona

Step 1: Determine if any administrative action is necessary.

Description: Describe the situation that may prompt action.

Organ Pipe Cactus National Monument (OPCNM) proposes to implement an ecological restoration program (ERP) that will restore damaged lands on OPCNM, Cabeza Prieta National Wildlife Refuge (CPNWR) and Bureau of Land Management (BLM)-Ajo Block. An ERP would support the missions of the National Park Service (NPS), US Fish and Wildlife Service (USFWS), and BLM, and would help manage public lands for sustainable use.

Ecological restoration involves repairing disturbances to natural areas by using passive, facilitated and active restoration strategies to assist the disturbed areas to recover to pre-disturbed conditions or at least to recover to an alternate stable state. Sometimes ecological restoration means removing invasive species, while other times it means

installing erosion control measures, decompacting soils, or restoring undesignated vehicle routes (UVRs). For the purposes of this document, ecological restoration would occur on UVRs and other disturbed lands, with the purpose of restoring healthy soils, natural or more stable hydrological functions, and a natural native plant and animal community.

The NPS is the lead agency for the development of the programmatic ERP/EA and is cooperating with the U.S. Customs and Border Protection (CBP), USFWS and BLM. Prior to implementation of the ERP, the agencies are required to consider potential environmental impacts on the quality of the human environment that would result. This proposed restoration would enhance the long-term preservation of the Sonoran Desert and the experience visitors have on these public lands. This Minimum Requirements Decision Guide (MRDG) is intended to provide guidance on restoration efforts on NPS and FWS administered wilderness areas.

Due to high levels of border-related activity, there are hundreds of miles of UVRs across the landscape and through the wilderness areas. Border-related activity includes both illegal cross-border activities and the corresponding law enforcement response. Vehicle use in wilderness is conducted in accordance with a 2006 Interagency Memorandum of Understanding (2006 MOU). CBP must frequently conduct interdiction efforts in wilderness areas in response to undocumented aliens (UDAs), drug and human smugglers, and where human lives are at risk given the area's rugged terrain and extremely hot temperatures.

NPS, USFWS, BLM, and CBP are cooperatively working toward restoration of many of the UVRs in order to restore natural conditions and improve habitat conditions for the endangered Sonoran pronghorn and lesser long-nosed bat.

In order to restore UVRs and endangered species habitat, we are proposing to use mechanized equipment in wilderness areas to conduct site preparation activities such as soil decompaction, site leveling, and other site prep activities. We propose to use three strategies. A passive strategy would be used on minimally disturbed sites where hand tools are sufficient to adequately restore the site and treat invasive plant species. A facilitated strategy is proposed where small equipment and shallow soil preparation is needed. The facilitated strategy would be used on low to moderately disturbed sites where the first few inches of soil need to be decompacted, scarified or leveled. Tools may include spring rake, small drag, chain saws, ATV mounted spray equipment, and weed whackers. Under the active strategy a full range of integrated restoration techniques would be available, including the use of large mechanized equipment and tools such as rippers, graders, drills and augers. This equipment may be considered the minimum necessary on heavily compacted or deflated soils, and on extensive areas of disturbance.

To determine if administrative action is necessary, answer the questions listed in A - F on the following pages by answering Yes or No, and providing an explanation.

A. Options Outside of Wilderness

Is action necessary within wilderness?

Yes: ☒ **No:** ☐

- The majority of the disturbed areas are within wilderness and many of the UVRs are heavily compacted or deflated either from inherent soil characteristics or repeated use. In order for restoration actions to be successful, many of the soils need to be compacted, and the original contours/grade need to be restored to facilitate successful replanting. We are implementing three different strategies based on the use of the minimum, most effective strategy that will meet our objectives and achieve the best restoration results.

B. Valid Existing Rights or Special Provisions of Wilderness Legislation

Is action necessary to satisfy valid existing rights or a special provision in wilderness legislation (the Wilderness Act of 1964 or subsequent wilderness laws) that allows or requires consideration of the Section 4(c) prohibited uses? Cite law and section.

Yes: ☒ **No:** ☐

The 2006 Memorandum of Understanding among the U.S. Department of Homeland Security and the U.S. Department of the Interior regarding cooperative National security and counterterrorism efforts on Federal lands along the United States' borders gives certain responsibilities to DOI, USDA, and CBP.

The responsibilities and terms specific to DOI and USDA states "the DOI and the USDA hereby recognize that, pursuant to applicable law, CBP is authorized to access the Federal lands under DOI and USDA administrative jurisdiction, including areas designated by Congress as wilderness, recommended as wilderness, and/or wilderness study areas, and will do so in accordance with the following conditions and existing authorities:

- CBP agents on foot or on horseback may patrol, or pursue, or apprehend suspected CBVs off-road at any time on any Federal lands administered by the Parties;

- CBP may operate motor vehicles on existing public and administrative roads and/or trails and in areas previously designated by the land management agency for off-road vehicle use at any time, provided that such use is consistent with presently authorized public or administrative use. At CBP's request, the DOI and the USDA will provide CBP with keys, combinations, or other means necessary to access secured administrative roads/trails. CBP may drag existing public and administrative roads that are unpaved for the purpose of cutting sign, subject to compliance with conditions that are mutually agreed upon by the local Federal land manager and the CBP Sector Chief. For purposes of this MOU, "existing public roads/trails" are those existing roads/trails, paved or unpaved, on which the land management agency allows members of the general public to operate motor vehicles, and "existing administrative roads/trail" are those existing roads/trails, paved or unpaved, on which the land management agency allows persons specially authorized by the agency, but not members of the general public, to operate motor vehicles

- CBP may request, in writing, that the land management agency grant additional access to Federal lands (for example, to areas not previously designated by the land management agency for off-road use) administered by the DOI or the USDA

for such purposes as routine patrols, non-emergency operational access, and establishment of temporary camps or other operational activities. The request will describe the specific lands and/or routes that the CBP wishes to access and the specific means of access desired. After receiving a written request, the local Federal land manager will meet promptly with the CBP Sector Chief to begin discussing the request and negotiating the terms and conditions of an agreement with the local land management agency that authorizes access to the extent permitted by the laws applicable to the particular Federal lands. In each agreement between CBP and the local land management agency, the CBP should require to use the lowest impact mode of travel and operational setup reasonable and practicable to accomplish its mission. The CBP should also be required to operate all motorized vehicles and temporary operational activities in such a manner as will minimize the adverse impacts on threatened or endangered species and on the resource and values of the particular Federal lands. However, at no time should officer safety be compromised when selecting the least impactful conveyance or operational activity. Recognizing the importance of this matter to the Nation's security, the CBP Sector Chief and the local Federal land manager will devote to this endeavor the resources necessary to complete required compliance measures in order to execute the local agreement within ninety (90) days after the Federal land manager has received the written request for access. Nothing in this paragraph is intended to limit the exercise of applicable emergency authorities for access prior to the execution of the local agreement. The Secretaries of the Interior, Agriculture, and Homeland Security expect that, absent compelling justification, each local agreement will be executed within that time frame and provide the maximum amount of access requested by the CBP and allowed by law;

- Nothing in this MOU is intended to prevent CBP agents from exercising existing exigent/emergency authorities to access lands, including authority to conduct motorized off-road pursuit of suspected CBVs at any time, including in areas designated or recommended as wilderness, or in wilderness study areas when, in their professional judgment based on articulated facts, there is a specific exigency/emergency involving human life, health, safety of persons within the area, or posing a threat to national security, and they conclude that such motorized off-road pursuit is reasonably expected to result in the apprehension of the suspected CBVs. Articulated facts include, but are not limited to, visual observation; information received from a remote sensor, video camera, scope, or other technological source; fresh "sign" or other physical indication; canine alert; or classified or unclassified intelligence. For each such motorized off-road pursuit, CBP will use the least intrusive or damaging motorized vehicle readily available, without compromising agent or officer safety. In accordance with paragraph IV .C.4, as soon as practicable after each such motorized off-road pursuit, CBP will provide the local Federal land manager with a brief report;

- If motorized pursuits in wilderness areas, areas recommended for wilderness designation, wilderness study areas, or off-road in an area not designated for such use are causing significant impact on the resources, or if other significant issues warrant consultation, then the Federal land manager and the CBP will immediately meet to resolve the issues subject to paragraphs IV .A.2 and IV .A.3 of this MOU;

- CBP may request, in writing, that the land management agency authorize installation of construction of tactical infrastructure for detection of CBVs (including, but not limited to, observation points, remote video surveillance systems, motion sensors, vehicle barriers, fences, roads, and detection devices) on land under the local land management agency's administrative jurisdiction. In areas not designated as wilderness, the local Federal land manager will expeditiously authorize CBP to install such infrastructure subject to such terms and conditions that are mutually developed and articulated in the authorization issued by the land management agency. In areas designated or managed as wilderness, the local Federal land manager in consultation with CBP, will promptly conduct a "minimum requirement," "minimum tool," or other appropriate analysis. If supported by such analysis, the local Federal land manager will expeditiously authorize CBP to install such infrastructure subject to such terms and conditions that are mutually developed and articulated in the authorization issued by the land management agency;

The responsibilities and terms specific to CBP are as follows:

- If CBP agents pursue or apprehend suspected CBVs in wilderness areas or off-road in an area not designated for such use under paragraph IV .B.5, then the CBP will use the lowest impact mode of travel practicable to accomplish its mission and operate all motorized vehicles in such a manner as will minimize the adverse impacts on threatened or endangered species and on the resources and values of the particular Federal lands, provided officer safety is not compromised by the type of conveyance selected;

- CBP will notify the local Federal land manager of any motorized emergency pursuit, apprehension, or incursion in a wilderness area or off-road in an area not designated for such use as soon as is practicable. A verbal report is sufficient unless either CBP or the land management agency determines that significant impacts resulted, in which case a written report will be necessary;

- If motorized pursuits in wilderness areas, areas recommended for wilderness designation, wilderness study areas, or off-road in an area not designated for such use are causing significant impact on the resources as determined by a land manager, or if other significant issues warrant consultation, then the CBP and Federal land manager will immediately meet to resolve the issues subject to paragraphs IV .A.2 and IV .A.3 of this MOU.

- CBP will consult with land managers to coordinate the placement and maintenance of tactical infrastructure, permanent and temporary video, seismic and other remote sensing sites in order to limit resource damage while maintaining operational efficiency;

- CBP will ensure that current and incoming CBP agents attend environmental and cultural awareness training to be provided by the land management agencies;

Other laws policies and agreements modify the wilderness protections provided in the Wilderness Act of 1964. On CPNWR, these special provisions are outlined as follows:

- "…law enforcement activities by the Immigration and Naturalization Service, the Drug Enforcement Agency, or the United States Customs service within CPNWR lands shall not be construed as precluding or otherwise affecting continued border operations." (Arizona Desert Wilderness Act of 1990, P.L. 101-628, Sec. 301(g).
- "…low-level overflights are not subject to compatibility determinations nor precluded by the designation of lands within the CPNWR as wilderness." (National Defense Authorization Act of Fiscal Year 2000, P.L. 106-65, Sec. 3032(d)(1)(D)).
- "…if the Secretary of the Navy or the Secretary of the Air Force determines that military operations, public safety, or national security require the closure to the public of any road, trail, or other portion of the CPNWR or Cabeza Prieta Wilderness, the Secretary of the Interior shall take such action as is determined necessary or desirable to effect and maintain such closure, including agreeing to amend the memorandum of understanding to establish new or enhanced surface safety zones." (National Defense Authorization Act of Fiscal Year 2000, P.L. 106-65, Sec. 3032(f)(1))

C. Requirements of Other Legislation

Is action necessary to meet the requirements of other laws? Cite law and section.

Yes: ☒ **No:** ☐

- Recovery of the Sonoran Pronghorn (*Antilocapra americana sonoriensis*) is dependent on wilderness ecosystems. (Endangered Species Act).
- Recovery of the Lesser Long-Nosed bat (*Leptonycteris yerbabuenae*) is dependent on wilderness ecosystems. (Endangered Species Act).
- The Biological Opinion's mandated the restoration of impacted Sonoran pronghorn and lesser long nosed bat habitat as part of the mitigation measures related to DHS building a series of SBI*net* towers (video surveillance towers) across the project area. The majority of the preferred habitat of these two species occurs in designated wilderness.

D. Other Guidance

Is action necessary to conform to direction contained in agency policy, unit and wilderness management plans, species recovery plans, or agreements with tribal, state and local governments or other federal agencies?

Yes: ☒ **No:** ☐

- A Biological Opinion under the ESA states "SBI*net* will provide $1,750,000 in funding to DOI to close and restore UVRs documented as a result of the UVR assessment. DOI will prioritize areas to close and restore based on the importance of the areas to Sonoran pronghorn and on CBP information regarding anticipated continued use of UVRs (*i.e.*, UVRs that will likely continue to be used by CBP due to emergency and exigent circumstances will receive a lower restoration priority as restoration in continuously used areas will not likely be successful). DOI will conduct the restoration work between years 2 and 5 (from the initiation of project construction)."

- A Biological Opinion under the ESA states "To help offset impacts to lesser long-nosed bats, Sonoran pronghorn, and other natural resources CBP will provide funding in the amount of $955,000 to restore 84 acres (to be identified by OPCNM personnel) within OPCNM, including illegal roads and trails within the Monument. We anticipate that about 60 percent of the restoration will benefit the conservation of the lesser long-nosed bat and about 40 percent will benefit the Sonoran pronghorn."

- Section 4.1.5 of NPS Management Policies (August 31, 2006) encourages restoration of natural systems.

- Section 6.3.7 of NPS Management Policies (August 31, 2006) encourages natural resources management within wilderness.

- Section 4.4.2.2 of NPS Management Policies (August 31, 2006) encourages restoration of native plant species.

- Section 4.4.4.2 of NPS Management Policies (August 31, 2006) encourages the removal of exotic species already present.

E. Wilderness Character

Is action necessary to preserve one or more of the qualities of wilderness character including: Untrammeled, Undeveloped, Natural, Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation, or Unique Attributes or Other Features that reflect the character of this wilderness area?

Untrammeled: **Yes:** ☒ **No:** ☐

The NPS and FWS wilderness areas currently do not meet the desired conditions for untrammeled wilderness character due to the presence of hundreds of miles of UVRs. Restoration of UVRs to near natural or more stable conditions would help restore the untrammeled character to many of the wilderness areas. There would be a short-term negative impact to the presence of mechanized equipment during treatment implementation. There may be traces of the use mechanized equipment evident for a few years following treatments. In the long-term the proposed action would restore many areas to a relatively untrammeled appearance.

Undeveloped: **Yes:** ☒ **No:** ☐

The presence of miles of UVRs detracts from the undeveloped character of the wilderness. The end result of the use of integrated restoration strategies would restore the undeveloped character to much of the wilderness project area, similar to that described under the Untrammeled character.

Natural: **Yes:** ☒ **No:** ☐

The proposed action will restore the natural quality of wilderness, as much as possible by:

- Restoring surface flow and more natural or stable soil conditions.
- Restoring native plant communities.
- Restoring habitat for endangered Species.
- Removing invasive plants

It may not always be possible to completely restore 'natural conditions' to disturbed areas of the Sonoran Desert. However, the proposed action will restore disturbed areas to more natural characteristics with greater stability than the existing conditions.

Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation:

Yes: ☒ **No:** ☐

The proposed action will have a short-term negative impact on solitude during treatment implementation to the solitude of the wilderness. However, solitude will be restored as soon as the project is completed. The proposed action will have long-term beneficial impacts for visitors to experience 'primitive' recreation as the evidence of UVRs and human disturbance will be removed from large tracts of wilderness, thus improving the feeling of being in a primitive areas.

Unique Attributes or Other Features that reflect the character of this wilderness:

Yes: ☒ **No:** ☐

This action will preserve other features by:

- Stopping accelerated erosion that exposes archeological sites.
- Help maintain the large block of Sonoran Desert wilderness within the project area.

F. Public Purposes

Is action necessary to protect one or more of the public purposes for wilderness (as stated in Section 4(b) of the Wilderness Act) of recreational, scenic, scientific, educational, conservation, and historical use?

- Improving the visual quality of the area by restoring disturbed lands and removing invasive plants.

Scenic: **Yes:** ☒ **No:** ☐

This action will preserve the scenic quality of wilderness by:

- Improving the visual quality of the area by restoring disturbed lands and removing invasive plants.

Scientific: **Yes:** ☒ **No:** ☐

This action will preserve the scientific quality of wilderness by:

- Setting up controls and tests to evaluate effectiveness of restoration activities within wilderness.

Educational: **Yes:** ☐ **No:** ☒

Conservation: **Yes:** ☒ **No:** ☐

This action will preserve the conservation quality of wilderness by:

- Restoring surface flow.
- Restoring hydrology.
- Restoring plant communities.
- Repairing habitat that is essential to the Sonoran pronghorn.
- Removing invasive plants

Historical: **Yes:** ☐ **No:** ☒

Step 1 Decision: Is any administrative action necessary in wilderness?

*In reviewing the Step 1 questions in A - F above, note that not all answers have equal weight in the Step 1 Decision: A - C and E have first priority; F has second priority; D has third priority. See **Instructions** for details.*

Yes: ☒ **No:** ☐

Administrative action is necessary in wilderness because these actions are required by the two biological opinions. These actions will preserve wilderness character by removing invasive plants, and restoring disturbed lands to a less impacted, more natural condition. Administrative action would reduce the impacts to wilderness

character and restore natural processes in wilderness. The environmental assessment concludes that if no action is taken with ecological restoration then disturbed ecosystems will continue to degrade resulting in the loss of wilderness character. The impacts of no action would be minor and adverse in the short and long term.

If action is necessary, proceed to Step 2 to determine the minimum activity.

Step 2: Determine the minimum activity.

Please refer to the accompanying MRDG *Instructions* for information on identifying alternatives and an explanation of the effects criteria displayed below.

Description of Alternatives

For each alternative, describe what the action is, when the activity will take place, where the activity will take place, and what methods and techniques will be used. Detail the impacts to the qualities of wilderness character and other comparison criteria, including safety. Where mitigation is possible, include mitigation measures. In addition to describing the effects of the alternative, it may be useful to break down each alternative into its component parts and list in tabular form the impacts to each comparison criterion.

Alternative A: No Action

Description:

Under this alternative, restoration actions would occur on a limited case-by-case basis as resources became available. Restoration of some degraded areas in wilderness may occur and manual treatment of invasive plants would continue. Mechanical and chemical treatments would not occur in wilderness. Recovery of wilderness character would take longer and impacts may remain detectable for the long term.

Impacts to Wilderness Character:

Untrammeled – Under the no action alternative, disturbed ecosystems will continue to degrade resulting in the loss of wilderness character. UVRs would remain unrestored and the impact to the untrammeled character of wilderness would be minor to moderate in the short and long term.

Undeveloped – Under the no action alternative, unrestored UVRs would continue to impact the undeveloped character of wilderness. Signs would be placed, outside of wilderness and near disturbed areas to restrict further actions or activities to the area. Impacts to the undeveloped character of wilderness would be minor and adverse.

Natural – Under the no action alternative, Impacts to natural and cultural resources would continue. Invasive species may continue to proliferate, and disturbed lands would remain disturbed for a long period of time (more than 50 years). The impacts to the natural character of wilderness would be minor and adverse.

Solitude or Primitive and Unconfined Recreation – Under the no action alternative, Impacts to visitor use and experience would remain unchanged. A small potential for encounters with crews would occur when restoration activities are conducted and could result in minor short term impacts to sounds and sights. Impacts to outstanding opportunities would be short to long term negligible to minor and adverse.

Unique Attributes or Other Features – Under the no action alternative, Impacts to unique attributes and other features would continue. The large block of Sonoran Desert wilderness would continue to be impacted by UVRs and invasive plants, and archeology sites would continue to be exposed due to accelerated erosion. The impacts to the unique attributes and other features of wilderness would be minor and adverse.

Impacts to other criteria:

Maintaining Traditional Skills – Not applicable.

Special Provisions – Under this no action alternative, the special provisions referenced in Step 1, Section B will not be mitigated.

Economics and Timing Constraints – Under the no action alternative, restoration would occur on a limited case-by-case basis as resources became available. Given the use of strictly man-power and hand tools to restore disturbed areas, this alternative would accomplish a low level of restoration compared to other alternatives. To accomplish restoration by use of crews with hand tools would be extremely difficult due to the large scale of disturbed lands and the remoteness of their locations. Restoration under this alternative would accomplish a lower level of restoration at a higher cost compared to other alternatives.

Impacts to safety of visitors and workers – Organ Pipe Cactus National Monument shares 30 miles of international border with Mexico. The entire monument is centrally located within a ONDCP (Office of National Drug Control Policy) designated High Intensity Drug Trafficking Area (HIDTA). The monument is also routinely used by illegal undocumented aliens entering the country and those who facilitate the smuggling of illegal aliens. In an effort to avoid apprehension, criminals have resorted to violence against law enforcement officers in and adjacent to the monument. Though not common, park visitors have been the victims of criminals operating in the area. Though unlikely, park management recognizes that all employees could be misidentified as enforcement officers or could be seen as a potential threat to criminals they might inadvertently encounter when working in the field. In some areas of OPCNM and CPNWR armed security is required for access. This security is required for any alternative.

There are inherent risks associated with work in the rugged terrain of the backcountry and in wilderness. There would be safety risks involved with the use of hand tools such as spades, pickaxes, rakes, and saws. Transporting equipment and moving debris for vertical mulching would entail safety risks. Access to work areas by the public would be restricted while activities were occurring so there would be no risk to the public.

Impacts Comparison Tables

Wilderness Character

Untrammeled

	positive impacts	negative impacts	
1st component: Method of access to site	No mechanized equipment or transport		
2nd component: Site preparation	No mechanized equipment	Much less site preparation will be accomplished	
3rd component: Restoration of site	No mechanized equipment	Much less restoration will be accomplished	
4th component: Condition after restoration		Much less restoration will be accomplished, leaving most conditions unrestored	**Untrammeled Grand Total**
TOTAL	**+++**	**---**	**+++/---**

Undeveloped

	positive impacts	negative impacts	
1st component: Method of access to site	No mechanized equipment or transport		
2nd component: Site preparation	No mechanized equipment	Much less site preparation will be accomplished	
3rd component: Restoration of site	No mechanized equipment	Much less restoration will be accomplished	
4th component: Condition after restoration		Much less restoration will be accomplished, leaving most conditions unrestored	**Undeveloped Grand Total**
TOTAL	**+++**	**---**	**+++/---**

Natural

	positive impacts	negative impacts	
1st component: Method of access to site	No mechanized equipment or transport		
2nd component: Site preparation	No mechanized equipment	Much less restoration will be accomplished	
3rd component: Restoration of site	No mechanized equipment	Much less restoration will be accomplished	
4th component: Condition after restoration		Much less restoration will be accomplished, leaving most conditions unrestored	**Natural Grand Total**
TOTAL	**+++**	**---**	**+++/---**

Solitude or Primitive and Unconfined Recreation

	positive impacts	negative impacts	
1st component: Method of access to site	No Impact	No impact	
2nd component: Site preparation		Visitors may encounter work crew	
3rd component: Restoration of site		Visitors may encounter work crew	
4th component: Condition after restoration	No impact	No impact	**S or P&UR Grand Total**
TOTAL		**--**	**--**

Unique Attributes or Other Features

	positive impacts	negative impacts	
1st component: Method of access to site	No Impact	No Impact	
2nd component: Site preparation		Accelerated erosion is not controlled	
3rd component: Restoration of site		Accelerated erosion is not controlled, Much less restoration will be accomplished.	
4th component: Condition after restoration		Accelerated erosion is not controlled, Much less restoration will be accomplished.	**UA or OF Grand Total**
TOTAL		---	---

Other Criteria

Maintaining Traditional Skills

	actions with beneficial effects	actions with adverse effects	
1st component: Method of access to site	No impact	No impact	
2nd component: Site preparation	No impact	No impact	
3rd component: Restoration of site	No impact	No impact	
4th component: Condition after restoration	No impact	No impact	**Traditional Skills Grand Total**
TOTAL	**NI**	**NI**	**NI**

Special Provisions

	positive impacts	negative impacts	
1st component: Method of access to site	No impact	No impact	
2nd component: Site preparation	No impact	No impact	
3rd component: Restoration of site	No impact	No impact	
4th component: Condition after restoration		No mitigation of special provisions on CPNWR.	**Special Provisions Grand Total**
TOTAL		**-**	**-**

Economics and Timing Constraints

	positive impacts	negative impacts	
1st component: Method of access to site		Equipment would have to be transported to site manually	
2nd component: Site preparation		Site preparation would increase dramatically	
3rd component: Restoration of site		Restoration of site would decrease dramatically	
4th component: Condition after restoration		Much less restoration will be accomplished, leaving most conditions unrestored	**Economics & Timing Grand Total**
TOTAL		**----**	**----**

Safety of Visitors and Workers

	positive impacts	negative impacts	
1st component: Method of access to site		Hauling materials and equipment manually	
2nd component: Site preparation		Working with hand tools, heat exhaustion	
3rd component: Restoration of site		Working with hand tools, heat exhaustion	
4th component: Condition after restoration		Much less restoration will be accomplished, leaving most conditions unrestored	**Safety Grand Total**
TOTAL		**----**	**----**

Alternative B: Proposed Action Alternative

Description:

Under this alternative, the comprehensive ERP would be put into effect. This would allow the use of a full range of restoration techniques and types of treatments that achieve maximum effectiveness in restoring the health of ecological communities while minimizing risks to humans and natural and cultural resources. The alternative would allow for site-specific strategies and treatments that would prevent or limit further disturbance, establish plant cover, decompact soils, re-establish natural contours and drainage patterns, manage invasive plants, reduce or prevent the development of new UVRs, reduce vehicle traffic on existing UVRs, and restore habitat for a number of animal species including the endangered Sonoran pronghorn and lesser long-nosed bat.

Impacts to Wilderness Character:

Untrammeled – Under the proposed action alternative the project would manipulate a disturbed area to move toward restoration of native ecosystems on a larger scale. The use of mechanical and chemical treatments would be conducted both in and out of wilderness. The use of chemical treatments may affect the untrammeled character of wilderness due to the impact of non-target species. The use of mechanized equipment would also have an impact to the untrammeled character of wilderness. These impacts would be minor to moderate and adverse in the short term. With the use of mechanized equipment we would be able to restore a much larger area, this would lead to minor and beneficial long term impacts to the untrammeled character of wilderness.

Undeveloped – Under the proposed action alternative, restoration activities on existing UVRs would be conducted on a larger scale and with mechanized equipment. The use of mechanized equipment, motorized transport and other prohibited uses would have a short term impact on the undeveloped character of wilderness. These short term impacts would be minor to moderate and adverse. The restoration of disturbed areas on a larger scale would lead to minor and beneficial to the undeveloped nature of wilderness.

Natural – Under the proposed action alternative impacts to the natural character of wilderness would occur in the short term. Decompaction of disturbed areas and chemical treatment of invasive species would impact the natural character of wilderness temporarily. These restoration activities would benefit wilderness character in the long term, once the restoration activities are completed. The short term impacts to the natural character of wilderness would be minor to moderate and adverse, while the long term impacts would be minor and beneficial.

Solitude or Primitive and Unconfined Recreation – Under the proposed action alternative impacts to visitor use would remain unchanged. A small potential for encounters with crews could occur when restoration activities are conducted and could result in minor short term impacts to sounds and sights. Impacts to outstanding opportunities would be short to long term negligible to minor.

Unique Attributes or Other Features - Under the proposed action alternative, impacts to unique attributes and other features would occur in the short term. Restoration of disturbed areas and chemical treatment of invasive plants would impact the unique attribute of the large block of Sonoran Desert wilderness in the short term. Archeology site exposure due to accelerated erosion would not be adversely impacted. The short term impacts would be negligible to minor and adverse, while the long term impacts would be minor and beneficial.

Impacts to other criteria:

Maintaining Traditional Skills – Not applicable

Special Provisions – Under the proposed action alternative, the special provisions referenced in Step 1, Section B would be mitigated.

Economics and Timing Constraints – Under the proposed action alternative, restoration would occur using a full range of techniques and types of treatments that achieve maximum effectiveness in restoring the health of ecological communities and wilderness character. The use of these techniques and types of treatments would drastically reduce costs and economic time constraints compared to the no action alternative.

Impacts to safety of visitors and workers – Organ Pipe Cactus National Monument shares 30 miles of international border with Mexico. The entire monument is centrally located within a ONDCP (Office of National Drug Control Policy) designated High Intensity Drug Trafficking Area (HIDTA). The monument is also routinely used by illegal undocumented aliens entering the country and those who facilitate the smuggling of illegal aliens. In an effort to avoid apprehension, criminals have resorted to violence against law enforcement officers in and adjacent to the monument. Though not common, park visitors have been the victims of criminals operating in the area. Though unlikely, park management recognizes that all park employees could be misidentified as enforcement officers or could be seen as a potential threat to criminals they might inadvertently encounter when working in

the field. In some areas of OPCNM and CPNWR armed security is required for access. This security is required for any alternative.

There are inherent risks associated with work in the rugged terrain of the backcountry and in wilderness. There would be safety risks involved with the use of hand tools such as spades, pickaxes, rakes, and saws. Transporting equipment and moving debris for vertical mulching would entail safety risks. Access to work areas by the public would be restricted while activities were occurring so there would be no risk to the public.

There are inherent risks associated with work in the rugged terrain of the backcountry and in wilderness. There would be safety risks involved with the use of hand tools such as spades, pickaxes, rakes, and saws, although the use of these tools would be reduced under this alternative. Access to work areas by the public would be restricted while activities were occurring so there would be no risk to the public.

Impacts Comparison Tables

Wilderness Character

Untrammeled

	positive impacts	negative impacts	
1st component: Method of access to site	Access to site would be done more efficiently	Use of motorized transport	
2nd component: Site preparation	Much more site preparation would occur	Use of mechanized equipment	
3rd component: Restoration of site	Much more restoration would occur	Use of mechanized equipment	
4th component: Condition after restoration	More sites would be restored, Untrammeled character would prevail		**Untrammeled Grand Total**
TOTAL	++++	---	++++/---

Undeveloped

	positive impacts	negative impacts	
1st component: Method of access to site	Access to site would be done more efficiently	Use of motorized transport	
2nd component: Site preparation	Much more site preparation would occur	Use of mechanized equipment	
3rd component: Restoration of site	Much more restoration would occur	Use of mechanized equipment	
4th component: Condition after restoration	More sites would be restored, undeveloped character would prevail		**Undeveloped Grand Total**
TOTAL	++++	---	++++/---

Natural

	positive impacts	negative impacts	
1st component: Method of access to site	Access to site would be done more efficiently	Use of motorized transport	
2nd component: Site preparation	Much more site preparation would occur	Use of mechanized equipment	
3rd component: Restoration of site	Much more restoration would occur	Use of mechanized equipment	
4th component: Condition after restoration	More sites would be restored, natural character would prevail		**Natural Grand Total**
TOTAL	++++	---	++++/ ---

Solitude or Primitive and Unconfined Recreation

	positive impacts	negative impacts	
1st component: Method of access to site	No impact	No Impact	
2nd component: Site preparation		Visitors may encounter work crew	
3rd component: Restoration of site		Visitors may encounter work crew	
4th component: Condition after restoration	No Impact	No Impact	**S or P&UR Grand Total**
TOTAL		--	--

Unique Attributes or Other Features

	positive impacts	negative impacts	
1st component: Method of access to site	Access to site would be done more efficiently	Use of motorized transport	
2nd component: Site preparation	Help stop accelerated soil erosion	Use of mechanized equipment	
3rd component: Restoration of site	Help stop accelerated soil erosion and restore disturbed areas to a more natural state.	Use of mechanized equipment	
4th component: Condition after restoration	Help stop accelerated soil erosion and restore disturbed areas to a more natural state.		**UA or OF Grand Total**
TOTAL			++++/---

Other Criteria

Maintaining Traditional Skills

	actions with beneficial effects	actions with adverse effects	
1st component: Method of access to site	No Impact	No Impact	
2nd component: Site preparation	No Impact	No Impact	
3rd component: Restoration of site	No Impact	No Impact	
4th component: Condition after restoration	No Impact	No Impact	**Traditional Skills Grand Total**
TOTAL			

Special Provisions

	positive impacts	negative impacts	
1st component: Method of access to site	No impact	No impact	
2nd component: Site preparation	No impact	No impact	
3rd component: Restoration of site	No impact	No impact	
4th component: Condition after restoration	Mitigation of special provisions would occur on CPNWR.		**Special Provisions Grand Total**
TOTAL	+		+

Economics and Timing Constraints

	positive impacts	negative impacts	
1st component: Method of access to site	Motorized transport would be more efficient and cost effective		
2nd component: Site preparation	Mechanized and chemical treatments would be more efficient and cost effective		
3rd component: Restoration of site	Mechanized and chemical treatments would be more efficient and cost effective		
4th component: Condition after restoration	More sites would be restored while costing less money		**Economics & Timing Grand Total**
TOTAL	++++		++++

Safety of Visitors and Workers

	positive impacts	negative impacts	
1st component: Method of access to site	Motorized transport would be safer		
2nd component: Site preparation	Mechanized use of equipment would potentially be safer	Chemical use would be potentially more hazardous	
3rd component: Restoration of site	Mechanized use of equipment would potentially be safer	Chemical use would be potentially more hazardous	
4th component: Condition after restoration	No impact	No impact	**Safety Grand Total**
TOTAL	+++	--	+++/ --

Comparison of Alternatives

It may be useful to compare each alternative's positive and negative impacts to each of the criteria in tabular form, keeping in mind the law's mandate to "preserve wilderness character."

	Alternative B	No Action
Untrammeled	+	NI
Undeveloped	+	NI
Natural	+	NI
Solitude or Primitive and Unconfined Recreation	-	-
Unique / Other Features	+	-
WILDERNESS CHARACTER	+	-

	Alternative B	No Action
Maintaining Traditional Skills	NI	NI
Special Provisions	+	-
Economics & Timing	+	-
OTHER CRITERIA SUMMARY	+	-

	Alternative B	No Action
SAFETY (visitors & workers)	+	-

Step 2 Decision: What is the Minimum Activity?

Please refer to the accompanying MRDG *Instructions* before describing the selected alternative and describing the rationale for selection.

Selected alternative: Alternative B

Rationale for selecting this alternative (including safety criterion, if appropriate):

This alternative allows the National Park Service to use a full range of restoration techniques and types of treatments that achieve maximum effectiveness in restoring the health of ecological communities while minimizing risks to humans and natural and cultural resources. This alternative would allow the use of small and large mechanized equipment which would result in adverse short-term impacts to wilderness qualities. However it would result in a high degree of restoration over the entire project area, allow faster recovery of the ecological communities, and help restore wilderness character. Using site-specific strategies and treatments would allow for a broader level of restoration in the project area compared to the no action alternative. Limiting the amount of staff and time to perform restoration in rugged terrain also reduces the safety risks to workers.

Monitoring and reporting requirements:

Check any Wilderness Act Section 4(c) uses approved in this alternative:

- ☒ mechanical transport
- ☒ motorized equipment
- ☒ motor vehicles
- ☐ motorboats
- ☐ landing of aircraft
- ☒ temporary road
- ☐ structure
- ☒ installation

Record and report any authorizations of Wilderness Act Section 4(c) uses according to agency policies or guidelines.

Follow agency policies for the following review and decision authorities:

Approvals	Signature	Name	Position	Date
Prepared by:				
Recommended:				
Recommended:				
Approved:				