2019

Oscura Mountains Ecosystem Management Planning Area Environmental Assessment

Contributing Organizations:

WSMR PW-E-CS
Eco, Inc. LLC Ecological Consultants

Photo of Oscura Mountains Colorado chipmunk by Doug Burkett

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U.S. ARMY WHITE SANDS MISSILE RANGE
WHITE SANDS MISSILE RANGE, NEW MEXICO 88002-5048
ENVIRONMENTAL ASSESSMENT

TITLE: OSCURA MOUNTAINS ECOSYSTEM MANAGEMENT PLANNING AREA ENVIRONMENTAL ASSESSMENT, White Sands Missile Range, New Mexico

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13. ABSTRACT (Maximum 200 words)

This Environmental Assessment (EA) has been prepared by WSMR to analyze the effects of a range of ecosystem management projects identified for ecosystem sustainment within the Oscura Mountains Planning Area (OMPA). This EA will serve as a planning document to provide criteria for how vegetation would be treated within the OMPA. The goals of the proposed actions are to improve the overall health and resilience of the OMPA in order to sustain the mission of providing valuable, natural and resilient testing and training grounds for America's military. The proposed actions call for vegetation treatments using a combination of manual, mechanical, prescribed fire and chemical treatment methods.

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Oscura Mountains Ecosystem Management Planning Area Environmental Assessment

Chapter 1

Purpose of and Need for Action

1.0 Introduction

White Sands Missile Range (WSMR) has prepared this environmental assessment (EA) to evaluate the potential outcomes of a range of ecosystem management projects identified for ecosystem sustainment within the Oscura Mountains Planning Area (OMPA). This EA will serve as a planning document to provide criteria for how vegetation would be treated within the OMPA.

This EA analyzes potential impacts from various treatment methods using a landscape perspective. This perspective delineates parameters for implementation of future treatment projects in the OMPA. This approach allows for a more thorough view of cumulative effects rather than a project specific assessment approach. This EA will be used by WSMR to decide which of the treatment options would be best to meet ecosystem sustainability objectives.

The proposed actions include vegetation, watershed and erosion control projects consisting of varying combinations of four treatment types: 1) prescribed fire, 2) mechanical, 3) manual, and 4) chemical treatments. The most appropriate treatment or combination of treatments would be implemented based on criteria outlined in this document.

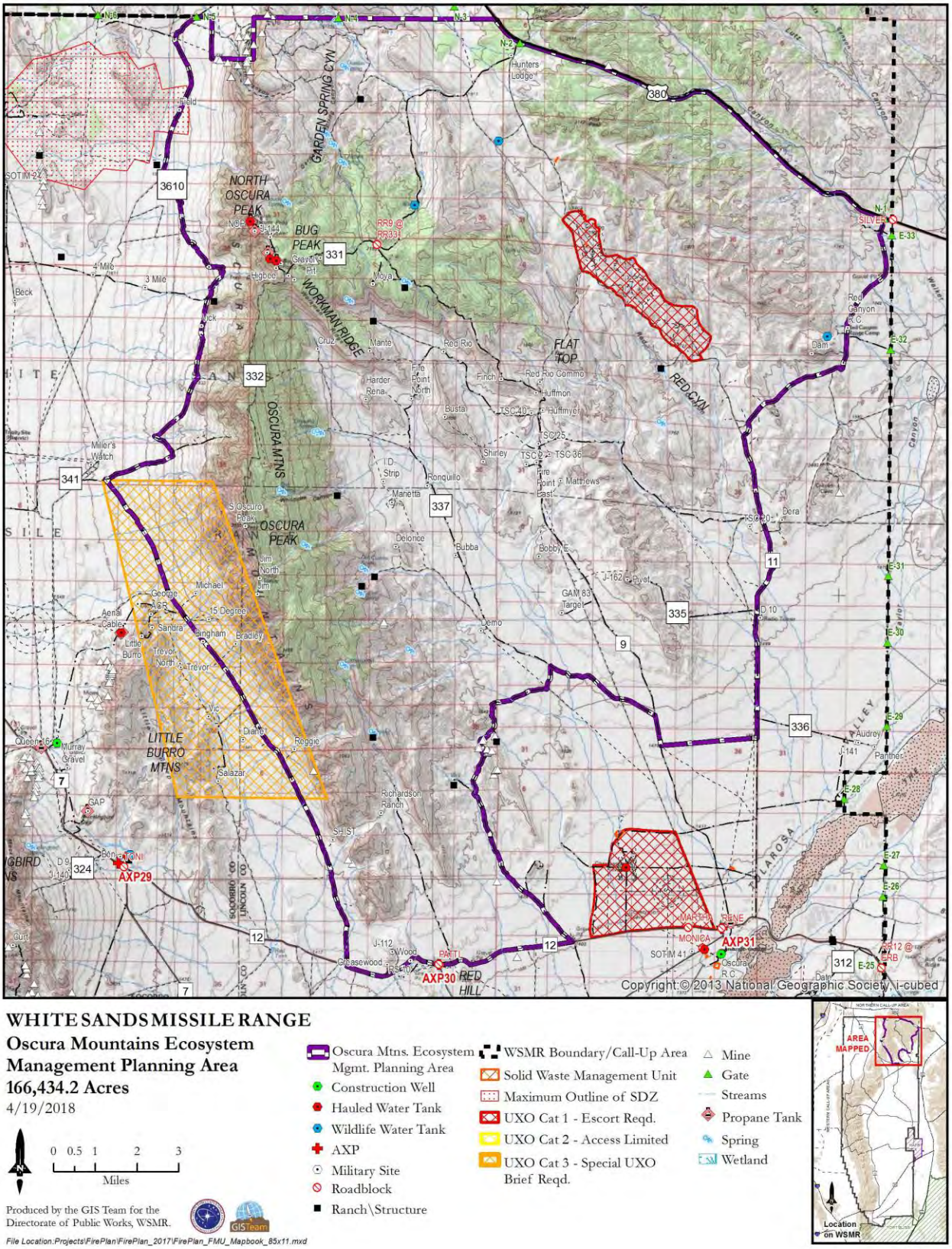
The geographic scope of the OMPA is 166,434 acres of Department of Defense (DOD) lands, located in the northeast quadrant of White Sands Missile Range. The planning area perimeter is bounded by WSMR access roads (Figure 1).

1.1 Purpose of and Need for Action

The goals of the proposed actions are to improve the overall health and resilience of the OMPA in order to sustain the mission of providing valuable, natural and resilient testing and training grounds for America's military.

The objectives of the proposed actions are to:

1) Protect valuable military structures atop the Oscura Mountains by reducing fuels adjacent to them (WSMR 2018, Appendix A, pg. A-105-106).



WHITE SANDS MISSILE RANGE

Oscura Mountains Ecosystem Management Planning Area

166,434.2 Acres

4/19/2018

0 0.5 1 2 3

Miles

Produced by the GIS Team for the Directorate of Public Works, WSMR.

File Location:Projects\FirePlan\FirePlan_2017\FirePlan_FMU_Mapbook_85x11.mxd

- Oscura Mtns. Ecosystem Mgmt. Planning Area
- Construction Well
- Hauled Water Tank
- Wildlife Water Tank
- AXP
- Military Site
- Roadblock
- Ranch\Structure
- WSMR Boundary/Call-Up Area
- Solid Waste Management Unit
- Maximum Outline of SDZ
- UXO Cat 1 - Escort Reqd.
- UXO Cat 2 - Access Limited
- UXO Cat 3 - Special UXO Brief Reqd.
- Mine
- Gate
- Streams
- Propane Tank
- Spring
- Wetland

Figure 1

2) Protect the persistent woodlands and the sensitive wildlife living atop the Oscura Mountains, and reduce the probability of a large wildfire burning through the crowns of these persistent woodlands by selective thinning alongside strategic roads (WSMR 2015, Section 4.6.2 and Table 3.3.2.4) (WSMR 2018, Appendix A, pg. A-105-106) (See Appendix C, Figure C).
3) Restore and enhance existing meadow habitats within piñon-juniper woodlands (WSMR 2015, Section 4.4.5.2 and Table 3.3.2.4) (See Appendix C, Figures A-1 and A-2, B).
4) Reduce oneseed juniper *(Juniperus monosperma)* densities and re-establish the natural fire regime within lower elevation grassland-juniper savanna sites (WSMR 2015, Section 4.4.8.2, 4.6.2) (See Appendix C, Figures D and E).
5) Improve wildlife habitat by reducing oneseed juniper densities on former grasslands (WSMR 2015, Sections 4.4.4, 4.4.8, 4.6) (See Appendix C, Figures D and E).
6) Reduce impacts of ongoing soil erosion by restoring eroded and silted-in earthen tanks and by adding check dams and rock gabions to trap sediment and slow water movement in head cuts.

The proposed actions call for vegetative treatments consisting of a combination of manual, mechanical, prescribed fire and chemical treatment methods. Once treatment objectives are achieved, maintenance of these treated areas would require periodic prescribed burning with a fire return interval (FRI) of once every 5-25 years. Manual, mechanical and chemical treatments would also be considered as maintenance options on a case-by-case basis. The 5 year FRI would be considered for areas within treated firebreaks that have become dense with grass regrowth and fire would be used to reduce fine fuel loading. Areas that have been broadcast burned, meadow areas and chemically treated or mechanically thinned areas would have an FRI of up to 25 years based primarily on the re-establishment and density of oneseed juniper seedlings (S. Bumgarner, WSMR fire and fuels contractor, pers. comm.).

At the crest of the escarpment along and south of North Oscura Peak are sites containing important structures and mission assets for WSMR and other government agencies. However, it is their positions upon the uppermost end of this persistent woodland that makes them vulnerable to the effects of a severely burning wildfire (WSMR 2018). There is a need to reduce fuel loads immediately adjacent to these assets by manual treatments of piñon and juniper trees in order to provide defensible space for firefighters to control and stop a wildfires' advance and to protect structures. These treatments would create safety zones for firefighters to escape to in the event of a sudden increase in fire intensity, also known as a blow-up (S. Bumgarner, WSMR fire and fuels contractor, pers. comm.).

Species at Risk (SAR) wildlife atop NOP would benefit from treatments below their primary habitat, which interrupts the continuous fuel canopy and creates an opportunity for firefighters to stop the uphill advance of a spreading wildfire (S. Bumgarner, WSMR fire and fuels contractor, pers. comm.). This would be accomplished by construction of a fuel break alongside the upper Garden Springs road, by removing juniper encroachments within existing meadows throughout the east side of NOP and by maintaining the fuel break that exists alongside Range Road 331, through removal of one-seed junipers within the road right-of-way. Fuel breaks may increase SAR odds of survival by giving aerial and ground firefighters an opportunity to take a crown-driven wildfire to the ground.

The slopes of the Oscura Mountains and the surrounding foothills downslope of the piñon-juniper woodlands become predominantly oneseed juniper woodlands and savannas. These mid-elevation (5,000'-6,500' above sea level) stands of oneseed juniper contain an understory dominated by grass species wherever there is deep soils and gentle topography. These areas are typical of former grasslands and savannas that have been converted to woodlands (Romme et al. 2009). Oneseed juniper expansion has resulted in reduced herbaceous ground cover, reduced vegetative species diversity, increased bare ground patch sizes and altered soil and hydrologic properties (Jacobs 2011).

Oneseed juniper is susceptible to mortality from fire, but fire alone will not spread through these stands as they currently exist. There needs to be some type of disturbance first (thinning and/or chemical treatment) in order to create a fire receptive fuel bed. Follow-up treatments using prescribed fires can then help restore these historic grassland and savanna ecosystems (S. Bumgarner, WSMR fire and fuels contractor, pers. comm.) (See Appendix C, Figures D and E).

1.2 Policy that Guides the Establishment and Direction of the Oscura Mountains Ecosystem Planning Area EA

Policy guiding the WSMR NEPA process is described in:

- Council on Environmental Quality (CEQ) regulations (40 CFR 1500, et seq.)
- 32 Code of Federal Regulations (CFR) 651, *Environmental Analysis of Army Actions*, Final Rule, 29 March 2002.
- Federal Land Policy and Management Act of 1976 (43 U.S.C. 1700 et. seq).

Environmental analysis incorporated into this process:

- *White Sands Missile Range Integrated Natural and Cultural Resources Management Plan and Environmental Assessment 2015-2019* (INCRMP) (WSMR 2015), which includes guidance, compliance and actions necessary to protect, sustain and conserve native populations of plants, animals and their habitats on WSMR.
- *White Sands Missile Range Integrated Wildland Fire Management Plan 2018* (IWFMP) (WSMR 2018) has a stated goal of protecting valuable military structures and associated infrastructure from wildfire damage while also allowing wildland fires to burn under prescriptive conditions to maintain natural fire regimes and sustain native ecosystems.
- *Sustain the Mission-Secure the Future-The Army Strategy for the Environment* (DA 1999) which has a goal of "Fostering a sustainability ethic within the Army that takes us beyond environmental compliance to sustainability."
- *2014/15 WSMR Sustainability Plan* (WSMR 2014) which includes the following environmental objectives:

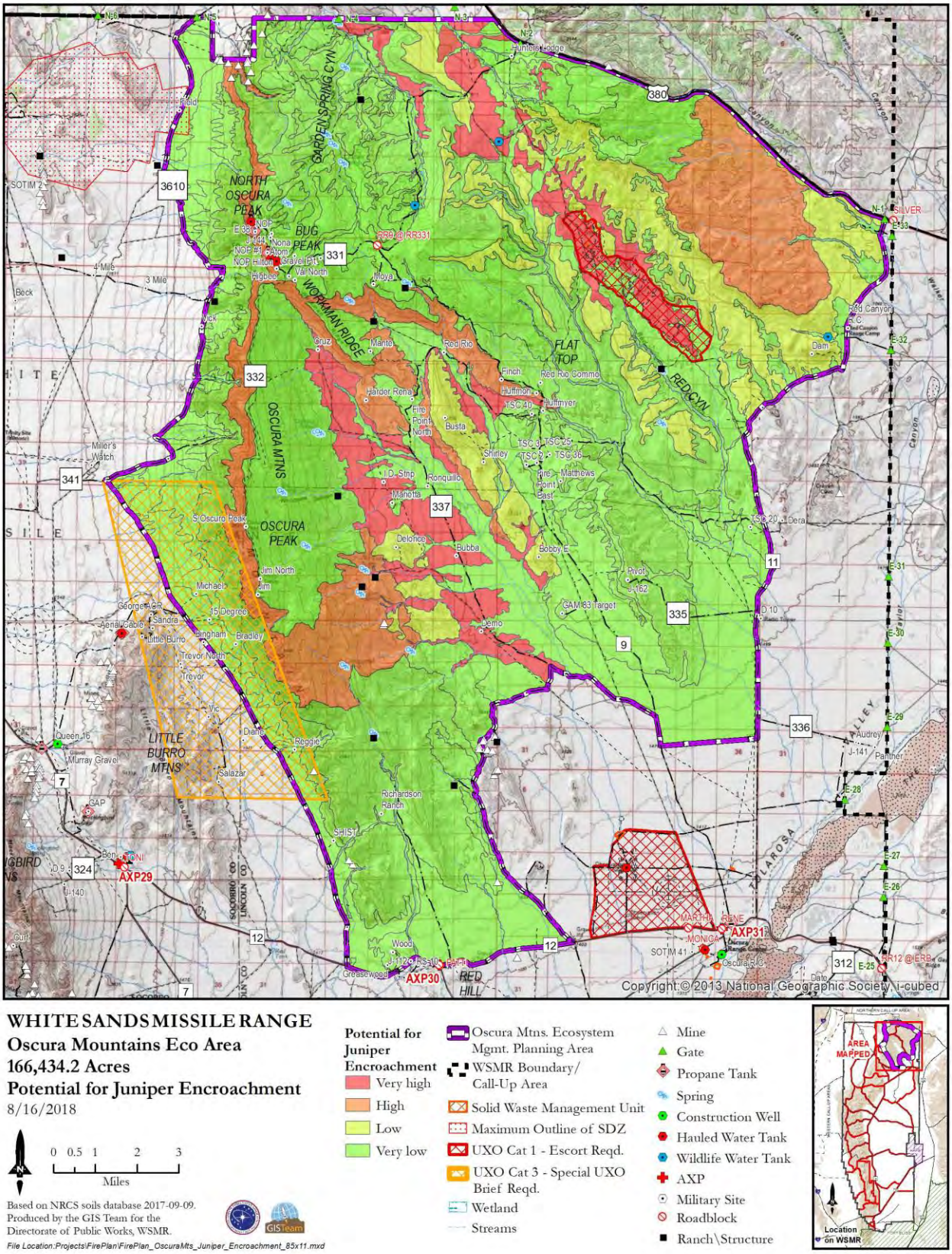
1) Incorporate environmental stewardship and sound land management practices into everyday installation activities to ensure the sustainability of the installation's biological heritage, land, natural, and cultural resources, and

2) Ensure that WSMR resources and capabilities are protected to maintain accessibility for multiple missions.

- *Final Environmental Impact Statement for Development and Implementation of Range-Wide Mission and Major Capabilities at White Sands, New Mexico.* White Sands Missile Range, New Mexico. November 2009.
- *Environmental Assessment for the White Sands Missile Range Integrated Wildland Fire Management Plan.* March, 2004.

1.3 Decision to be made

This Oscura Mountains Ecosystem Management Planning Area Environmental Assessment will analyze and evaluate the environmental consequences of implementing various vegetation and watershed treatment projects considered under the proposed action alternatives. White Sands Missile Range will decide whether to implement all or portions of the proposed actions described in this EA, or to implement the no-action alternative, or whether further environmental studies would be required.



WHITE SANDS MISSILE RANGE
Oscura Mountains Eco Area
166,434.2 Acres
Potential for Juniper Encroachment
8/16/2018

0 0.5 1 2 3
Miles

Based on NRCS soils database 2017-09-09.
Produced by the GIS Team for the Directorate of Public Works, WSMR.

File Location:Projects\FirePlan\FirePlan_OscuraMts_Juniper_Encroachment_85x11.mxd

Potential for Juniper Encroachment
- Very high
- High
- Low
- Very low

- Oscura Mtns. Ecosystem Mgmt. Planning Area
- WSMR Boundary/ Call-Up Area
- Solid Waste Management Unit
- Maximum Outline of SDZ
- UXO Cat 1 - Escort Reqd.
- UXO Cat 3 - Special UXO Brief Reqd.
- Wetland
- Streams

- Mine
- Gate
- Propane Tank
- Spring
- Construction Well
- Hauled Water Tank
- Wildlife Water Tank
- AXP
- Military Site
- Roadblock
- Ranch\Structure

Figure 2

Chapter 2
Proposed Actions and Alternatives

2.0 Proposed Actions

The **No Action Alternative** would consist of management as it exists currently within the scope of existing environmental documents.

Proposed Action **Alternative A** includes use of a combination of three types of treatment methods: manual, mechanical, and prescribed fire. Treatment projects would be implemented in two phases. Phase one projects would be the highest priority for treatment because they would serve to help protect valuable military structures and infrastructure atop the Oscura Mountains. This order is needed as a safety check prior to implementing Phase Two projects located much further downslope from Phase One projects. Phase Two projects would consist of watershed, ecosystem and wildlife habitat enhancements.

Proposed Action **Alternative B** includes all of the same actions as Alternative A with the addition of: There would also be the use of chemical herbicides to control unwanted vegetation. Projects under Alternative B would therefore consist of a combination of manual, mechanical, prescribed fire and chemical treatments.

2.1 No Action Alternative

The no-action alternative would not provide any additional protections for valuable military facilities located atop and along the Oscura Mountains crest. Military infrastructure would continue to be at risk from a severe crown wildfire (IWFMP 2018). The meadows of the Oscura Mountains would continue to be invaded by broom snakeweed, four-wing saltbush and piñon and juniper trees leading to the loss of open meadow habitat important for their diversity of native vegetation and wildlife (S. Bumgarner, WSMR fire and fuels contractor, pers. comm.). No treatment of brush and trees alongside roads would mean that wildfires that started below the roads in piñon-juniper woodlands could potentially gain intensity and burn across these roads and burn through the crowns of persistent piñon-juniper woodlands atop the Oscura Mountains. Garden Springs Canyon roads would be of little value as firebreaks due to their rough, windy two-track treads, continuous adjacent fuels conditions and the absence of safety zones for firefighters. Roads would continue to erode leading to water channeling down the tracks and increased gullying. Earthen dams throughout the project area are currently breached or silted in and would not provide water infiltration and would not help stem water flow downstream leading to further soil erosion. Without some checks on water movement, existing gullies and arroyos would continue to erode, deepen and straighten during high water runoff events (S. Bumgarner, WSMR fire and fuels contractor, pers. comm.).

2.2 Proposed Action Alternative A- Projects Using Mechanical, Manual, and Prescribed Fire Treatments

Phase One projects would be designed to protect military and other governmental agencies structures, decrease wildfire probability and intensity on the upper slopes of the Oscura Mountains and would include the following treatments:

1. Manual and mechanical thinning and/or mastication of piñon and juniper trees around military sites and their access roads, followed by handpiling and burning piles, or lop and scatter of slash leaving slash in place for wildlife cover, or a combination of piling, scattering and/or burning.
2. Sustaining existing upper elevation meadows by thinning, grubbing, mastication, and/or prescribed fire to remove invading brush and small trees.
3. Improving Upper Garden Springs Canyon road to firebreak standards of 8 foot width to mineral soil with erosion control features and turnouts and by thinning and limbing trees and burning adjacent roadside areas to create a shaded fuelbreak. See Appendix C for maps of treatment areas.

Phase Two projects would include ecosystem, wildlife habitat and watershed improvement treatments in the lower elevations of the Oscura Mountains ecosystem planning area. The project treatments would include:

1. Prescribed broadcast fires in selected areas where fine fuels are continuous enough to spread fire and affect burning of shrubs and smaller trees and as a tool to maintain other treatments.
2. Manual thinning, using chainsaws, within dense piñon-juniper stands to create openings that would benefit wildlife species such as mule deer (Bender et. al 2013) and to improve watershed conditions on slopes, ridges and within swales and canyons.
3. Mechanical excavation of silted-in ponding areas and outlet repair within existing, breached earthen dams and constructing new erosion control check dams using heavy or light equipment, including use of rock gabions in areas of headcuts and ongoing soil erosion.
4. Improving primitive roads to firebreak road standards and decreasing soil and water erosion by using mechanical equipment to create and/or install drain dips, crowns, turnouts, road surface compaction, water bars, bar ditches and/or culverts along designated roadways.

2.2.1 Proposed Action Alternative A and B-Phase One Projects

2.2.1.1 Manual Thinning to Protect Structures atop the Oscura Mountains

The proposed action calls for the use of a 5-15 person crew with chainsaws to thin piñon pine and juniper trees in strategic areas to protect military structures and infrastructure atop the Oscura Mountains. Thinning would have the benefit of providing a safer, more defensible space around structures from which firefighters could engage a wildfire (S. Bumgarner, WSMR fire and fuels contractor, pers. comm.). The thinning would be around Range Road (RR) 331, within 100 feet of military facilities located atop North Oscura Peak (NOP) and on Jim Peak.

Within 100 feet of each structure, trees could be thinned up to 100%. All thinning would occur outside of migratory bird nesting season (February through August). Trees that have been used by pinyon jays for nesting in the past will be retained as well as trees within 500 meters of pinyon jay colony nests unless the trees are critical to remove due to proximity to a structure and considered to be an imminent fire hazard. No piñon pines would be cut within 150 meters of the Oscura Mountains escarpment edge to conserve habitat for the Oscura Mountains chipmunk. Trees below the western escarpment are excluded from treatment due to safety considerations and chipmunk and golden eagle habitat considerations.

Fuel reduction methods include manual thinning of piñon and oneseed juniper trees and/or mechanical shredding or mastication of trees followed by slash treatments using prescribed fires. Slash treatment would include selectively thinning and piling slash within 100 feet of structures and possibly burning the piles. Leave trees (those marked to remain intact) would be marked and selected based on their vigor and health, leaving intact the largest and healthiest piñon trees. The distance of 100' around structures is based on professional judgment and experience of what is necessary to adequately protect these structures on NOP given slope, plus the height, density, and proximity of adjacent combustible fuels. (https://www.nfpa.org/Public-Education/By-topic/Wildfire/Preparing-homes-for-wildfire).

Slash treatments would include cut, buck and handpiles, lop and scatter of cut materials or lop and scatter of trunks and large limbs with some handpiling of smaller diameter limbs. Handpiles would occur in areas within 100 feet of structures. Some of these piles would be burned later after curing. Some piles would be left intact for their value as wildlife cover. All slash would be pulled away from leave trees (large diameter trees or snags) to mitigate potential impacts from prescribed fire activity. Slash within 50' of an arroyo would be dragged and placed in the erosion cut to catch silt and reduce soil movement.

A monitoring program designed to measure vegetation and wildlife response to disturbance (thinning) would be incorporated into the project specific plan. WSMR will conduct post-treatment monitoring of pinyon jay nest sites to determine if pre-treatment nesting areas continue to be utilized following treatment. Collection of pre-treatment nest site use data in 2019 should provide important baseline data to assess effects of treatments. WSMR should also assess the effects of any thinning/fuels treatments on Oscura Mountains' chipmunk and gray vireo *(Vireo vicinior),* both species are state Threatened species and Category 1 (Immediate Priority) SGCN (NMDGF 2016). This information would be extremely valuable for future management planning efforts.

2.2.1.2 Mechanical/Manual Thinning and Burning within Existing Meadows

Restoration and enhancement of existing meadows would require a crew with chain saws or a masticator to cut or shred undesirable shrubs and trees, potentially followed by treatment with broadcast prescribed fire during the cool season to reduce slash and brush accumulations. Broadcast burning would help to prepare the open ground for potential reseeding using a mix of native grasses and forbs. This would have the effect of helping native grasses and forbs get started while keeping invasive species from re-establishing (S. Bumgarner, WSMR fire and fuels contractor, pers. comm.). Prescribed burning would occur

during the fall/winter after fuels are cured and when it is more likely to be outside the nesting season for migratory birds (Appendix C, Figures 1A, 2A and B).

The use of machinery for mastication would be dependent on proximity of meadows to existing roads, slopes, soils, topography, potential for cultural resources, soil moisture and capabilities of the machinery available. Trees or shrubs would be cut or shredded as close to the ground as possible. Trees that have been used by Pinyon jays for nesting, and all adjacent trees within 500 meters of nest areas, will be retained. Mulch would be distributed to a depth < 2" in order to allow for native grasses and forbs to emerge and re-establish after treatment.

2.2.1.3 Road Improvements, Mechanical/Manual Thinning and Burning to Create Firebreaks

Proposed treatments include manual and/or mechanical thinning alongside existing roads to create fuel breaks by removing or cutting trees and brush for approximately one chain (66') in depth parallel to the road (Appendix C, Figures 1A, 2A and C). Most piñon pines and junipers under 8" DRC within the one chain corridor would be cut or masticated. All stumps would be cut as close to ground level as possible. Leave trees within the thinning corridor would be retained using the following criteria: 1) large piñon pine trees with single trunk, conical shape with no defects or disease showing; 2) large, tree-form junipers with single trunk and exhibiting healthy crown; 3) Spacing of leave trees should have at minimum 10 feet of open space between crowns; 4) Smaller leave trees that resemble the above criteria would be selected if there are no other mature trees to select. Leave trees would be limbed from the bottom up to breast height to reduce ladder fuel potential. Tree thinning would not occur within 500 meters of known nests of pinyon jays, and would occur outside of nesting season (February through August). Slash from manual thinning would be lop and scatter or hand piles with some piles burned later and other piles left for wildlife cover. Masticator slash would be scattered by the machine and left to decompose naturally. Masticator slash would not be piled deeper than 2'' above the ground's surface. Prescribed burning of piles would occur during the fall/winter after fuels are cured and outside of the nesting season of migratory birds. Fall burning would occur when young of the year chipmunks are active and could escape piles used for cover.

Identified primitive roads within the Oscura Mountains would be improved to firebreak standards of 8' wide graded road surface free of vegetation and compacted and crowned if possible, with necessary erosion control features added (culverts, drain dips, water bars, bar ditches) to help maintain the road during the monsoon season. Turnouts would be added in flat areas to facilitate turning around and for movement and passage of firefighting equipment. Machinery necessary for road improvements would include some or all of the following: road maintainer, bulldozer, excavator, compactor, front-end loader, backhoe and dump trucks.

2.2.2 Proposed Action Alternatives A and B- Phase Two Projects

2.2.2.1 Prescribed Fire Treatments of Broadcast Burning Juniper-Invaded Grasslands

Treatment would be to broadcast burn lower elevation juniper stands in order to reduce buildup of hazardous fuel loads, decrease encroachment of woody species onto grasslands, increase diversity of grasses, forbs and shrubs, and increase palatable wildlife browse (S. Bumgarner, WSMR fire and fuels contractor, pers. comm.)(Appendix C, Figure D). Existing roads, natural barriers and changes in fuel types would be utilized as control lines. Handline may need to be constructed on portions of a burn unit if deemed necessary by the Prescribed Fire Burn Boss. All prescribed fires would be conducted in accordance with a burn plan developed for each specific project. The Prescribed Fire Burn Plan would specify the weather and fuel conditions, fire behavior, firing and holding resources needed, and prep work (i.e. sites to be protected, line construction) needed to safely and efficiently meet the predetermined objectives for the project. The Prescribed Fire Burn Plan would identify any persons and agencies to be notified concerning the prescribed fire project and would specify the monitoring protocols to be followed.

Considerations for gray vireos *(Vireo vicinior)* include breeding season surveys and the avoidance of areas used for nesting. Fire-killed trees will be left standing, which provide foraging, perching, and nesting sites for birds (Gillihan 2006). Retaining mature juniper trees and existing snags is also important to provide nest trees for migratory birds and mast crops for wildlife (NMDGF 2016).

2.2.2.2 Manual and Mechanical Thinning of Juniper Stands for Improving Watershed Conditions and Wildlife Habitat

Thinning of dense oneseed juniper stands would occur within the polygons designated for prescribed fires and chemical treatments (Appendix C; Figures E and F). Thinning would be considered as a follow-up treatment after the effects from prescribed fires and chemical treatments are evaluated for effectiveness. Thinning of oneseed juniper would be designed to create a mix of forage interspersed with hiding/security and thermal cover. Additionally, thinning would be done in mosaic patterns creating edge effects, clumps and treatment pockets designed to enhance wildlife habitat and use.

Junipers would be thinned, reducing the average densities on hillsides and ridgetops by 20% to 40%. Slopes would be treated by a hand crew utilizing chainsaws. Slash created from these treatments would be lopped and scattered to support grass establishment by providing shade and protection for seedlings of native grasses, forbs and shrubs. If slash becomes too deep then piles will be created from branches and limbs. The creation of many small piles is advantageous over larger, fewer piles due to the scorch effect on leave trees from larger, and hotter-burning piles (S. Bumgarner, WSMR fire and fuels contractor, pers. comm.) Treatments within the project area would be monitored pre and post-treatment to evaluate treatment effectiveness of improving wildlife habitat. Thinning treatments would be maintained, on a case-by-case basis, by prescribed fire treatments.

Juniper woodlands in the project area are potential habitat for gray vireos. Prior to thinning, gray vireo surveys will be conducted according to protocol and nest areas will be excluded from treatment. Distance from nests to be excluded will be determined in cooperation with NMDGF and the USFWS.

2.2.2.3 Mechanical and Manual Treatments to Enhance Watershed and Stabilize Soil Erosion

The vegetation treatments of thinning and prescribed fire, in combination with mechanical restoration of existing erosion control structures and water impoundments, mechanical construction of additional watershed rehabilitation structures and mechanical maintenance and repair of existing roads would help to reduce soil erosion, increase water infiltration into the water table, hold sediments on-site (within watersheds), protect downstream private properties, and protect water quality (S. Bumgarner, WSMR fire and fuels contractor, pers. comm.)

Loss of soil from treatments described herein would be negligible because treatments would not occur on steep slopes. Targeted areas are less than 20% slope. Chemically treated vegetation would not be cut down and roots will help hold soil in place as a new crop of vegetation begins to take hold. The areas targeted for treatment are homogeneous stands of one-seed juniper. By creating holes in this vegetation type it is expected that vegetative species diversity would increase and loss of topsoil would decline with new growth. Places where vegetation is cut by hand and erosion rills and arroyos are evident would receive the cut vegetation to help slow water movement across the surface of the ground. Staking would occur to help keep vegetation in place during high water events (S. Bumgarner, WSMR fire and fuels contractor, pers. comm.)

Many of the existing earthen dams in the Oscura Mountains project area have become silted in or breached by excessive water runoff. These existing structures would be restored to proper function by bulldozer, loader and/or excavator, cleaning out retention areas and rebuilding dams, including potential construction of enhanced overflow (rock/gabion) structures to prevent breaching in the future. New construction of earthen dams would be based on the need for erosion control and on recommendations by engineers, hydrologists, and natural resource professionals as to siting, size and frequency. Design, staking, and engineering would be completed prior to equipment being moved to the area. Entire drainage bottoms and/or swales with erosion problems, would be culturally surveyed in preparation for the construction of earthen erosion control structures. Structure placement would begin at the upper end of drainage/watershed and continue downstream as needed to reach management objectives. Smaller check dams made with rocks and metal gabions, compacted earth or with cut brush and logs would be used in upper reaches of canyons where head cut erosion is occurring in order to slow water and to trap soil movement. These smaller dam structures would be accomplished with a mixture of manual labor constructing small dams and filling gabion structures with rocks and mechanical methods utilizing excavator, loader or dozer to build dirt or log dams and to fill gabions and to move rock gabions into effective positions.

Primitive two-track roads throughout the project area would be prioritized based on need and improved utilizing a combination of some or all of these erosion control features: road surface compaction, drain dips, water bars, road crowns, culverts and bar ditches. All road enhancement work would be accomplished using a maintainer (grader), excavator, loader, compactor and/or bulldozer. Some roads may need aggregate base course material added in order to fill in low spots or to build up road crowns which would require dump trucks and a road compactor.

2.3 Proposed Action Alternative B-Project Treatments Using Mechanical, Manual, Prescribed Fire and Chemical Methods

Proposed Action Alternative B includes all of the proposed actions in Alternative A plus the use of chemical treatments in Phase Two in order to reduce the densities of oneseed juniper *(Juniperus monosperma)* trees. These areas are places wildland fires may spread in grassland fuels between junipers but would not reduce oneseed juniper densities due to their large size (Appendix C, Figure E). Proposed projects would include the application of an herbicide within prescribed areas of flat to rolling terrain with proper soil characteristics. Soil requirements for proper absorption of pelleted herbicides include sandy to loamy soils; soils containing over 25% clay are not porous enough for chemical treatment to be economically effective (McDaniel and Duncan 1995). In clayey areas, a foliar herbicide may be used. Foliar herbicides do not have soil property restrictions as their chemicals are absorbed directly by the plants' foliage.

2.3.1 Proposed Action Alternative B-Phase Two Project-Chemical Treatment

Proposed action Alternative B includes the use of approved chemical treatments to reduce densities of oneseed juniper upon former grasslands and savannas (Figure 2). The chemical treatment would only be used in areas of slight to moderate slopes (<20% slope) and where prescribed fire treatments are ineffective due to the lack of continuous fine ground fuels, the large size and density of juniper trees and where mechanical or manual treatments would not be cost effective.

One potential chemical treatment includes the use of the approved, pelleted herbicide, tebuthiuron, which would be applied directly onto the soil surface using an applicator mounted to an ATV or backpack or aerially from an aircraft. Other approved chemical treatments, such as Vista and/or Tordon may be considered for future use, and will follow best management practices similar to the use of tebuthiuron. Additionally, WSMR may consider research applications of other approved chemical treatments individually or in combination that may be more effective and/or that may result in less potential environmental effects.

All herbicide treatments would be applied as per the chemical label. Tebuthiuron would be applied at a rate of .8 lbs. to 2.5 lbs. active ingredient (a.i.)/acre within areas that are dominated by oneseed juniper. The clay pellet dissolves with precipitation and the herbicide percolates into the soil where it is taken into the plant by the roots and translocated to the leaves where it inhibits photosynthesis. Any chemical

applications would occur in the fall/early winter to take advantage of typically gentle rainfall. Flat terrain to 20% slope will be the limits for applying pellets. There is no danger of wind drift but there is a potential for the pellets to be washed downslope in a heavy precipitation event. Liquid foliar sprays would have to be conducted during calm weather conditions to alleviate the chemical drift that could occur during windy weather.

The Bureau of Land Management completed a Programmatic Environmental Impact Statement (PEIS) that analyzed the potential impacts of herbicide use on BLM managed public lands (USDI 2007). The analysis established mandatory buffer distances of 100 meters around waterways, riparian areas, and around threatened or endangered plant species due to the potential for chemical movement. This policy would be carried forward into this proposed action.

For vegetation treatments involving a chemical herbicide, monitoring would be established on each treatment area to assess the degree to which the treatment meets the goal of ecosystem enhancement. Parameters measured to infer success would include, but not be limited to, reduction in basal cover of oneseed juniper and vegetative species composition. Use of 300 meter vegetation transects prior to treatment would establish a baseline. Transects would be reread once a year for 3 years post-treatment and at least once every 5 years thereafter. Where possible, each transect would be matched with a paired transect outside the treatment area. Transects would be permanent and would include photo points. While transects may be read at any time, transects should be read at about the same time each year. Study design would be consistent across the treatment area to allow a cumulative assessment of the restoration effort through time.

2.4 Action Alternatives Considered but not Analyzed

An action alternative of using prescribed fire only was considered. This alternative would use existing vegetation as fuel for prescribed fires. However, fire alone would not reduce larger juniper trees. Prescriptions necessary for fire intensity severe enough to kill larger junipers would pose an unacceptable risk of fire escapes.

A proposed action to exclude the use of prescribed fires after thinning on the upper slopes of the Oscura Mountains was considered. This alternative would reduce standing fuels to piles or to slash that is scattered across the ground. Slash generated would decay slowly over time. As these fuels cured, they would not be burned under controlled conditions but would continue to be flammable and could ignite and burn under undesirable conditions. Piles that are left to deteriorate naturally underneath the canopies of trees may harbor harmful insects like the Pinyon ips beetle *(Ips confusus)* that emerges in springtime and could potentially decimate remaining live piñon trees. This scenario would not meet objectives of making WSMR landscapes more resilient.

Chapter 3
Affected Environment and the Environmental Consequences of Implementing Alternatives

3.0 General Setting

The OMPA is located within the US Department of the Army's White Sands Missile Range. Uses of the Range are for the purposes of military testing and training. The Army's goals for the use of this land is to sustain the lands' natural resources, in quantity, quality and configuration to meet current and future Department of Defense requirements (DA 1999). This chapter describes the existing environment and discusses and analyzes how the proposed action alternatives A and B and the no-action alternative would affect valued environmental components (VEC) or valuable resources of the planning area. Chapter 4 describes mitigation measures that minimize potential impacts associated with the two proposed action alternatives.

3.1 Valued Environmental Components

A VEC analysis was conducted to identify environmental resource areas potentially impacted by the proposed action. This analysis considered natural and human environmental resources which are applicable to the proposed actions being considered for the OMPA and could be impacted by combinations of past, present, and reasonably foreseeable future actions. Each of the VEC categories described in the Army NEPA Analysis Guidance Manual (U.S. ARMY Environmental Command [USAEC] 2007) were considered for their potential impacts resulting from the actions detailed in this EA. Three additional categories (vegetation, soils and wildlife) were added to the VEC analysis due to their relative importance to a landscape vegetation treatment EA such as this one. VECs not being further considered are due to the determination that actions proposed by this EA would have little significant effects upon them and are addressed in other NEPA documents, such as the Range-wide EIS (2010) and the INCRMP (2015). These VECs include airspace resources, noise effects, wetland resources, socioeconomics, energy, hazardous materials/hazardous waste, traffic and transportation systems.

The following Valued Environmental Components were rated as significant due to their potential to be significantly affected by the proposed treatments. Effects on these VECs can be either positive or negative depending on the treatment. Significant VECs include:

- Soils
- Vegetation
- Wildlife
- Air quality
- Water resources
- Human health and safety
- Land use

- Cultural resources
- Facilities

3.2 Soils

3.2.0 Affected Environment

Major soil types in the OMPA include shallow, rocky soils over igneous, basalt, sandstone and limestone bedrock on hills and mountains; gravelly loams, gravelly sandy loams, and calcareous soils on piedmonts, hills and fans around the base of the mountains; and deep, finer textured soils in alluvial valleys and basin bottoms. Soils in canyon bottoms are typically fluvial river wash materials with textures varying from cobbles, sand, and silt to clays (NRCS 2015).

Detailed descriptions of the soils within the OMPA are found in the Soil Survey of White Sands Missile Range, New Mexico (2015) published by the Natural Resources Conservation Service (NRCS). https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx. The most common soils found in the OMPA are all complexes and together make up about 60% of the soil classifications found in the OMPA. They are: Aridic lithic argiustolls-Aridic argiustolls complex, 15 to 75 % slopes; Deama-Penagua-Rock outcrop complex 35 to 90 % slopes; Deama-Rock outcrop complex, 30 to 90 % slopes; Desario-Cuate complex, 5 to 35 % slopes (NRCS 2015). Most of the soils found in the OMPA are subject to water erosion, evident in the amount of incised arroyos and gullies found throughout the OMPA. Wind erosion is less of a problem in the OMPA due to adequate vegetative cover over most of the area. Silty and loamy bottomlands in basins and deserts are highly susceptible to wind erosion.

3.2.1 Environmental Consequences

3.2.1.1 No Action Alternative

Implementation of the no action alternative would not change current soil conditions. Ongoing topsoil erosion would continue, especially during high wind and high precipitation events.

3.2.1.2 Proposed Actions Common to Alternatives A and B

3.2.1.2.1 Prescribed Burning

Prescribed burning is used as an effective shrub reduction treatment when continuous herbaceous cover is present, thus allowing fire to spread. The herbaceous plants would burn, along with the shrubs. Soils would be darkened for a short time after the fire with a greater amount of bare ground. Prescribed fires that burn intensely and have long heat residence times create hydrophilic soils due to heat crystallization of soil particles and could cause reduced water infiltration into the soil horizon. On the other hand, prescribed fires break down insoluble compounds in the soil and release nutrients important for plant

development including increased carbon, potassium, phosphorus, and nitrogen (S. Bumgarner, WSMR fire and fuels contractor, pers. comm.).

Burning piled vegetation can generate high soil heat for extended periods of time, reducing soil microorganisms and delaying revegetation under the area where materials were burned. A BMP is to keep slash piles small and tightly compact with piled vegetation greater in height than in width to minimize soil sterilization under the piles. Piles would be constructed in areas of fuel breaks where the objective is to reduce fuel loads while leaving a reduced canopy of live trees. Piles are made at a distance from the leave trees that protects them from burning. The erosion potential of soils temporarily increases after prescribed fire, due to soil sterilization and loss of plant and organic matter cover. Runoff could carry some nutrients off site, along with ash. Once vegetation reestablishes on bare ground, canopy and ground cover would provide soil protection and soil erosion would decrease.

Extremely intense fires would cause a higher than desired mortality on all plant species, resulting in the exposure of excess amounts of bare ground over a longer period of time, leading to greater soil loss. A BMP would be to avoid this type of fire by burning within prescriptions that call for cool-season burning during early to mid-springtime (S. Bumgarner, WSMR fire and fuels contractor, pers. comm.).

Burning increases nutrient cycling by releasing nutrients tied up in litter and plant material back into the soil. Soil temperatures of burned areas are usually higher for several months post-burn than those of adjoining unburned areas, due to the bare soils darkened ground and increased amounts of sunlight reaching the soil surface. This can result in an earlier green-up in the spring the first year after burning (S. Bumgarner, WSMR fire and fuels contractor, pers. comm.).

3.2.1.2.2 Manual and Mechanical Treatments

Manual treatments would slightly impact soils over a treatment area. Soils would be lightly disturbed and loosened in the areas where people would be walking and working during the removal of shrubs and trees, creating a temporary, small increase in soil erosion. Some shrubs would be removed and tree slash would be lopped and scattered in areas where vegetation is not dense and where impacts to leave trees is not an issue and hand piled in areas of heavy fuels and where protection of leave trees is a concern. Lop and scatter helps to lessen the potential of soil loss from erosion because cut material is scattered and shields large areas of open ground. Handpiling of slash creates more disturbance than lop and scatter due to dragging the cut material across open ground and into piles. Burning of piles can cause soil sterility directly beneath the pile area and cause further erosion as plants will be slow to recolonize these areas. As the vegetation regrows, and additional ground cover is gained, soil impacts would drop to below pre-treatment levels (S. Bumgarner, WSMR fire and fuels contractor, pers. comm.).

Use of mechanical treatments would disturb and loosen soils throughout the treatment area. This type of treatment would result in the removal of some grasses and forbs and would leave areas bare of ground cover temporarily. Tracked vehicles generally cause greater amounts of soil disturbance than rubber-tired equipment. The large area of vulnerable soils would significantly increase the potential for erosion by wind

and water until sufficient ground cover is re-established, generally within one to two years after treatment (S. Bumgarner, WSMR fire and fuels contractor, pers. comm.).

3.2.1.3 Proposed Action for Alternative B-Herbicide Application

Some off-road ATV traffic may be required to scout and flag treatment areas or to apply pellets to the soil. Soil disturbances associated with ATV use during or prior to chemical treatment would occur. A BMP to mitigate soil disturbance and lessen erosion potential would be to require that off-road travel only occur when the soil surface was dry and to avoid driving the same track repeatedly to avoid creating roads or ruts. Additionally, ATV use would be limited within treatment areas to single passes through oneseed juniper stands while pellets are being distributed.

Chemical treatments for reducing vegetation would not physically alter soil's chemical properties; however, such treatment could cause indirect effects to soils by impacting soil microorganisms. Depending on the application rate and the soil environment, herbicides such as tebuthiuron can either stimulate or inhibit soil organisms. Some soil microorganisms may be negatively impacted for the duration of the treatment. Microbial activity would be expected to rebound once dispersion of the chemical into the soil horizon is complete (Tu et al. 2001), generally within 1-3 years. Some soil microorganisms can metabolize tebuthiuron and often are reported to be responsible for herbicide decomposition.

After chemical treatment, the soil would begin to gain organic matter from the decomposition of plant leaves, stems, roots, and then after the target plants die, through increased biomass production of grasses and forbs. The additional organic matter in the soil would support increased populations of microorganisms. Additional organic matter also would improve the water holding capacity and fertility of the soil, allowing for increased herbaceous production of grasses and forbs (Norris and Moore, 1981).

The soil would be affected by the post-treatment change in abundance and types of vegetation that act to shield soil from erosion. The decrease in canopy cover post-treatment would result in some short-term increase in surface water and wind erosion. Erosion impacts would diminish as herbaceous vegetation increased over the treatment area. In the long-term, it is expected that increased herbaceous ground cover would improve soil stability, decrease erosion and increase water infiltration.

3.3 Vegetation

3.3.0 Affected Environment

Vegetation includes assemblages of all the plants found within the OMPA. But of particular importance is those plants within the OMPA that are considered rare or having special status. The term special status plant species includes the Army plant Species at Risk (SAR) as well as other species recognized by the state of New Mexico, the USFWS and other wildlife conservation organizations as being rare, sensitive, species of concern, endangered or threatened. Appendix A lists rare plants of WSMR along with their status,

including one federally listed as an endangered species, Todsen's pennyroyal *(Hedeoma todsenii*). Todsen's pennyroyal occurs on the western edge of WSMR and also east of WSMR, in the Sacramento Mountains. The species has not been documented in the Oscura Mountains, and habitat modeling does not predict that it occurs there (Charles Britt, Mesa Ecological Services). Therefore, the proposed action is not expected to affect this species.

The state of New Mexico (NM) lists four plant species for WSMR that are considered endangered: night-blooming cereus *(Peniocereus greggii),* Todsen's pennyroyal, Organ Mountain pincushion cactus *(Escobaria organensis)* and the Mescalero milkwort *(Polygala rimulicola)* and 17 species listed as Species of Concern (SOC) (WSMR 2015). None of the plant species listed as endangered or as SOC have been found in the OMPA with the exception of the New Mexico penstemon (*Penstemon neomexicanus)* which is listed as a state SOC (Appendix A).

Table 1 is an additional list of WSMR species of interest that are known to occur within the OMPA. Many of these species have been down-listed from federal and/or state categories because the current evidence shows they were not as threatened or endangered statewide as once believed. However, all of these species are rare on WSMR (WSMR 2015). If populations of these plants are discovered during pre-treatment surveys, then protection mitigations would be proposed such as creating a polygon where no treatments would occur within the vicinity of the plants, or building fireline around a group or colony of rare plants.

Table 1 WSMR Plant Species of Interest found in the Oscura Mountains

Long-flowered amsonia	*Amsonia longiflora*	limestone substrate
Spoonleaf rabbitbrush	*Lorandersonia spathulata*	montane grasslands
Payson's hiddenflower	*Cryptantha paysonii*	limestone substrate
Dotted gayfeather	*Liatris punctata*	one site overlooking Pronghorn Valley
Bigelow tansyaster	*Dieteria bigelovii*	shaded areas of P-J woodlands
Gyp daisy	*Xanthisma gypsophilium*	deep shade in narrow canyons
Longstem flame flower	*Phemeranthus longipes*	limestone bedrock
Threadleaf horsebrush	*Tetradymia filifolius*	mountainous terrain
Wright spiderwort	*Tradescantia wrightii*	grassland or riparian areas
Desert rose	*Rosa stellata* var. *mirifica*	high elevations

There are two major land resource areas (MLRAs) described as being within the OMPA by the Natural Resources Conservation Service (NRCS): The Central New Mexico Highlands; and the Southern Desertic Basins, Plains and Mountains. Many different vegetative assemblages are present within those areas, and they are broken out by the NRCS as ecological sites. Ecological sites are important to land managers because they represent a unique, identifiable, and repeatable patch of vegetation and soil on a landscape that can be managed or treated and treatment results across the site should be similar. Each ecological site is considered dynamic and is the current product of environmental factors that influence the development of the soil and vegetation, including disturbance regimes. There are two 'Forestland' and 34

'Rangeland' ecological sites found within the OMPA. Detailed descriptions of ecological sites found within the planning area can be obtained from the NRCS website:
https://www.nrcs.usda.gov/wps/portal/nrcs/surveylist/soils/survey/state/?stateId=NM

Muldavin et al (2000) classified five major vegetation community types present on the Oscura Mountains and immediately surrounding areas (Fig. 3 *Note-Figure 3 does not include all of the OMPA).

1) **Pinyon woodlands** are characterized by moderately closed canopies (25–60% cover) dominated by two needle pinyon (*Pinus edulis*), with oneseed juniper (*Juniperus monosperma*) subdominant or codominant, but never more than 50% of the canopy and located at higher elevations, mainly along the gradual eastern slopes.

2) **Juniper woodlands** occur at slightly lower elevations along the eastern side of the Oscura Mountains. Juniper woodlands are savannah-like with open canopies (10-40% cover) and grassy inter-tree spaces; two needle pinyon is usually entirely absent, although occasionally a few individuals may be present.

3) **Montane scrub** is dominated by mountain mahogany (*Cercocarpus breviflorus*) with wavyleaf oak (*Quercus undulata*) as a common associated species, and usually occurs on slopes and ridges, particularly the western slope and the bottom of the eastern slope.

4) **Interior chaparral** is characterized by shrub live oak (*Quercus turbinella*) communities, usually found on low to mid elevation slopes near juniper woodlands or grasslands.

5) **Foothill-montane temperate grassland** is characterized by blue grama (*Bouteloua gracilis*), New Mexico needlegrass (*Achnatherum perplexum*), Arizona fescue *(Festuca arizonica)* and western wheatgrass (*Elymus smithii*) dominated communities and occurs on mountain slopes or in mountain valleys.

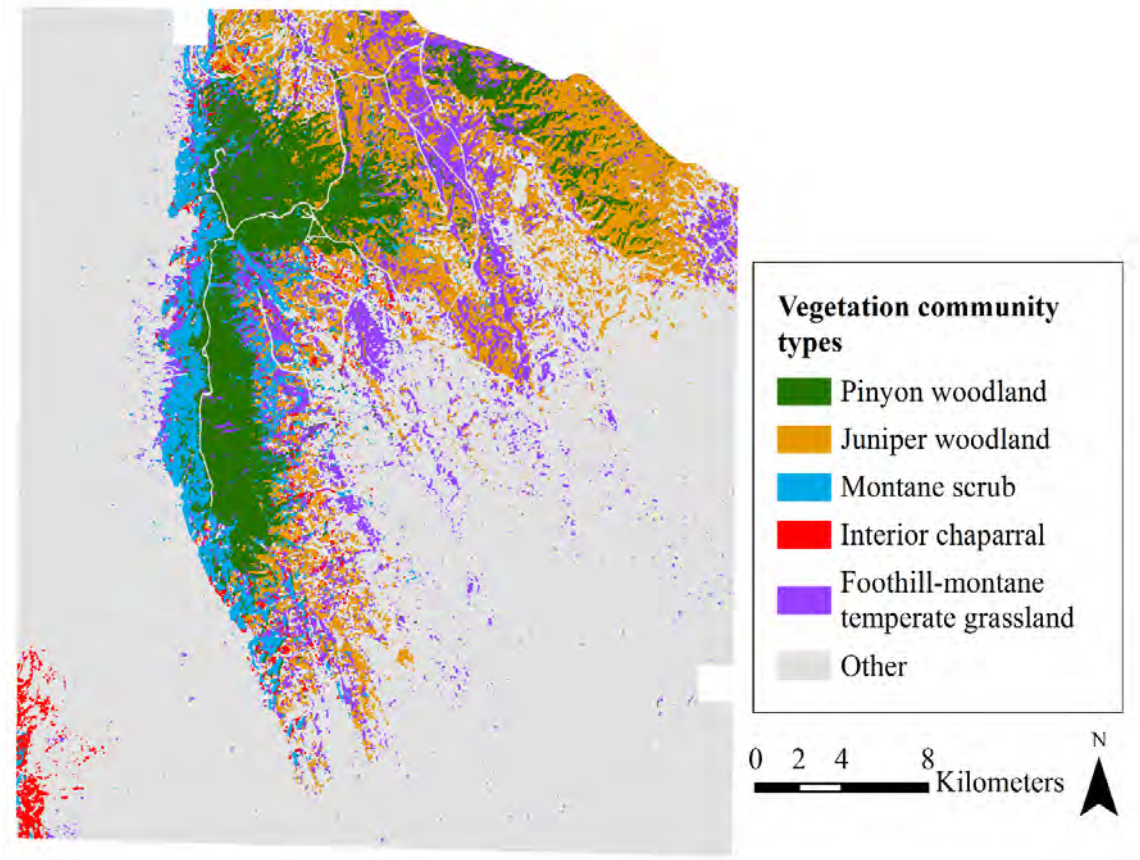


Figure 3. Oscura Mountains vegetation community types based on Muldavin et al 2000

3.3.1 Environmental Consequences

3.3.1.1 No Action Alternative

Implementation of the no action alternative would result in no change to current impacts upon vegetative resources. Oneseed juniper encroachments onto grasslands would continue to spread (Jacobs 2011). More grasslands would be lost as they become shaded by shrubs and unable to compete for limited water and food resources. Plant diversity would diminish (Romme et al. 2009). Fuel loads of both live and dead fuels would continue to accumulate leading to a higher likelihood of wildfires burning unchecked.

3.3.1.2 Proposed Actions Common to Alternatives A and B

3.3.1.2.1 Prescribed Burning

In defined project areas where there is sufficient understory of fine fuels, broadcast prescribed fires would be used to reduce shrub cover and juniper density and would help create openings where a more heterogeneous mixture of annual and perennial plant species could thrive, thus benefitting a variety of wildlife species, including deer, pronghorn and elk (Bender 2012). BMPs for prescribed fire projects include

a written prescribed fire plan that includes prescriptions and mitigations to ensure adequate fire containment and control as well as acceptable levels of plant mortality. A BMP for prescribed fires within meadow restoration areas is to burn in the early spring when fuel moistures are high in live and heavy dead fuels thus reducing the need for extended hand/mechanical firelines to be built for fire control.

Prescribed fires generally burn with mixed severity, resulting in light scorching of plants in areas without continuous herbaceous understory, moderately burning shrubs and trees where fuels are more continuous and with slopes to help carry fire uphill, to severely burned areas where stands of continuous fuels are thick enough to carry fire to the uppermost branches of trees and shrubs and fire then potentially spreads independently between the crowns. This mosaic type of burned landscapes is beneficial to a host of plants, many of which appear right after fire opens the canopy. Succession of perennial plants follows colonizing annual forbs. The diverse array of plants following burns are rich in nutrients, crude protein and fiber making them sought after by many wildlife species including insects, birds and mammals (S. Bumgarner, WSMR fire and fuels contractor, pers. comm.).

The proposed action would result in a reduction of woody species from prescribed fire treatments. Mature shrubs of most species would resprout from the root collar (S. Bumgarner, WSMR fire and fuels contractor, pers. comm.). Most shrubs must be several years old to resprout and at least 10 years old to begin to produce seeds (McPherson 1995). If managing for grassland habitats, recurring fire can gradually eliminate old shrubs, while also preventing young plants from reaching the age they can resprout. Prescribed fire treatments can eventually reduce the shrub seed bank and reduce the numbers of shrubs present on the landscape. Scott (1999), studying the Baker Prescribed Burn (May-June 1995) in the Peloncillo Mountains of southwestern New Mexico, found that an initial fire resulted in a 20% kill of shrubs (mesquite, little-leaf sumac, red barberry, white-thorn acacia) and an 80% kill on juniper. Sixty-five percent of the shrubs were top killed but re-sprouted the following year. Without continued periodic burning, changes in shrub species cover and species presence would be short lived.

Prescribed fires would be used as a follow-up to chemical and/or manual/mechanical treatments in order to reduce the regrowth of small juniper shrubs, to accelerate the breakdown of remaining dead vegetation and litter and to provide a nutrient-rich seedbed for the germination of desirable forbs, shrubs and grasses.

Riparian areas in the OMPA are relatively small but important areas, most often associated with deep canyon bottoms with rocky substrates, springs and seeps. Riparian areas contain a diverse mixture of trees, shrubs, grasses and forbs that are beneficial to many species of wildlife. Prescribed burning BMPs exclude burning in riparian areas and canyon bottoms and can generally be protected from fire effects by igniting fires mid-slope, above and around the footprint of riparian areas. However, indirect impacts to riparian vegetation could occur, subsequent to the burn, from increased sedimentation and soil erosion. In the short-term, depending on the amount of sedimentation, riparian vegetation could be covered by silt deposition and in some cases killed. One BMP to minimize siltation within riparian areas would be to burn in the early spring to keep fire intensity low and to allow for plant recovery before the onset of the rainy season. Riparian plant species are adapted to disturbance and readily resprout or reseed in the new

deposition. In the longer term, riparian sites would respond to new, higher nutrient-laden soil deposition. The long-term result would be expanded riparian areas consisting of a heterogeneous mixture of plants with varying age classes, aiding a hydrologic system capable of longer water retention, better water storage and decreased losses of topsoil from sediment flow (S. Bumgarner, WSMR fire and fuels contractor, pers. comm.).

3.3.1.2.2 Manual and Mechanical Treatments

Johnson et al (2017) examined piñon pine vigor in the Oscura Mountains and other places from 2004 to 2012 and also investigated the relationship between patterns of piñon pine condition and distribution of nesting Pinyon jays. Results of the eight year study showed that vigor changes in piñon pines were positive in areas of lower tree density and negative in areas of higher tree density; larger trees were more likely than smaller trees to decline in vigor. Average annual vigor decline was greater with decreasing cool-season precipitation. The probability that Pinyon jays nested was higher in areas of higher piñon pine vigor in 2010–2012; this relationship became more pronounced over the three years. Overall, the average condition of piñon pines declined over the eight year period. This example suggests that incremental, weather-influenced changes in tree condition may impact the wildlife of arid woodlands (Johnson et al 2017). Pinyon pines have good nut productivity between 75-160 years of age, maximum productivity between 160-200 years, and declining productivity after 200 years (U.S. Forest Service Fire Effects Information System https://www.fs.fed.us/database/feis/plants/tree/pinedu/all.html). Treatments, therefore should retain the most productive pinyon nut crop trees and the oldest, largest pinyons to maximize pinyon nut mast crops for wildlife. Higher basal area trees should be retained based on their selection by pinyon jays for use as nest trees (Johnson et al. 2018), and dense canopies around these nest trees should be retained to provide cover from nest predation.

According to Gillihan (2006), only larger, mature trees can provide proper-sized cavities needed by cavity-nesting birds, and large trees (especially dead or partially dead ones) are favorite perching sites. Gillihan (2006) suggests that for thinning within pinyon-juniper stands, apply a combination of single-tree selection, group selection, and shelterwood systems. These systems allow for reduced tree density and enhanced understory development while permitting continued pinyon and juniper productivity. Single-tree selection should be applied in mature stands (Gillihan 2006). These recommendations would be incorporated into WSMR prescriptions for treatments atop the Oscura Mountains while providing for the protection of human structures and benefits to wildlife habitat.

Manual treatments would be the localized removal of plants, either by chainsaws or by handtools, mostly oneseed juniper and smaller piñon pines, but other shrub species as necessary to maintain open characteristics of meadows and to thin piñon-juniper stands around man-made structures and along roadways (IWFMP 2018). The removal of shrub and tree species would allow for rapid recovery of other plant species, particularly if followed by prescribed fire, through decreased competition for water, nutrients and sunlight. Manual treatments have advantages over the use of mechanical equipment. Manual methods cause less soil disturbance, can be implemented on steep slopes and in places far from

roads. Manual treatments may not require cultural ground surveys to be completed due to minor potential for cultural site disturbance.

Mechanical equipment treatments of grubbing up plants or masticating plants could be carried out over larger areas and in a shorter time frame with less expense than manual treatments, but would have correspondingly larger impacts to non-target plant species, to soils and to cultural sites. A combination of manual and mechanical methods for thinning projects may be most efficient use and would be determined on a case-by-case project basis.

3.3.1.3 Proposed Action for Alternative B-Herbicide Application

As site specific projects are considered for herbicide treatments under the proposed action, the specific ecological site descriptions for the area will be consulted to ensure soil types and plant assemblages are compatible with the type of treatment being proposed. For example, if a particular project site has soil components dominated by clays, then pelleted herbicide treatments for that area will not be considered, due to clay soils' colloidal particles which inhibit the herbicide from being readily absorbed (G. Alpers, Dow Agrosciences, pers. comm.).

Soil surveys and soil samples were taken from 5 locations located within tebuthiuron proposed treatment areas. Soil samples were sent to A & L Plains Agricultural Laboratories, Inc. for analysis of soil texture for sand, silt, clay and organic matter content. Soil analysis shows that the ridgetop sites near Selso Martinez tank had levels of clay that were too high for tebuthiuron to have much effect on juniper mortality. Lower elevation sites near Hunter's Lodge and Red Rio showed high levels of sand and loam making these areas good targets for tebuthiuron treatments (G. Alpers, Dow Agrosciences, pers. comm.).

Tebuthiuron is relatively safe and effective, but can have undesirable effects off-site and on non-target species. Treatments would be designed to reduce damage to non-target vegetation by using appropriate application rates, adjusting timing of application, and designing leave-out areas of slopes >20% and buffering around drainages (G. Alpers, Dow Agrosciences, pers. comm.).

In general, chemical treatments are expected to decrease the cover and density of shrubs and trees while increasing the cover and density of desirable grasses and forbs and eventually, other shrub species. Herbaceous production, ground cover, and community structure would be shifted toward intermediate grass dominated states that vary in grass cover depending on the degree of retrogression present at treatment or, conversely the remaining cover of grasses and non-affected shrubs available for re-establishing the site. In areas where sufficient grass cover is not present, there is potential for large increases of exotic (such as tumbleweed *[Salsola tragus]*) and native annual forbs and grasses, as well as potential for a relatively barren aspect. Some injury or loss of non-target forb and shrub species would be likely to occur (G. Alpers, Dow Agrosciences, pers. comm.).

Forbs and grasses would begin to re-establish from the soils' seed bank the year after treatment, depending on the amount and timing of precipitation received (G. Alpers, Dow Agrosciences, pers. comm.).

The following information on the herbicide tebuthiuron has been collated from the product label, MSDS, and the Weeds Control Methods Handbook (Tu et. al 2001).

3.3.1.3.1 Spike 20P (Tebuthiuron) Treatment

Tebuthiuron is used primarily for control of creosote *(Larrea tridentata)* but is effective for juniper control (<6' tall, near 100% mortality) at higher rates of application (7 lb. a.i. /ac to 10 lb. a.i. /ac). This application rate has a mortality of @ 50%-75% on larger oneseed junipers depending on soil properties. Tebuthiuron is applied as a clay pellet that dissolves with precipitation or moisture. Tebuthiuron is active and mobile in the soil and is translocated from the soil by roots through the plants to the leaves where it inhibits photosynthesis. Lack of chlorophyll essentially causes starvation of the plant over time.

The mobility of Tebuthiuron is greatly influenced by soil texture. For this reason, application is only during months when there is relatively low probability of high rainfall events that would allow for increased movement across the soil surface and not through the soil column.

In laboratory studies, Tebuthiuron leached slowly through a clay soil, but leached more readily through a sand soil column. In field studies, Tebuthiuron leached slowly in medium textured soils with 2-3 percent organic matter (USDI 2007). Tebuthiuron was found in runoff water in field studies on controlled watersheds when storms occurred immediately after application (USDI 2007).

Metabolism, degradation, and leaching of Tebuthiuron in soil were studied in the laboratory and field. The half-life of Tebuthiuron is 10 to 13 months in field studies conducted in moderate-to-high rainfall areas. In low rainfall areas, the rate of dissipation was much slower (USDI 2007). In southern New Mexico, the half-life would be approximately 30 months +/- 10 months (Melendez 2005).

Tebuthiuron is generally considered a non-selective herbicide when used at application rates considered for this proposal. Grasses as well as shrubs and forbs are affected by the herbicide at proposed rates. Shrubs such as tarbush *(Flourensia cernua)* and mariola *(Parthenium incanum)* are susceptible to tebuthiuron at the proposed rates, while mesquite *(Prosopis glandulosa)* is not susceptible to the proposed application rate. Non-target, desirable shrub/tree species known to be susceptible to this chemical are ocotillo *(Fouquieria splendens),* desert willow *(Chilopsis linearis)*, wolfberry *(Lycium berlandieri),* and sumac *(Rhus spp.).* Grasses and herbaceous plants may be affected by tebuthiuron during the first year following treatment. An increase in ground cover and density of grasses and forbs would be expected by the second growing season, as competition for water and nutrients with shrubs decreases (USDI 2007).

In monitoring studies done by the Las Cruces District Office of the BLM, there were regional differences in grass response, but in general short grass cover was highest 4 to 8 years following treatments. Mid-grass cover was generally highest in areas treated 14 to 17 years previously (Melendez 2005).

Beneficial impacts from chemical treatments would be indirect changes in water storage capacity within the soil and a more frequent fire regime. Mortality of targeted plants would cause a release and redistribution of nutrient and mineral resources into the interspaces between plants. Herbaceous species would establish and litter cover increase, water runoff would slow and infiltration increase.

Most herbaceous plant species would benefit from chemical shrub control and continue to increase over the long-term. Successful implementation of herbicide treatments followed by prescribed fire over select portions of the OMPA would result in grass and forb cover dense enough and continuous enough to allow for wildfire potential, perhaps to the extent fire could begin to maintain a more natural, native vegetative community similar to a juniper savanna ecological site reference state. Eventually much of the area mapped as P-J encroachments would show a decrease in shrub-like vegetation and an increase in density and diversity of herbaceous species (S. Bumgarner, WSMR fire and fuels contractor, pers. comm.).

3.3.1.3.2 Special Status Plant Species

The herbicide, Tebuthiuron, proposed for use in the OMPA, poses risks to special status species (includes Army SAR, USFWS listed as threatened or endangered species and NM threatened, endangered and SOC) and to other non-target plants that provide important wildlife habitat (USDI 2007) Potential direct impacts to non-target plants would be through exposure to herbicide, and possibly, crushing of individual plants by equipment associated with the project.

A BMP of the proposed action is to survey individual proposal sites for presence or potential presence of special status species prior to treatment. The proposed action would include designing treatments to eliminate or avoid impacts to special status plant species, to the extent that direct, indirect and cumulative impacts are mitigated and consistent with Army policy. Use of buffers, slope restrictions and timing of application to avoid high/heavy rainfall events around special status species plants would minimize or eliminate the potential for negative impacts (USDI 2007). This is possible with aircraft delivery of tebuthiuron as applicator aircraft are configured with programmable GPS that allows for the upload of project area shape files into the GPS that interact with the release mechanism of the herbicide applicator to turn on and off at project area boundary coordinates.

No federally listed plant species are known to be located within the OMPA. If future surveys detect listed species, or if legal status changes on plants known to occur within the OMPA, WSMR would consult with the US Fish and Wildlife Service as required under Section 7 of the Endangered Species Act where a proposed project may affect a species. Proposed treatments would not proceed until completion of consultation and implementation of any stipulations. For candidate and New Mexico state SOC species WSMR would employ measures to ensure treatments would not contribute to the need for the species to be listed. For State listed plant species, WSMR would ensure that any treatment would further the conservation of the species. By ensuring each project proposal is consistent with Army environmental policy; impacts from herbicide application would not jeopardize species or contribute to the need for listing special status plant species. Appendix A lists the known special status plant species that occur on WSMR. The OMPA has potential habitat for at least five species from Appendix A: Night-blooming cereus

(Peniocereus greggii), Mohave panicgrass *(Panicum mohavense),* and Sivinski's scorpionweed *(Phacelia sivinskii).* The New Mexico penstemon *(Penstemon neomexicanus*) is known to occur within the planning area within meadows and alongside roadways within the upper elevations of the Oscura Mountains. Others from this list may eventually be found in the planning area as more plant surveys are conducted.

Areas of important wildlife habitat would be excluded from treatments and buffered to prevent loss of important habitat components or specific plant species. Examples would be heterogeneous stands of sumac, hackberry, desert willow, cottonwood, mountain mahogany, and oak and other shrubs that may occur along arroyos or on small sites within a proposed treatment area that is otherwise dominated by juniper. Herbicide would be applied so as not to contact or impact the desirable plant(s). A buffer area of 100 meters surrounding the desirable plants would be omitted from the treatment polygon. Pelleted tebuthiuron application would result in no negative impacts from wind drift but surface movement of pellets during a high precipitation event (>.50"/hr.) could cause mortality of non-targeted plants (USDI 2007).

3.4 Wildlife

Wildlife includes all of the animals found with the OMPA, but of particular importance are those animal species within the OMPA that are in any of the following categories (Appendix B):

- Listed as threatened or endangered under the Endangered Species Act (ESA), or are a candidate for listing under the ESA (https://ecos.fws.gov/ipac/location/index)
- Listed by the state of New Mexico as Threatened, "Endangered", or a "Species of Greatest Conservation Need" (http://www.bison-m.org/index.aspx)
- Considered an Army Priority Species at Risk (SAR), defined as those which would have a significant impact on military installations if listed as threatened or endangered under the ESA (Balbach et. al 2010)
- A species at risk, defined by the Army as "Species not yet Federally listed as threatened or endangered under the ESA, but are either designated as candidates for listing or are regarded by NatureServe as critically imperiled or imperiled throughout their range because are declining in population." (Balbach et. al 2010)
- On the list of DoD Partners in Flight "Mission-sensitive Species" that, if listed, would have the greatest impact to mission implementation
- Are considered by other agencies or conservation organizations to be rare or sensitive

The USFWS does not list sensitive species, but does list wildlife species considered to be threatened and endangered, as well as candidate species proposed for listing: https://ecos.fws.gov/ipac/location/index. 17 species have potential to occur within the Oscura Mountains planning area: Two mammals, six birds, three snails, one crustacean, one amphibian, one fish and three flowering plants (Appendix A and B). http://www.bison-m.org/index.aspx includes 55 species of animals that occur or have potential to occur within the planning area. This list includes state listed species and species designated as sensitive. As

described in the proposed action, all specific projects proposed within the OMPA will consider the most current list of special status species appropriate for the habitats found at each proposed project treatment site. Mitigations to reduce potential impacts to sensitive wildlife species would be incorporated into each project-specific REC as a BMP when habitat for a particular sensitive species is being affected by treatments.

3.4.0 Affected Environment

The biotic assemblage in the OMPA is diverse, owing to the convergence of influences from the Chihuahuan Desert, Rocky Mountains, Sierra Madre, Great Plains and Great Basin (Parmenter et al. 1995). The region also exhibits a relatively high degree of species endemism, a result of the basin and range physiography. The mesas, hills, mountains and canyons together with scattered riparian and aquatic habitat associated with springs add to the diversity and biotic value of the Oscura Mountains ecosystem. The Oscura Mountains provide an important terrain and habitat corridor between the San Andres Mountains and the Rocky Mountains for animal movement, thus genetic exchange, and for species range expansion/contraction necessary for long-term viability with expected changes in climate (Parmenter et al. 1995).

The diversity of habitat and terrain features that result in both endemism and connectivity, combined with the fact that the Oscura Mountains are at the northern limit of the Chihuahuan Desert and thus, the northern limit for geographic distribution of a number of species, equates to the potential for a large number of rare animal species within the planning area.

The following species are of special conservation concern, and will be described and analyzed in greater detail than other wildlife species:

Oscura Mountains Chipmunk *(Neotamias quadrivittatus oscuraensis)*-The Oscura Mountains chipmunk is a subspecies of the Colorado chipmunk that is endemic to WSMR and isolated from Colorado chipmunks living in the northern half of New Mexico (NMDGF 2018). It is listed by New Mexico as Threatened and a Category I ("Immediate Priority") Species of Greatest Conservation Need (NMDGF 2016, NMDGF 2018). The NatureServe Global rank is T1, indicating the species is critically imperiled range wide, and the Natural Heritage state rank is S1 indicating the species is critically imperiled in the state (Johnson and Smith 2017).

The Army considers the Oscura Mountain chipmunk to be a Priority Species at Risk (SAR) (IMCOM 2006, Balback et. al 2010). Army SAR are species which, if listed as threatened or endangered under the ESA, would have a significant impact on military operations (Balbach et. al 2010). Installations are required to incorporate SAR management into the development and execution of Integrated Natural Resource Management Plans (INRMP), assess impacts of proposed actions on SAR in NEPA analysis when proposed actions have the potential to affect SAR, and to incorporate SAR protection and conservation in mission planning (IMCOM 2006). AR 200-1 requires installations to implement management plans for species at risk to include, but not limited to, survey, monitoring, habitat enhancement, and protection.

The Oscura Mountains chipmunk is "extremely vulnerable to habitat loss or alteration" (NMDGF 2018). Its limited distribution in a high elevation "sky island" habitat renders it particularly vulnerable to impacts from drought and climate change as the species will not have the option to adapt by moving to higher elevations (Johnson and Smith 2017). Perkins-Taylor and Frey (2018) listed wildfire, disease, anthropogenic disturbance, and climate change as the greatest threats to the species. New Mexico describes the most immediate threats as destruction of natural habitat by human activities and wildfire (NMDGF 2018). Johnson and Smith (2017) warned that drastically thinning pinyon juniper woodland would negatively impact chipmunk habitat. Therefore, it is extremely important to ensure than any treatments in their habitat intended to reduce the chance of catastrophic wildfire do not inadvertently render their habitat unsuitable.

Sullivan and Wilson (2000) described "critical habitat" for the Oscura Mountains chipmunk as areas of mesic mature pinyon-juniper-oak woodland and forest, rocky limestone/igneous outcrops, ledges, cliffs along escarpments associated with north and northeast facing slopes. Conservation goals included preventing the destruction or fragmentation of existing habitat, including biotic and abiotic elements. Management actions included the identification and protection of "critical habitat", and to maintain habitat elements through restoration when appropriate. Prescribed fire, tree thinning, or other methods were not discussed. The chipmunk Conservation Management Plan (Sullivan and Wilson 2000) included potential harmful impacts of fire, primarily habitat degradation and fragmentation. Mitigations to avoid habitat loss included keeping wildfires small, avoiding ground disturbing activities, replanting of vegetation in disturbed areas and ensuring vehicles stay on established roadways.

The WSMR Integrated Natural and Cultural Resources Management Plan (INCRMP) did not include specific management recommendations for the chipmunk, but described essential habitat within 8 sections of land at elevations of 7,800-8,200 ft. where vegetation is dominated by mature pinyon, oneseed juniper, mountain mahogany, antelope bush, oaks, and four-wing saltbush (Sullivan 1996; WSMR 2015). Old growth piñon/juniper woodlands were identified as a conservation concern in the Oscura Mountains Operational Unit (OU). Objectives included the preservation of areas of ecologically important vegetative communities in sufficiently large blocks to minimize habitat fragmentation while supporting mission requirements.

Perkins-Taylor and Frey (2018) used occupancy modeling to determine ecological factors related to the distribution and habitat selection of the species. They had lower detection probabilities at sites without mature pinyons, and found chipmunks in 0 of 43 juniper woodland sites and 3 of 20 montane scrub sites. Areas within 150 m of an escarpment had a predicted occupancy probability of nearly 100% above 2,085 m (6,840 ft.) elevation.

Proposed treatments in juniper woodland areas, such as prescribed fires and herbicide treatments, are not likely to affect the Oscura Mountains chipmunk because chipmunks are not likely to inhabit these areas. Burning and thinning of junipers in meadows is also not likely to significantly affect chipmunks

unless wildfire inadvertently spreads to the mature pinyon woodlands. This is not likely because any burning or thinning that occurs adjacent to pinyon woodlands will be strictly controlled. A burn plan will be written for each project, with measures such as weather criteria, close monitoring of fires, black-lining, and measures to ensure that fires are contained overnight.

Selective thinning near Range Road 331 and North Oscura Peak (Appendix C, Figure A) has the greatest potential to affect chipmunk habitat. All areas atop NOP proposed for thinning are likely to be occupied by chipmunks. The proposed thinning in these areas is intended to protect military structures from wildfire. The primary conservation for chipmunks is a buffer area within 150 meters of the escarpment where piñon pines and junipers will not be cut (Section 2.2.1). When, and if, specific thinning treatments are proposed for this area, WSMR will consult with NMDGF and Dr. Jennifer Frey (NMSU) for input on methods that will not negatively affect chipmunk habitat.

Migratory Birds- Executive Order (EO) 13186, Responsibilities of Federal Agencies to Protect Migratory Birds, directs Federal agencies to develop and implement a Memorandum of Understanding (MOU) with the USFWS to promote the conservation of migratory bird populations. Each MOU is required to incorporate bird conservation measures into agency activities, minimize negative impacts to migratory birds, restore and enhance bird habitats, incorporate migratory bird conservation into planning processes and agency plans, promote conservation research and information exchange, and provide training and information on methods to avoid and minimize take of migratory birds. Environmental analyses of Federal actions required by the National Environmental Policy Act (NEPA) or other environmental review processes must evaluate the effects of actions and agency plans on migratory birds. The resulting "Memorandum of Understanding Between the U.S. Department of Defense and the U.S. Fish and Wildlife Service To Promote the Conservation of Migratory Birds" (2006) focuses on non-military readiness actions, and outlines a collaborative approach to promote conservation of migratory birds and their habitats on DoD lands. https://www.jcs.mil/Portals/36/Documents/Doctrine/Interorganizational_Documents/doi_mou_birds2006.pdf. In the MOU, DoD commits to follow all migratory bird permitting requirements, encourage incorporation of comprehensive migratory bird management objectives in planning documents, assess migratory bird impacts before starting activities, implement actions to minimize take, manage military lands and non-military readiness activities to support migratory bird conservation, and evaluate the effectiveness of conservation measures to minimize or mitigate take of migratory birds.

In addition to the MBTA, the Bald and Golden Eagle Protection Act (Eagle Act) adds additional protection for Bald and Golden Eagles by using a more restrictive definition of take than the MBTA. While both resource laws prohibit the possession, injury, or killing of Bald and Golden Eagles, the Eagle Act also prohibits take from disturbance. The following definition of "disturb" was codified in regulations at 50 CFR 22.3: "Disturb means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior." Take does not need to be intentional in order for the Eagle Act to be enforced; therefore, negligent actions that

lead to eagle take may also result in prosecution. The Eagle Act also provides year-round protection of Golden Eagle nests by prohibiting nest destruction, even when empty. Human-induced alterations or habitat manipulations around former nest sites are prohibited even when eagles are not present if the alteration decreases productivity or causes death, injury, or nest abandonment when the eagles return. Under the Eagle Act, permits from the USFWS are required for activities that result in take of Golden Eagles or their nests, even when take is unintentional. https://www.fws.gov/birds/policies-and-regulations/laws-legislations/bald-and-golden-eagle-protection-act.php.

Pinyon Jay *(Gymnorhinus cyanocephalus)*-Pinyon jay populations have declined dramatically in the Southwest over the last 50 years, and New Mexico populations have declined at a rate of 3.46% per year since 1968 (Johnson and Smith 2017). In New Mexico, the Pinyon jay is a Category I ("Immediate Priority") Species of Greatest Conservation Need (NMDGF 2016) and is listed as SC1 (the highest bird conservation priority) by the New Mexico Avian Conservation Partners. It is a USFWS Bird of Conservation Concern https://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php, and the Natural Heritage New Mexico state rank is S2/S3 (imperiled/vulnerable). The Pinyon Jay is on the "Watch List" of the DoD Partners in Flight Mission-sensitive Priority Bird Species list.

The total population estimate for WSMR in 2012 was 125 birds, with about 50 birds nesting in the North Oscura Peak area and 75 birds in the area of the Red Rio bombing range and Hardin Ranch. There is not a current estimate for population size, but Pinyon jays were observed twice in 2018 (S. Bumgarner, WSMR fire and fuels contractor, pers. comm.), and in the spring of 2019 a flock is being monitored in the NOP area (T.L. Cutler, WSMR Wildlife Biologist, pers. comm.).

Pinyon jays are important long-distance dispersers of pinyon nuts, and therefore play an important role in the establishment of new pinyon trees and ecosystem health of pinyon juniper woodlands. Therefore, as with the Oscura Mountains chipmunk, it is extremely important to ensure than any treatments in their habitat intended to reduce the chance of wildfire do not inadvertently render their habitat unsuitable.

Research by Johnson et al. (2018) indicates that the thinning of mature pinyon trees with the known nest colony at North Oscura Peak could cause pinyon jays to abandon the nest site. It is not known if suitable nest habitat occurs elsewhere in the adjacent woodland, though a flock occurred within the Red Rio Bombing Range to the east in 2012. Loss of the Pinyon jay colony is not desirable considering their imperiled status and their function in maintaining healthy PJ woodland ecosystems.

While more research is needed on the amount of thinning that will cause Pinyon jays to abandon a nest colony, Johnson et al. (2018) recommends siting thinning treatments to avoid pinyon jay nest colonies while still meeting fuel management goals. No treatments will be conducted within 500 meters of previously or currently occupied Pinyon Jay nesting areas. Any treatments considered for the upper slopes of NOP would only be done outside of the nesting season which is February-August.

The following are recommendations (K. Johnson, University of New Mexico, personal communication; E. Duvuvuei, New Mexico Department of Game and Fish, personal communication) that will be followed as individual projects are proposed and assessed for impacts to Pinyon jays:

- A minimum of a 500m buffer from any nest site within a colony to account for colony/nest site shifts between years.
- Avoid disturbance to old/large trees, as these trees are the most productive for the piñon crop
- If possible, thin within existing/naturally occurring piñon die-off areas
- Use a "patchy-clumpy" mosaic of small patches for thinning instead of evenly spaced thinning

The New Mexico Bird Conservation Plan (New Mexico Partners in Flight 2007) describes the Pinyon jay as a high vulnerability species, with about 28% of the species occurring in New Mexico indicating high stewardship responsibility for the state. The plan states that habitat may be degraded by poorly planned woodland thinning and tree removal efforts, and that management should focus on the preservation of mature stands of pinyon-juniper woodland across large areas of the state. Specific recommendations include:

- Avoid cutting or clearing of healthy, mature pinyon-juniper habitat.
- Maintain undisturbed woodland habitat with a mixed size and age distribution of trees.
- Where die-offs have occurred and where feasible, initiate restoration of pinyon-juniper habitat. (Note however that where pinyon trees have been eliminated, this will be a long-term endeavor.)
- Fire is not recommended as a management tool in pinyon-juniper woodland.

Gray vireo (*Vireo vicinior*)-The gray vireo is listed by New Mexico as a Threatened species and a Category I ("Immediate Priority") Species of Greatest Conservation Need (NMDGF 2016, NMDGF 2018). This species is on the "Watch List" of the DoD Partners in Flight Mission-sensitive Priority Bird Species list. In 2007, the New Mexico Department of Game and Fish (NMDGF) wrote a recovery plan for the species which primarily recommended improving the knowledge of the ecology of the species and the impacts of habitat use or alteration rather than specific actions to recover the species (NMDGF 2007). The BISON-M (www.bison-m.org) species booklet recommends the following in relation to fire:

"Pinyons and junipers are easily killed by even low-intensity fires and regenerate very slowly, so a burned area will lack tree cover for a very long time. Use prescribed fires only outside of the nesting season (April through July). Accept infrequent wildfires (even large, stand-replacing fires) as a natural part of pinyon-juniper woodland ecology. Such burns contribute to landscape heterogeneity and provide nesting and foraging opportunities for a more diverse avian community. Leave some fire-killed trees standing. The trees will provide foraging, perching, and nesting sites for birds." (Gillihan 2006).

Gray vireos evolved with wildfire in pinon-juniper ecosystems. Pinon-juniper woodlands experience infrequent high-severity fires in persistent woodlands (Friggens et al. 2018, Romme et al. 2008, Romme et

al. 2009), infrequent high-severity fires and patchy, mixed-severity fires in wooded shrublands, and frequent, lower-intensity fires that maintain grasses and open stand structure in savannas (on WSMR, dominated by oneseed junipers). The low-intensity fires proposed in this EA, and in gray vireo habitat, most closely resemble historical fire regimes in pinon-juniper savannas and wooded shrublands.

In New Mexico, the vireo typically inhabits oneseed juniper savannas at 5,500-7,000 feet in the central and western part of the state, and juniper-oak woodlands and desert riparian communities at 4,300-6,600 ft. in the southern part of the state (Delong and Williams 2006). Gray vireos could occur in any of the proposed treatment areas, but especially the juniper woodlands where prescribed burns, thinning, and chemical treatments are proposed.

The New Mexico Bird Conservation Plan (New Mexico Partners in Flight 2007) recommends that management for Gray Vireos in New Mexico should focus on the protection of existing healthy pinyon-juniper woodlands in order to minimize the impacts of recent and ongoing loss of this habitat to drought and beetle infestation. Areas containing only juniper and a shrub component may provide suitable habitat for Gray Vireos and should be conserved. Specific recommendations include:

- Restrict clearing or wood cutting in areas of healthy and intact pinyon-juniper habitat.
- When and where feasible, initiate restoration of pinyon-juniper habitat. (Note however that where pinyon trees have been eliminated, this will be a long-term endeavor.)
- Maintain 35-45% shrub cover over large areas in middle-aged stands of juniper or pinyon-juniper.

The DoD Legacy program funded Gray Vireo research on WSMR, ARNG Camel Tracks Training Area, and Kirtland Air Force Base in New Mexico (Johnson et al. 2012). Mean territory size was 2.3 ha (L. Wickersham, Animas Biological Studies, pers. comm.). Vireos selected nest sites with more trees and taller trees (3.3 to 4.0 m), but not the tallest trees, compared to available habitat within their territories. Higher tree density at nest sites versus surrounding habitat may help conceal nests from predators and cowbirds and provide more foraging opportunities on leaves, branches and tree trunks close to nests (Johnson et al. 2012). Habitat modeling resulted in 30,074 acres of potential habitat in the northern Oscuras. The current project proposes treating about 20% of this area with prescribed fire, herbicide treatments, and thinning. Surveys in May 2019 resulted in about 65 Gray Vireo detections within the treatment polygons, and three nests found incidentally to presence/absence surveys (L. Wickersham, Animas Biological Studies, pers. comm.). Limited funds precluded surveys outside of treatment polygons, but future surveys will be designed to survey areas both inside and outside of proposed treatment polygons.

WSMR will take the following actions to avoid/minimize impacts to gray vireos in the OMPA:

1. Conduct pre-treatment and long-term post-treatment monitoring for vireo presence/absence, habitat use, and reproductive success. Treatments that occur immediately prior to vireo nesting

season (such as prescribed fires in March or early April) must rely on previous-year survey results to inform planning.

2. Evaluate each proposed treatment via the environmental review process to ensure that measures are incorporated to avoid/minimize impacts to gray vireos, such as:
    - Conduct prescribed burns prior to April or after July, outside of gray vireo nesting season
    - Include a mosaic of treated and untreated habitat, and conduct post-treatment assessments (e.g., number and size of junipers killed) to inform future treatments. Size of untreated habitat should consider gray vireo territory size.
    - Target the elimination of small/young junipers and retain a portion of taller junipers preferred for nesting. Consider that vireos also use areas with higher tree densities compared to surrounding habitat.
    - Buffer areas around known vireo nest trees from treatments.
    - Consider vireo densities across the landscape.
3. Where treatments negatively affect the vireo population, adjust methods in future projects to avoid and minimize impacts to the species.
4. Coordinate review of monitoring and treatment plans with U.S. Fish and Wildlife Service and NM Department of Game and Fish IAW the Sikes Act, WSMR IPMP, WSMR INRMP, and Executive Order 13186 Responsibilities of Federal Agencies to Protect Migratory Birds.

Golden eagle *(Aquila chrysaetos)*-Golden eagles occur throughout WSMR, including wooded habitats such as pinyon-juniper woodland and ponderosa pine (*Pinus ponderosa*) forest. There are four occupied breeding territories that intersect with this project area. Three of the territories have nests on the cliff faces of the escarpment to the west and south of the project area. WSMR biologists do not anticipate that proposed management actions will affect these nests or degrade eagle habitat. Nests in the Bug Peak breeding territory are close to prescribed burn areas flanking Workman Ridge (Appendix C, Figure E). WSMR will ensure that fire activities are located and conducted in such a way as to not modify or destroy eagle nests or disturb eagles.

Mexican spotted owl *(Strix occidentalis lucida)*-There are no known confirmed records of the Mexican spotted owl occurring on WSMR (WSMR 2009 Biological Assessment). A survey of breeding habitat for the MSO (WSMR 2003) concluded that habitat at WSMR is not suitable to support breeding MSOs because: (1) the mountain slopes are not steep enough to support canyon nesting, (2) elevations are not high enough to support the large trees used for forest nesting, (3) where riparian vegetation is apparently adequate, the canyons are either not sufficiently incised or they are isolated from appropriate montane forests, and (4) where canyons are more deeply incised, the trees are too short. However, the forested habitat present at WSMR could potentially support dispersing, wintering, or vagrant owls between fall and spring.

Bat species-Several bat species considered sensitive taxa or Threatened by the State of New Mexico have potential to occur in the project area: Townsend's big-eared bat *(Corynorhinus townsendii)* , spotted bat

(Euderma maculatum) (Threatened), Cave myotis *(Myotis velifer),* fringed myotis *(Myotis thysanodes),* big free-tailed bat *(Nyctinomops macrotis),* long-eared myotis *(Myotis evotis),* long-legged myotis *(Myotis Volans),* western red bat *(Lasiurus blossevilli),* western small-footed myotis *(Myotis ciliolabrum),* and Yuma myotis *(Myotis yumanensis).* The proposed actions are intended to improve forest health, and therefore should be beneficial to bat species that use the OMPA. A best management practice (2.2.1) has been included to prevent disturbance of potential bat roost sites such as caves, trees with loose bark or cavities, and rock crevices. If bat species have potential to occur within treatment areas, these areas will be surveyed by WSMR biologists or by bat experts using accepted survey methods. If bats or bat roosts are encountered by thinning contract personnel they will be avoided and reported to Army PW-E personnel.

3.4.1 Environmental Consequences

3.4.1.1 No Action Alternative

Under the no action alternative there would be no new treatments on Army lands in the OMPA. Changes to habitat and impacts to wildlife on Army land would be through the continuance of current military or civilian actions for military testing/training purposes and from natural events such as lightning caused wildfires or floods.

3.4.1.2 Proposed Actions Common to Alternatives A and B

3.4.1.2.1 Prescribed Burning

Prescribed fire treatments would be implemented on lower elevation sites where burnable fuels are sufficient to allow continuous burning. Over time, prescribed fire would be used as a follow-up treatment to other treatments. Fire creates wildlife habitat through a mosaic of burned and unburned vegetation and by creating variable impacts of light to severely burned vegetated areas which creates opportunities for a variety of new plants to recolonize burned areas and creates high levels of plant diversity. Depending on vegetative composition and burn severity, vegetative and animal diversity may increase or decrease. Through time, after grassland areas are restored, burned areas would add to the overall plant diversity by allowing more forbs and shrubs to become established (Bender 2011).

Some wildlife would be directly impacted by fire (killed, injured, displaced and/or disturbed). Most wildlife would avoid the fire by moving to unburned areas or sheltering in rocks or burrows. There could be some mortality to pre-fledgling birds in nests based on the timing of the prescribed fire but the magnitude of impact would not approach the local population level of any species. There is potential for mortality to bats (especially young bats) if smoke is dense in day or maternity roosts. The fire, aircraft, and human activities associated with the prescribed fire project would result in short-term disturbances to nearby wildlife. Larger mammals such as coyotes and mule deer would typically leave the area when disturbed. Direct kills of smaller mammals because of implementing prescribed fires would be low, although some could suffocate as a result of the smoke and heat. It may be possible that small and large mammal populations could decrease temporarily because of the loss of cover which would make them more

susceptible to predation or due to a loss of immediately available forage. Mammal and reptile populations should recover to or above pre-treatment levels as vegetation recovers. Because fire would result in a mosaic of burned and unburned vegetation, and variably impact plants within burned areas, and because the burn would occur on a relatively small portion of the habitat available within the OMPA, loss of food or cover would not affect any species at the population level (S. Bumgarner, WSMR fire and fuels contractor, pers. comm.)

BMPs for prescribed fire treatments would be included that eliminate or avoid impacts to known SAR. Specific BMPs would be documented in the REC for each project. Successful implementation of grassland restoration would benefit species such as pronghorn, Rocky Mountain elk, prairie dogs, aplomado falcon, Sprague's pipit, Baird's sparrow and pollinators. Project selection, timing and prescriptions would limit negative impacts to species such as Texas horned lizard and various bat species.

3.4.1.2.2. Manual and Mechanical Treatments

Because manual and mechanical vegetative treatment methods do not lend themselves to treating large areas in the OMPA, impacts to wildlife and special status species would be minimal. Treatments would be designed to eliminate or avoid impacts to the extent direct, indirect and cumulative impacts are consistent with federal and State regulations as well as Army policy with regard to SAR. For projects where vehicles and heavy equipment would be used, there is potential for disturbance or mortality to individuals. No impact would approach the population or species level. In some cases, manual treatments would be part of a protective measure incorporated into a fire, mechanical or chemical treatment. Examples might be manual thinning of dense trees to reduce hazardous fuels and to prevent crown fires or building fireline around a water catchment installed for wildlife. Creating firelines, done mainly to protect structures, would be designed to follow existing roads or use natural openings to the extent possible.

3.4.1.3 Proposed Action for Alternative B-Herbicide Application

Herbicide would be aerially delivered within polygons shown in Figure F in Appendix C. Late October or early November would be the targeted time to aerially apply herbicides. This is because there is less likelihood of pellet movement or removal of applied liquid herbicide due to an extreme rain event at this time of year. No federally listed, nor any Army SAR species would be affected by the chemical treatments as the treatment polygons are outside of known Oscura Mountains chipmunk habitat and outside of known Pinyon jay nesting habitat. Project level biological surveys would be conducted prior to project implementation to assure that sensitive or rare plant and animal species would not be adversely affected by the chemical treatment.

The potential direct impacts from herbicide application to terrestrial wildlife include short-term disturbance and displacement of individuals due to aircraft noise and human activities in the area and the potential for effects from exposure to the chemicals. Vehicles and human activity associated with the project would likely result in a short-term displacement of mobile animals and crushing of small plants.

Impacts from vehicles and displacement would be at the individual level and not approach the local population or species level.

Exposure to chemicals could be through ingestion, indirect contact or as a result of runoff, and accidental spill. Direct chemical effects depend on the sensitivity of each species to the chemical used, differences in sensitivity among individuals (life stage), rate and degree of exposure and pathway of exposure. Indirect chemical impacts would vary with the degree to which a species or individual was positively or negatively affected by changes in habitat.

The Bureau of Land Management completed a Programmatic Environmental Impact Statement (PEIS) to analyze the potential for impacts of herbicide use on BLM managed public lands (USDI 2007). The analysis included ecological risk assessments. The risk assessments analyzed endpoint effects of herbicides including mortality levels to wildlife as well as effects on plant and animal growth, reproduction and other ecologically important sub-lethal processes. A variety of exposure scenarios were considered in order to assess both acute and chronic effects (direct spray of individual or water body, indirect contact with foliar residue, ingestion of contaminated food items, off-site drift of spray, surface runoff, deposition of contaminated dust and accidental spills to water bodies). Information used in the analysis consists mostly of toxicity studies conducted in conjunction with the EPA pesticide registration process. The PEIS described specific risks from specific herbicide exposure (USDI 2007).

The BLM PEIS (p 4-84) (USDI 2007) concluded that "tebuthiuron may have a moderate residence time in water bodies (over 1 year in anaerobic conditions). Under an accidental spill scenario, tebuthiuron would pose a low risk to fish and aquatic invertebrates in ponds. Accidental direct spray of tebuthiuron over a pond would pose a low chronic risk to aquatic invertebrates, and accidental direct spray over a stream would pose a low to moderate chronic risk to aquatic invertebrates. Fish are not at risk from accidental direct spray. Off-site drift and surface runoff of tebuthiuron does not pose a risk to fish or aquatic invertebrates. If tebuthiuron is applied at the typical application rate, under normal application scenarios, it is likely to have little or no impact on fish or aquatic invertebrates". Tebuthiuron application to aquatic habitat is not a part of the proposed action. Timing of application, slope restrictions and buffers around aquatic habitat included in the proposed action largely negate the potential for impacts to aquatic or riparian species.

The use of pelleted forms of herbicides reduces the potential for exposure and ingestion scenarios relative to liquid applications. This factor combined with design features including timing for gentle rainfall, slope restrictions, and inclusion of buffers around important wildlife habitat can reduce the potential for impacts to animals.

The potential for indirect impacts to wildlife and to special status species is through changes to vegetation over time. With successful implementation of herbicide treatments and subsequent treatments utilizing prescribed fire, vegetation would transition from shrub dominated with relatively large areas of bare soil to grass dominated with smaller bare soil interspaces, higher herbaceous canopy cover and more

herbaceous species diversity. In general, grassland adapted wildlife species would benefit and shrubland adapted species would be negatively affected (pers. comm. G. Alpers 2018).

Successful implementation of herbicide treatments would set the stage for follow-up treatments using prescribed fires and would also increase the potential for wildfires, both of which would help to maintain grassland habitats while also resulting in increased herbaceous diversity and continuity within the treatment area. Ongoing military and civilian land uses could potentially negate the re-establishment of historic fire regimes on a large scale in the OMPA. In the long term, habitat in the OMPA would likely be the result of continual artificial manipulation by herbicide, mechanical treatments and/or prescribed fire on a repeated basis. Even so, the proposed action would set the stage for a conversion and maintenance cycle that would ultimately benefit many grassland-dependent wildlife species (pers. comm. Bumgarner 2018).

3.5 Air Quality

3.5.0 Affected Environment

The air quality of the OMPA is considered to be very good and is designated a Class II air quality area. A Class II area allows for moderate amounts of short-term degradation of air quality. The primary source of air pollution in the region is pm10 dust (particulate matter that is airborne and <10 microns in size) generated off-site during high wind events, common during the spring months in New Mexico (WSMR 2015).

Air Quality and smoke management are regulated by the New Mexico Environment Department's Air Quality Bureau. For prescribed fires, a prescribed fire plan is developed to guide managers when air quality conditions are favorable for minimizing smoke impacts to the public and to implement BMPs to reduce smoke emissions (i.e. only burning under forecast conditions of good or excellent smoke dispersal; burning when fuel moistures are low to get rapid consumption and less smoldering).

3.5.1 Environmental Consequences

3.5.1.1 No Action Alternative

Implementation of the no action alternative would have no effects on current air quality.

3.5.1.2 Proposed Actions Common to Alternatives A and B

3.5.1.2.1 Prescribed Burning

Preparation of firebreaks, pre-burn scouting and off-road vehicular travel could result in some disturbance to ground and would result in a small increase in airborne dust. Ignition of vegetation would create smoke. After prescribed fire operations are completed, areas where ash was created from burned vegetation

combined with soils made bare from loss of litter cover and vegetation would become vulnerable to wind erosion. This effect would create short-term impacts to air quality by contributing to particulate matter in the air.

As vegetative communities responded to the treatment, it is expected that within one to three years, increased vegetative ground cover would reduce windborne dust potential to below pretreatment levels.

3.5.1.2.2 Manual and Mechanical Treatments

Manual thinning treatments of cutting trees and dragging slash would result in some disturbance to the ground and a small, temporary increase in windborne dust. The use of heavy equipment would allow for treatment of larger areas but would create greater disturbance to the soil as well as a correspondingly larger potential for windborne soil over longer periods of time.

As vegetative communities respond to the treatments over one to five years, increased vegetative ground cover would eventually reduce the potential for windborne dust to below pre-treatment levels.

3.5.1.3 Proposed Action Alternative B-Herbicide Application

The application of a pelleted herbicide would be executed by mechanical methods and would not have any effects on air quality. Application of a foliar herbicide would affect air quality for a short time over the area being sprayed. Over time, as the herbicide causes mortality in targeted juniper trees, some dust may be generated from areas underneath the trees as needles brown and fall from the plant and the soil is exposed to wind events. Within three years' time after defoliation, it is expected that herbaceous vegetation would fill in those open spaces and new vegetative cover would reduce wind-borne erosion and dust to below pre-treatment levels.

3.6 Water Resources

3.6.0 Affected Environment

The major drainages within the OMPA are ephemeral. Running or standing water occurs only after precipitation events. There are no large perennial surface waters within the proposed treatment area. Large bottomlands and draws found throughout the area can briefly carry substantial amounts of water during high rainfall events causing runoff and flooding. There are a number of small riparian areas within the OMPA, mostly associated with small springs, narrow, rocky canyon bottoms where ground water is forced close to the surface and collects in tinajas, earthen water impoundments (tanks) and wells constructed for livestock and also used by wildlife. Reported well depth information indicates groundwater levels are typically over 100 feet below ground surface.

The OMPA drains into closed basins, with the eastern component draining into the Tularosa Basin and western and northern portions of the planning area draining into the Jornada del Muerto Basin.

3.6.1 Environmental Consequences

3.6.1.1 No Action Alternative

Implementation of the no action alternative would not change current impacts to water resources. Soil erosion would continue to degrade topsoil, vegetative cover of junipers would increase and herbaceous ground cover would continue to decrease leading to increased soil erosion, deeper and more incised arroyos and decreased percolation of water into the soil.

3.6.1.2 Proposed Actions Common to Alternatives A and B

3.6.1.2.1 Prescribed Burning

Prescribed burns would temporarily create bare ground areas that would have increased potential for soil erosion during surface water runoff. As revegetation occurs on burned areas over one to two years post-burn, bare areas would decrease in size to less than pre-treatment levels, leading to improved groundwater infiltration.

3.6.1.2.2 Manual and Mechanical Treatments

Manual treatment would be carried out in relatively small areas within meadows, alongside existing roadways, or to create small openings in juniper stands on ridges and hillsides. This BMP of creating numerous small openings would reduce the overall potential impacts of removing vegetation. There would be negligible impacts to water infiltration rates. Soils would be loosened and disturbed by manual means of vegetation removal and creating piles leading to potential for moving soils offsite by large rain events. Another BMP would be to leave cut materials in place (lop and scatter) onsite to reduce soil disturbance.

The use of machinery to remove shrubs would produce similar, but greater impacts. The increase in bare ground patches would add to the potential for short-term erosion and decreased surface water quality. Water does not percolate as well or as quickly into bare soils as it does into ground with vegetation. Ground water would not be recharged as rapidly as when vegetation is present.

All of these effects would continue to some extent until sufficient ground cover becomes reestablished, generally within 1-5 years from initial disturbance.

3.6.1.3 Proposed Action Alternative B-Herbicide Application

A buffer area of a minimum of 100 meters would be designated around all water impoundment structures prior to application of herbicide, to ensure that dirt tanks and wells are excluded from chemical treatments. Canyon and swale bottoms would also be buffered for a minimum of 100 meters and not be treated with herbicide, to reduce the potential for damage to riparian vegetation.

After treatment, pelleted herbicide could be displaced through surface runoff, should an intense rainfall event occur shortly after application and before the pellets have dissolved into the soil. A BMP for

herbicide application would be to avoid application during the monsoon season when such storms are likely and herbicide would only applied to relatively flat ground or on <20% slopes.

Foliar herbicide is absorbed by the plant through its leaves or needles and residual herbicide dries completely within a few hours. Oils left on the exterior of the plant are inert and non-toxic to soils or other plants if washed off the target species. Applications would only occur during days when no precipitation is predicted and when winds are predicted to be light, <8 MPH.

Wells in the proposed treatment area are few but are deep enough below the ground surface to preclude contamination by herbicide through the soil profile. There is also very low potential for herbicide to percolate into groundwater aquifers as they are deep below the grounds surface. Over the long-term, increased herbaceous ground cover would slow runoff and allow for greater infiltration of water into the soil.

3.7 Human Health and Safety

3.7.0 Affected Environment

Hazardous activities performed on WSMR are subject to applicable Army regulations, appropriate levels of risk analysis and review, and appropriate levels of approval. WSMR plans test events and other hazardous activities to carefully meet requisite Army ground and flight safety criteria. Radio frequency operations are coordinated, and applicable frequency assignments and limitations are established prior to use.

The primary safety issues associated with the proposed actions include those inherent to human activities for ecosystem management including: thinning, prescribed fire operations, and operation of heavy and light mechanical equipment. These safety concerns include, but are not limited to:

- Work-related risks and hazards associated with heavy equipment, power tools and machinery;
- Vehicle accidents;
- Exposure to venomous animals;
- Exposure to burning vegetation and smoke;
- Exposure to UXO;
- Exposure to steep, rocky, loose terrain.

The safety policy of WSMR is to take every reasonable precaution in the planning and execution of all operations that occur on WSMR to prevent injury to people and damage to property. This involves implementing extensive measures for risk mitigation, as well as increased range control and patrol in areas determined to have risks to public and employee safety.

3.7.1 Environmental Consequences

3.7.1.1 No Action Alternative

Under the no action alternative, there would be no new treatments completed in the OMPA. Range activities would continue as previously conducted and there would be no new impacts to health and human safety.

3.7.1.2 Proposed Actions Common to Alternatives A and B

3.7.1.2.1 Prescribed Burning

Environmental consequences to health and human safety from prescribed fires can be direct effects to firefighters of burning skin or airways which can lead to serious injury or death if there is prolonged or excessive exposure. Less serious injuries from fires can occur such as 1st and 2nd degree burns to skin and smoke inhalation leading to bronchial diseases or simple lung irritations. Other risk factors while conducting prescribed fires include hazards of walking on uneven, loose, rocky ground, use of sharp edged or pointed handtools, gasoline or oil spills, driving on dusty, rough roads, trees falling from burned-out root systems, dust, noise from chainsaws, pumps or other motors, excessive heat and dryness and hypothermia. All prescribed fires are required to have a written plan that includes a detailed risk analysis with mitigations to reduce the risks. If it is determined that risks cannot be mitigated then the prescribed fire is not undertaken as firefighter safety is priority #1 and is not compromised.

Indirect effects of prescribed fires to the human environment include unhealthy levels of smoke over population centers. This is not an issue with prescribed fire in the OMPA due to its remote location. There may be smoke issues in terms of reduced visibilities leading to hazardous driving conditions along US Highway 380 in vicinity of Bingham and Chupadera Mesa. There may be short-term health issues in terms of smoke inhalation of particulate matter to firefighters, within persons living on private ranches around the northern boundaries of WSMR, and to other persons scattered across the northern part of WSMR. Respiratory smoke effects would be of relatively short duration and burning would not occur on days that are determined by the NM Environment Department to be poor smoke dispersal days. Burning would not be constrained by wind direction except when burning atop the Oscura Mountains where easterly winds would constrain burning. This is due to facilities located atop the Oscura Mountains which are all proximal and west of where burning would occur and could be negatively impacted by smoke drift from the east from prescribed fires.

3.7.1.2.2 Mechanical and Manual Treatments

Direct effects to human health and safety from mechanical and manual vegetative treatments would be hazards to workers operating specialized equipment. Chain saws, handtools and heavy mechanical equipment are inherently dangerous if not operated according to safety guidelines. Loss of life or limbs can occur from operating tools improperly. Risks of injury can be mitigated through proper training and

consistent use of personal protective equipment (PPE) including chainsaw chaps, hearing protection, hardhats, gloves, 8" high boots or taller, eye protection and long sleeve shirts and pants.

Indirect negative health effects from operating equipment are breathing exhaust fumes and handling corrosive materials such as gasoline and oils over long periods of time. These effects can lead to decreased pulmonary functions or could be causal agents for certain types of cancers in workers. Mitigations include proper use of PPE mentioned above plus proper use of respirators or dust masks as the situation dictates.

3.7.1.3 Proposed Action Alternative B-Herbicide Application

Herbicide application activities would comply with all Army and WSMR policies and procedures to minimize potential health and safety hazards. Chemical material spills would be reported immediately to WSMR PW-E. Accident reports would be submitted documenting measures taken or proposed to minimize impacts and/or to prevent recurrences.

Tebuthiuron, whose systematic name is N-(1, 1-dimethylethyl)-1, 3, 4-thiadiazol -2-y1)-N, N'-dimethylurea, is an off-white to buff colored crystalline solid with a pungent odor. Tebuthiuron has been successfully formulated with kaolin clay sources for efficiency and storage stability and is applied as a small pellet directly onto the soil, most often using a calibrated applicator mounted to a fixed wing aircraft. The clay pellet dissolves with precipitation and the herbicide percolates into the soil where it is taken into the plant by the roots and translocated to the leaves where it inhibits photosynthesis.

Aerial application of the pellets or foliar spray would involve setting up a staging area, where the pellets or liquid would be loaded into the aircraft. The staging area would be located as near as possible to the application site and aircraft might use existing roads as landing strips. Roads would be blocked during take-offs and landings. The staging area would probably receive small amounts of herbicide dust from pellet loading process; however, a single exposure is not likely to result in the chemical being absorbed through the skin in harmful amounts (MSDS 2009). Recommendations for handlers of Tebuthiuron include: in dusty or misty atmospheres, use an approved particulate filter respirator; for skin protection, use clean body-covering clothing; for eye/face protection, use chemical goggles.

Ground application of tebuthiuron would involve use of an ATV and one or two riders who would distribute 4-8 pellets around the dripline of each targeted juniper. Larger junipers would receive more pellets. This method would be more labor intensive and take much more time but is very selective and can target individual plants.

Potential health effects to human handlers, including possible adverse effects, can occur if this material is not handled in the recommended manner. Tebuthiuron may cause slight temporary eye irritation. Dust may irritate eyes. First aid is to immediately flush eyes with water; remove contact lenses, if present, after the first five minutes, then continue flushing eyes for 15 minutes. Obtain medical attention without delay,

preferably from an ophthalmologist (MSDS 2009). There are not likely to be adverse effects from prolonged skin exposure. If irritation occurs, wash skin with plenty of soap and water (MSDS 2009).

Tebuthiuron can cause moderate toxicity if swallowed. Small amounts swallowed incidentally as a result of normal handling are not likely to cause injury; however, swallowing larger amounts may cause serious injury, even death. Swallowing may result in gastrointestinal irritation. First aid for ingestion is to induce vomiting immediately and consult a physician (MSDS 2009).

Inhalation of dust or vapors from tebuthiuron is not likely to be hazardous if at normal daytime temperatures. First aid for inhalation that causes irritation is to move the person to fresh air; if effects occur or continue consult a physician. There is no specific antidote for tebuthiuron. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient (MSDS 2009). Precautions to be taken by handlers include washing skin thoroughly with soap and water after handling and before eating or drinking and washing exposed clothing before using again (MSDS 2009).

3.8 Land Use

Land use, as addressed in this EA, refers only to US Army lands within the borders of WSMR. Within these borders are several special use areas which occur in the Oscura Mountains planning area and are managed differently than other lands due to their sensitivities.

3.8.0 Affected Environment

3.8.0.1 Military Land Use

WSMR developed a Land Use Classification system to assist in planning range use. The classifications primarily reflect the administrative status of land areas and overlying airspace and the associated limitations on use (WSMR 2009). The *Final Environmental Impact Statement (FEIS) for Development and Implementation of Range-Wide Mission and Major Capabilities at WSMR* lists 17 discrete Land Use Classifications involving combinations of land status and airspace designations at WSMR.

The FEIS (WSMR 2009) provides an overview of the Land Use Classifications for the WSMR lands. The project areas associated with the OMPA fall under Land Use Classification C, *Augmented Test Zone*, with the exception of the Red Rio Bombing Range which falls under Land Use Classification D, *Impact Area*. All proposed activities would be consistent with WSMR's Land Use and Airspace Strategy Plan ([LUASP] Appendix B, WSMR 2009) and would follow the siting and review process provided in Section 6 of the FEIS. Sensitive species and specialized areas would be avoided to the fullest extent feasible.

Land Use Classification C, *Augmented Test Zone*, supports a wide variety of test and management activities, including airborne and surface-based weapons firing, impact zones, and danger zones, directed energy systems, aircraft operations, dismounted operations, communications and instrumentation, field

operations, and off-road travel using all types of vehicles (heavy/light, tracked/wheeled). Activities in this Land Use Classification can be constrained by a variety of environmental or operational factors. For example, certain safety buffers, such as around munitions storage facilities, are in effect continuously and preclude siting or occupation of other facilities. The large safety buffer associated with The Red Rio Bombing Range is temporary, lasting only for the duration of aerial bombing operations, thus allowing for multiple uses at other times (WSMR 2009) (Figure 2).

Land Use Classification D (*Impact Area*) lands, such as the Red Rio Bombing Range, are known to contain duded high-explosives rounds and are not compatible with any ground activity other than explosive ordnance disposal (EOD) and data recovery. Adjacent areas are subjected to noise, smoke, dust, and an increased potential for wildfires (WSMR 2009).

3.8.0.2 Recreational Land Use

Hunting within the OMPA is conducted for recreation and wildlife population management. Since the 1950s, WSMR and NMDGF have cooperated to conduct hunts for big- and small-game animals across WSMR. Big game available for hunting on WSMR include oryx, desert bighorn sheep, Rocky Mountain elk, mule deer and mountain lion. Small-game species include furbearers, upland game birds, waterfowl, and non-protected species. Recreational hunting is authorized on WSMR only so long as it does not interfere with WSMR mission-related activities. To avoid conflict with military testing and training events, big game hunts are typically conducted on weekends and scheduled well in advance, although small game hunting is allowed during non-mission days in accordance with New Mexico laws.

Hunting on WSMR occurs in compliance with state and federal laws, NMDGF regulations, and WSMR regulations. A Department of Army Memorandum Garrison Policy Letter #12: *White Sands Missile Range Installation Hunting Program* (WSMR 2016) addresses responsibilities, policies and procedures, safety and security issues, and methods, means, and access for hunting on WSMR. Hunting on WSMR is authorized and regulated in accordance with WSMR, state, federal, and Army and Range regulations and policies. Hunting seasons, dates, areas, closures, species, licensing, weapons restrictions, and bag limits are primarily established by and in compliance with state regulations. WSMR is closed to fishing, sport trapping, and hunting for black bear, Barbary sheep, and turkey. The collection and/or killing of reptiles and amphibians are prohibited (WSMR 2016).

Restricted Access Hunts are available only to WSMR personnel who have long-term up-range access authority and have a Range Hunting Permit, and to guests who are escorted by volunteers that are properly permitted. Restricted access oryx hunts are conducted to reduce animal numbers in remote areas of the range including within the OMPA (WSMR 2016).

Other limited and restricted recreational opportunities exist within the OMPA. These activities are generally restricted to weekends and include guided group tours led by WSMR personnel for hiking, cultural site visits and wildlife and plant viewing.

3.8.1 Environmental Consequences

3.8.1.1 No Action Alternative

Under the No-Action Alternative, there would be no new land use impacts.

3.8.1.2 Proposed Actions Common to Alternatives A and B

Effects or impacts to military or recreational land uses from manual, mechanical or prescribed fire treatments would be short-term and small-scale. The project area's footprint would be closed to military or recreational activities while thinning, cutting, grubbing, masticating, and burning or dam building was ongoing. Treatment activities will be difficult to schedule if planned within the footprint of the SDZ for Red Rio Bombing Range due to needing several days to complete these treatments and the ongoing, almost daily use of Red Rio by Holloman AFB aircraft. During prescribed fire operations there would be increases in off-site smoke for short durations which could affect visibility for test missions atop the Oscura Mountains and to aircraft maneuvering around Red Rio Bombing Range.

Long-term effects to land uses would be virtually non-existent. Some hunting opportunities may be enhanced due to increased herbivore use in thinned or cleared areas. Newly created openings and clearings could attract some species of birds, small mammals such as gophers and mice, and pollinators due to an increase in diversity of herbaceous plants in these areas.

3.8.1.3 Proposed Action Alternative B-Herbicide Application

Effects to WSMR land use from application of chemical herbicide would be short-term. There would likely be 1-2 days that aircraft would be flying and disseminating the herbicide. Some of the area treated by chemical would fall within the Safety Danger Zone (SDZ) for Red Rio Bombing Range. Air Force training missions at Red Rio would be a priority over the chemical treatment. Proponents for this treatment would have to work with Holloman Range scheduling to find days that do not conflict with use of Red Rio Bombing Range. WSMR test missions would also be a higher priority than this treatment so working with WSMR Range Scheduling to schedule treatments around missions is critical.

Once the herbicide is distributed there would be no other direct effects to land uses by WSMR or recreationists. Indirect effects would be long-term as junipers would slowly die and other herbaceous vegetation would begin to grow. Hunting opportunities would be enhanced in these treated areas due to farther sight pictures for hunters and an increased heterogeneity in the plant community leading to increased herbivore use. There would be no long-term effects to military or civilian test or training missions from the chemical treatments of juniper.

3.9 Cultural Resources

Cultural resources include prehistoric and historic sites, structures, artifacts, and districts that depict evidence of human activity considered important to any culture, subculture, or community. Cultural resources consist of archaeological resources, architectural resources, and traditional cultural properties.

Archaeological resources consist of the material remains of prehistoric and/or historic human activity. The Archaeological Resources Protection Act of 1979 (ARPA) defines archaeological resources as "pottery, basketry, bottles, weapons, weapon projectiles, tools, structures or portions of structures, pit houses, rock paintings, rock carvings, intaglios, graves, human skeletal materials, or any portion or piece of any of the foregoing items".

Traditional cultural properties may include archaeological resources, architectural resources, topographic features, plant and animal habitat, and any other inanimate object deemed essential to the continuance of a traditional culture by Native Americans and other groups.

Section 101(d)(6)(B) of the National Historic Preservation Act (NHPA) requires federal agencies to consult with Indian tribes that attach religious or cultural significance to historic properties. Compliance with 36 CFR 800.2, which implements consultations with Native Americans, may be conducted by federal agencies as part of a government-to-government undertaking.

In accordance with Section 101(b)(3) of the Act, State Historic Preservation Officers (SHPO) advise and assist federal agencies in carrying out their Section 106 responsibilities and assist agencies, organizations, and individuals to ensure that historic properties are taken into consideration at all levels of planning and development. In New Mexico, the SHPO is the director of the New Mexico Historic Preservation Division (HPD) of the Department of Cultural Affairs. Consultation between WSMR and SHPO is an ongoing process regarding actions taken at WSMR.

3.9.0 Affected Environment

The WSMR INCRMP (WSMR 2015) provides a comprehensive treatment of the historic context and documented cultural resources on WSMR. Approximately 25 percent of the 2.2-million acre missile range has been surveyed for the presence of cultural resources. These efforts have documented about 7,100 archaeological sites demonstrating at least 12,000 years of human occupation in the area (WSMR 2015). Documented sites include Native American sites, historic mining sites, homesteads, ranches, trails, and sites related to the military presence in the area (WSMR 2009).

Significant cultural resources are found in the OMPA. These include, but are not limited to, Archaic camping sites, the remains of pit house structures, lithic scatters from Archaic times to late 1800s Apache, historic mining and ranching sites, and historic military properties.

Each individual project would have a REC submitted so that impacts to cultural resources can be assessed. Surveys for Cultural Resources would be performed prior to implementing clearing and thinning projects. If historic properties exist within the proposed project area that are eligible to the NRHP, then they would be avoided or mitigated.

3.9.1 Environmental Consequences

3.9.1.1 No Action Alternative

Under the no action alternative, current management of protection and cataloging of cultural resources would continue. There would be no added impacts to cultural resources.

3.9.1.2 Proposed Actions Common to Alternatives A and B

3.9.1.2.1 Prescribed Fire Treatments

Prescribed fires and their management have undesirable impacts upon cultural resources ranging from destruction or damage to displacement through erosion. The level of cultural survey and any mitigation measures required depends on fuel load as well as other factors that contribute to the intensity of the burn. Cultural resource surveys would be considered on a project-by-project basis to avoid or minimize impacts to significant resources.

3.9.1.2.2 Manual and Mechanical Treatments

Site specific cultural resource inventories will be conducted prior to any ground disturbing activities and any impacts to cultural resources will be avoided or mitigated. Mechanical treatments, such as the use of a masticator for removing trees and brush would be likely to impact cultural resources through damage and displacement of the archaeological record and would require a site-specific cultural survey. Road improvements and/or erosion control work that involves the use of heavy equipment would require a cultural survey of the area to be impacted.

Manual treatments of tree and shrub cutting followed by lop and scatter of slash, being small scale and low ground-disturbing impact, may not have effects to cultural resources and may or may not require a site-specific cultural survey. However, tree falling, limb dragging and piling could disturb cultural artifacts and should have some level of cultural survey completed prior to implementation.

3.9.1.3 Proposed Action Alternative B-Herbicide Application

Aerial or manual application of pelleted tebuthiuron or foliar sprays would not have a direct impact upon cultural resources. The pellets would simply bounce off of any cultural features as they fall from the airplane. Once on the ground they offer no adverse effects to cultural resources as they dissolve and enter the soil horizon after precipitation. Foliar sprays would soak into porous material and evaporate quickly from non-porous surfaces. The increase in ground cover and reduction of soil erosion following treatment would offer additional protections for cultural resources in the long term.

3.10 Facilities

Facilities include the full array of man-made structures, including antennas, power lines, fences, towers, windmills, bunkers, observation posts, observatories, warehouses, offices, laboratories and roads. All of these facility types are found in the OMPA.

3.10.0 Affected Environment

Most of the facilities within the OMPA are protected from wildfire effects due to their construction materials, their siting on concrete or cleared pads, or their locations within low fuel loads. Power lines are an exception and many power poles and electric lines are at risk in a severe wildfire. Powerline corridors or right-of-ways are the responsibility of the local power supplier. At-risk facilities include all of the structures and infrastructure located atop North Oscura Peak. Facilities at Jim Peak are susceptible to wildfire damage. The boundary fence along the north perimeter of WSMR is at risk of damage from wildfires. Facilities at Red Rio Bombing Range are at risk from wildfire damage. These facilities are owned by the US Air Force. Protection responsibility lies with Holloman Air Force Base and their personnel have conducted prescribed fires in the past to reduce hazardous fuel loads.

During years of above average precipitation, weeds and grasses can grow sufficiently to create a higher than normal flammable fuel hazard and risk to nearby structures once these plants have cured and dried. Protection of these facilities from wildfire effects should be the responsibility of the users or owners of these facilities (IWFMP 2018). Actions of mowing, weeding, raking, grubbing or chopping should be accomplished yearly by facility tenants or owners to keep flammable fuels from accumulating near facilities. Actions proposed within this EA are designed to help further protect facilities located within the OMPA from effects of a severe wildfire.

3.10.1 Environmental Consequences

3.10.1.1 No Action Alternative

Under the no action alternative, current management practices would continue. Flammable fuels would continue to build up around facilities making them susceptible to damage from wildfires.

3.10.1.2 Proposed Actions Common to Alternatives A and B

3.10.1.2.1 Prescribed Fire Treatments

Prescribed fire treatments in vicinity of facilities would be, by design, small in size and limited in intensity in order to safely protect facilities. Prescribed fires should not be included as a treatment option for powerline corridors as smoke can easily cause powerlines to arc between wires causing power outages.

Pile burns are the safest way to treat fuels with fire in the vicinity of structures. Broadcast burns and burns within lop and scatter areas would burn with greater intensity and be harder to contain during windy

conditions. Monitoring of broadcast fires would likely take more time than burning slash piles due to the longer residence time of fire moving across the landscape.

Burning slash in piles creates sterile soils directly under the burn pile which, in turn, creates places where plants are slow to recolonize. Smoke effects are minimized by pile burning as piles burn hot and fast. Broadcast burning creates more smoke than pile burning and can affect visibilities and cause respiratory problems in humans if the smoke persists for long periods of time.

3.10.1.2.2 Manual and Mechanical Treatments

Tree thinning using chainsaws would accomplish fuels reduction in vicinity of facilities. Thinning prescriptions within the OMPA should include criteria to leave the largest and healthiest piñon pines intact. Thinning treatments designed to protect facilities would include slash treatments as part of the project design. Slash would be pulled away from the crown spread of leave trees. Slash piles require a lot of personnel time and effort to construct so a combination of piles and lop and scatter would be the most desirable way to treat slash. Piles would be done in areas adjacent to facilities (from facility edge to about 100 feet out) and lop and scatter of slash done further away from the facilities.

A masticator could be used to thin portions of treatment areas where slopes are not over 30% and in areas close to roads. Slash would be scattered by the masticator head to be uniform in depth as much as possible across the unit.

Foot traffic, falling trees and dragging slash would create soil and wildlife disturbances, but effects would be short-term. Thinning would create openings and a subsequent vegetation response that would help to heal any soil erosion and would help draw wildlife back into these areas. The same effects would be true for mechanical treatments. The main difference would be that any areas that would be treated by machinery would need to be surveyed by cultural specialists due to the amount of soil disturbance that the machinery would cause across the thinning unit.

3.10.1.3 Proposed Action Alternative B-Herbicide Application

Herbicide could be used to treat fuels around facilities but the resultant slash and standing dead vegetation would need to be removed. Herbicides would take months to years to reduce flammable fuels. Therefore the use of chemical applications to protect facilities is not a realistic, viable option. Manual and mechanical methods can accomplish the objective of protecting facilities much quicker.

Herbicide use under powerlines is a common way to reduce vegetation within these corridors. However, powerline corridor maintenance is usually the responsibility of the power company that owns the utility and treatments should already be occurring in these areas. If, in the course of administering projects under the life of this EA, it is found that powerline corridor treatments need to be done, then manual methods of cutting and removing the resultant slash may need to be accomplished. This action would need to be negotiated with the entity responsible for powerline maintenance.

Chapter 4 Mitigation Practices to Minimize Adverse Environmental Effects

Best Management Practices (BMPs) are included as ways to minimize the adverse effects of implementing any of the action alternatives. The no-action alternative needs no new BMPs since management would remain as it currently exists with existing BMPs already in place.

4.1 Best Management Practices Included in Alternatives A and B

Each proposed project would include a number of features to minimize negative impacts and ensure that project treatments are consistent with the BMPs listed below. However, due to the large scope of this EA in terms of geographic area, variety of soil types, variety of vegetative communities, number of types of treatment considered, relatively high density of prehistoric and historic resources, high diversity of wildlife and variety of resource uses, it is impractical to produce a comprehensive list of every BMP that might be incorporated into any given project.

1. Each proposed project would be reviewed through the environmental review process to ensure potential impacts to cultural and natural resources have been analyzed, environmental compliance is met, and levels of impact are consistent with relevant existing NEPA analyses.
2. Each proposed project will include details on treatment objectives, methods proposed, current tree species and densities, target tree species and densities, and measures included to avoid/minimize impacts to sensitive species such as the gray vireo, pinyon jay, and Oscura Mountain chipmunk.
3. Each proposed project would be evaluated with regard to potential for impacts from a current list of Army Species at Risk (SAR). No treatment would be implemented that is not consistent with current Army policy for SAR.
4. The appropriate level of cultural resources inventory would be determined by the processes described in the NHPA. Protective measures would be incorporated into the project design as appropriate to ensure compliance with the NHPA, the INCRMP and the SHPO.
5. Past historic Pinyon jay nest areas would be left intact and buffered by leave trees for 500 meters. No treatments would occur during the breeding season.
6. Conduct pre-treatment and post-treatment monitoring for sensitive species such as the gray vireo, pinyon jay, and Oscura Mountain Colorado chipmunk. Monitor presence/absence, habitat use, and reproductive success of the gray vireo. Where treatments negatively affect sensitive species, adjust methods for future projects to better avoid/minimize impacts.
7. Project activities would be postponed during wet periods, when soil is too wet to support construction equipment in order to minimize soil disturbance. If equipment creates ruts in excess of four inches deep, soil shall be deemed too wet to adequately support construction equipment.
8. Weed-risk considerations to prevent the spread and introduction of invasive and/or noxious weeds would be followed, including washing heavy equipment before being transported into the project area.

9. Existing roads would be utilized, to the maximum extent possible, to accomplish the project objectives. Appropriate measures would be taken to insure that new vehicle ways are not created as a result of this action, and all disturbed areas would be rehabilitated to the extent possible, back to their natural state.
10. All prescribed fire projects would be conducted in accordance with a burn plan developed for that specific project.
11. Fire-killed trees will be left standing, which provide foraging, perching, and nesting sites for birds (Gillihan 2006), unless the tree poses a safety risk of falling to humans or nearby structures.
12. Monitoring for prescribed fire, mechanical and manual treatments would be treatment specific, but designed to assess success or failure of the treatment.
13. All project treatment areas would be monitored to ensure noxious/exotic plant species do not become established. Where identified, control measures would be immediately implemented.
14. SAR Plants: All proposed project treatment areas where habitat or other information suggests possible presence of SAR plants would be surveyed prior to treatment for occurrence. Site and treatment specific buffers or other protective measures (e.g. burning when plant is dormant) would be established to ensure SAR plants are not negatively impacted beyond acceptable levels. Acceptable level of impact would be determined as per regulations and policy (e.g. Consultation with FWS where a federally listed plant may be affected).
15. Off-Road Travel: ATVs and UTVs should stay on roads as much as possible and walk within areas off roads. When ATV's or other vehicles are necessary for off road travel for planning, mapping, or carrying tools and supplies on the project, travel would occur only on dry soil surfaces to minimize soil compaction and tire ruts. Creation of new trails would be avoided by not driving the same track over and over.
16. Treatment Shape: Treatments would be designed to minimize impacts to visual resources by avoiding straight or block shapes.
17. Monitoring: Monitoring studies would be established for vegetation treatments. Data would be collected to assess the degree to which the treatment meets the key goals of watershed and habitat improvement. Workload associated with monitoring treatment would be contingent on staffing levels and funding availability
18. All slash piles would be kept small and tightly compact with piled vegetation to minimize size of soil sterilization when burning.
19. Masticator slash would be scattered by the machine and left to decompose naturally. Masticator slash would not be piled deeper than 2'' above the ground's surface. This is so that new seedlings will be able to emerge easily through the slash.
20. Slash within 50' of an arroyo would be dragged and placed in the arroyo to catch silt and reduce soil erosion.
21. No piñon pines would be cut within 150 meters of the Oscura escarpment to conserve habitat for the Oscura Mountains chipmunk *(Neotamias quadrivittatus oscuraensis).*
22. Avoid hot or severe burning prescribed fires by burning within prescriptions that call for cool-season burning during winter or early to mid-spring.
23. Exclude riparian areas from prescribed fire. These areas can generally be protected from fire effects by igniting fires mid-slope, above and around the footprint of riparian areas.

24. UXO training is required for all personnel working on WSMR ranges including contractors. UXO training must be documented and signed by all personnel receiving training.
25. Care should be taken will all possible methods to clear land as there is a mix of direct buried and aerial communication cable in the area, mostly near range roads in the right of way. If any excavation is necessary contact Danny Apodaca at (575) 678-3901 or 312-2501 for a cable locate.
26. Personnel will be taught to identify and instructed to avoid disturbance of potential bat roost sites such as caves, trees with loose bark or cavities, and rock crevices. If bats or bat roosts are encountered by personnel they will be avoided and reported to Army Environmental personnel.

4.2 Best Management Practices for Alternative B-Chemical Treatment

1. All herbicide treatments would be applied as per the label, the Material Safety Data Sheet (MSDS) and State law.
2. Monitoring would be established on each project to assess the degree to which the chemical treatment meets the key goals of watershed and wildlife habitat improvement. Parameters measured to infer success would include basal cover and species composition.
3. Desirable Plant Buffers: No herbicide application would be permitted within 100 meters of areas containing desirable native trees or shrubs such as mountain mahogany, ceanothus, little-leaf sumac *(Rhus microphylla),* skunkbush sumac *(Rhus trilobata),* desert willow *(Chilopsis linearis),* netleaf hackberry (*Celtis reticulata*), oaks *(Quercus spp.),* cottonwood *(Populus spp.)* and/or other important wildlife habitat vegetation susceptible to the herbicide. Each treatment would be designed to buffer important habitat inclusions to ensure minimum impacts to local wildlife populations.
4. Raptor Nest Buffers: No herbicide application would occur within 100 meters of any stick nest if the substrate species is susceptible to the herbicide to be used in that treatment. For example, Tebuthiuron application could occur within 100 meters of a soap tree yucca *(Yucca elata)* with a stick nest because Tebuthiuron does not kill soap tree yucca. Conversely, a little-leaf sumac with a stick nest would be buffered 100 meters to ensure it would not be killed.
5. Water Buffers: All wildlife waters, windmills and dirt tanks within the treatment area would be buffered a minimum of 100 meters to ensure exclusion from chemical effects.
6. Timing: Application of chemical herbicide would be conducted in the fall/ winter to coincide with typically gentle rainfall to minimize herbicide movement with runoff and because this is the time period when plants are storing carbohydrates in the root zone for overwintering. This aids in uptake of the herbicide by the roots and hastens plant mortality.
7. To mitigate soil disturbance and lessen erosion potential: ATV use would only occur when the soil surface is dry and would avoid driving the same track repeatedly to avoid creating new roads or ruts. Additionally, ATV use would be limited within treatment areas to single passes through oneseed juniper stands while pellets are being distributed.
8. Use applicator aircraft that are configured with programmable GPS that allows for the upload of project area shape files into the GPS that interact with the release mechanism of the herbicide applicator to turn on and off at project area boundary coordinates.

9. Treated junipers will be left to defoliate. Future prescribed fires will remove smaller branches but many stems will be left standing for years. These snags provide refugia for many plants that will sprout and grow within the area of the snag's canopy and amid the organic matter from duff accumulation, while also providing perches and food sources for a variety of avian and other wildlife species.
10. Wherever existing snags are found, they will be left intact as they are important for cavity nesting birds.

Chapter 5
Cumulative Effects

A cumulative impact is defined in 40 CFR 1508.7 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. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

This analysis of cumulative impacts focuses on the geographical area defined as all potentially suitable treatable sites in the OMPA, as described in the proposed action.

Major resource uses that have been occurring, and are expected to continue to occur within the OMPA, regardless of the alternative selected, include military testing and training operations and recreational hunting.

These are legitimate activities but nevertheless add to the cumulative impacts to the ecosystem. The impacts of past and current activities on WSMR, the suppression of wildfires, in combination with a climate that regularly produces periodic long-term droughts, have promoted the spread and encroachment of brush species out of their historic proportions. Increasing shrub cover has resulted in a loss of basal vegetative cover, and reduced the production and diversity of herbaceous plants, making soils more susceptible to erosion. Over the long term, Alternatives A or B of the Oscura Mountains Ecosystem Management Plan would begin to reverse some of these vegetative changes.

5.0 Cumulative Effects of Implementing the No-Action Alternative

Historic vegetation changes on rangelands in the southwestern United Sates has been well-documented (Bahre 1991, Buffington and Herbel 1965, Dick-Peddie 1993), resulting in loss of productivity and economic viability (Dick-Peddie 1993). Today, vast areas of the Oscura Mountain's lower elevation landscapes function below their potential in terms of habitat provision and watershed stability because of past resource use including cattle, sheep and goat grazing, mineral extraction, fire suppression and military use. Native woody plants such as honey mesquite *(Prosopis glandulosa),* Creosotebush *(Larrea tridentata),* broom snakeweed *(Gutierrezia sarothrae)* and oneseed juniper *(Juniperus monosperma)* have exhibited large-scale increases across New Mexico rangelands in recent history (Buffington and Herbel 1965, Dick-Peddie 1993). Once these shrubs become established on former grasslands, they tend to increase in density and outcompete other native vegetation for soil moisture, nutrients, and sunlight. They are less susceptible to drought than herbaceous species. Lands with high densities of invasive brush typically exhibit accelerated soil erosion rates, decreased water infiltration and decreased biodiversity. These sites have been altered to a degree that prevents recovery without human intervention. Further, many of these shrub invaded sites within the OMPA do not have sufficient grass fuel continuity to allow treatment with just prescribed fire (IWFMP 2018).

5.1 Cumulative Effects of Implementing Alternatives A or B

Ecosystem management projects in the OMPA would occur over time, spanning 10 years or more, to allow for a variety of treatment options and prescriptions, leading to greater herbaceous heterogeneity and differing age classes of vegetation after project implementation. The staggering over time of treatment projects would moderate direct impacts to resources and buffer the cumulative impacts of repeated actions over the landscape. Individual treatments would range from <1 acre to thousands of acres in size. The size and number of projects would be dependent on many factors, including funding, confirmation that potential treatment areas are within treatment prescription parameters, and the ability to implement appropriate pre and post treatment monitoring. The degree of positive cumulative impacts would increase as the size and combined total of individual projects progress.

Best management practices mentioned earlier, prescription parameters and appropriate design features would mitigate negative impacts of individual projects. Specific additional design features and prescriptions would be developed on a case-by-case basis, based on environmental conditions and resource concerns found within individual projects.

The amount of area proposed for treatments within the overall project area is not known at this time. The cumulative impacts associated with the proposed actions are expected to have an overall beneficial impact to various resources over the entire OMPA, given the prescription parameters, mitigations, best management practices, common design features, and case-by case project design. In general, the long-term changes to vegetation and soil health would benefit the watershed, the ecosystem and the wildlife species dependent on them. Sustaining the benefits of the projects would require monitoring to determine whether modification to future projects is needed, or whether implementation of additional projects would be needed, or whether resource use restrictions would be needed to ensure the longevity of the restoration efforts.

Undesirable impacts to other resource values from implementation of the OMPA projects would not be significant given the implementation of controls, procedures, and BMPs as outlined in this document.

Selective thinning in the upper portions of the Oscura Mountains would only occur at the minimum level needed to protect structures and provide safety zones for firefighters. Thinning of the overstory in these small areas would favor retaining the largest and healthiest piñon pines.

A monitoring program to study wildlife responses to the disturbance (thinning) would be accomplished by qualified biologists.

Benefits of prescribed fire in dense oneseed juniper stands would include an increase in herbaceous plant diversity and overall biomass as well as an increase in animal species diversity, including pollinators and other insects, birds, reptiles and large and small mammals. Watershed conditions would improve over

time after large-scale removal of juniper including rising water tables and increased water infiltration, thereby reducing precipitation run-off and soil erosion.

The combination of the treatment projects proposed in action alternatives A and B would have the effects of protecting valuable military structures, infrastructure and facilities from wildfires, while moving the greater OMPA ecosystem towards ecological conditions of more open grass-juniper savannas with higher herbaceous diversity, improved wildlife habitat, and improved erosion control.

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Appendix A
Threatened, Endangered and Species of Concern Flora on WSMR

Plant Table derived from WSMR Integrated Natural and Cultural Resources Management Plan 2015

Common Name, *Scientific Name*	**Federal Status**	**State Status**
Todsen's pennyroyal, *Hedeoma todsenii* R.S. Irving	E	E
Night-blooming cereus, *Peniocereus greggii* (Engelmann) Britton and Rose var. *greggi*	-	E
Organ Mountains pincushion cactus, *Escobaria organensis* (D.A. Zimmerman) Castetter, Pierce, and Schwerin	-	E
Mescalero milkwort, *Polygala rimulicola* Steyermark var. *mescalerorum* Wendt and Todsen	-	E
Organ Mountains evening primrose, *Oenothera organensis* Munz	-	SC
Alamo beardtongue, *Penstemon alamosensis* Pennell and Nisbet	-	SC
Mosquito plant, *Agastache cana* (Hook) Wooton and Standley	-	SC
Castetter's milkvetch, *Astragalus castetteri* Barneby	-	SC
Warner's dodder, *Cuscuta warneri* Yunker	-	SC
La Jolla Prairie clover, *Dalea scariosa* Watson	-	SC
Sandberg's pincushion cactus, *Escobaria sandbergii* Castetter, Pierce, and Schwerin	-	SC
Vasey's bitterweed, *Hymenoxys vaseyi* (A. Gray) Cockerell	-	SC
Mohave panicgrass, *Panicum mohavense* Reeder	-	SC
New Mexico penstemon, *Penstemon neomexicanus* Wooton and Standley	-	SC
San Andres Cross rockdaisy, *Perityle staurophylla* (Barneby) Shinners var. *staurophylla*	-	SC
San Andres Cross rockdaisy, *Perityle staurophylla* (Barneby) Shinners var. *homoflora* T.K. Todsen	-	SC
Silvercup philadelphus, *Philadelphus microphyllus* Gray subsp. *argyrocalyx* (Wooton) C.L. Hitchcock	-	SC
Mescalero currant, *Ribes mescalerium* Coville	-	SC
Supreme sage, *Salvia summa* A. Nelson	-	SC
Plank's catchfly, *Silene plankii* C.L. Hitchcock and Maguire	-	SC
Sivinski's scorpionweed, *Phacelia sivinskii* Atwood, Knight and Lowrey	-	SC

E = endangered

SC = species of concern

Appendix B

Threatened, Endangered, and Species of Concern Fauna on WSMR

Table 1 Fauna derived from WSMR Integrated Natural and Cultural Resources Management Plan 2015

Species		Status		WSMR Habitat or Occurrence
Common Name	***Scientific Name***	**Federal**	**State**	
Birds				
Least tern (Interior population)	*Sterna antillarum*	E	E	Transient.
Northern aplomado falcon	*Falco femoralis septentrionalis*	Experimental, non-essential population	E	Savannas and grasslands, often with scattered trees or tall yuccas. Rarely encountered within WSMR, fewer than 10 observations of aplomado falcons within WSMR.
Southwestern willow flycatcher	*Empidonax traillii extimus*	E	E	An individual was observed at Davie's Tank. Possible during migration within other riparian areas. No breeding habitat.
Bald eagle	*Haliaeetus leucocephalus*	N/A	T	Rare in winter. Known to scavenge on oryx carcasses in the fall and winter.
Mexican spotted owl	*Strix occidentalis lucida*	T	SGCN	Species or Critical Habitat does not occur on WSMR.
American peregrine falcon	*Falco peregrinus anatum*	N/A	T	Suspected breeding in Oscura and San Andres mountains.
Baird's sparrow	*Ammadramus bairdii*	N/A	T	Grasslands; Jornada Plain.
Bell's vireo	*Vireo bellii*	N/A	T	Early successional riparian thickets; San Andres Mountains (below 5,000 feet).
Mountain plover	*Charadrius montanus*	N/A	SGCN	Rare in migration or winter.
Yellow-billed cuckoo	*Coccyzus americanus*	T	SGCN	Limited desert riparian woodland areas consisting of willow, cottonwood, and dense mesquite. Observed during migration only, no breeding habitat.
Black tern	*Chlidonias niger*	N/A	N/A	Migration/stopover only.

Western burrowing owl	*Athene cunicularia hypugaea*	N/A	SGCN	Chihuahuan Desert scrub with open stands of creosotebush and large succulents.
Brown pelican	*Pelecanus occidentalis*	N/A	E	Migration/stopover only.
Neotropic cormorant	*Phalacrocorax brasilianus*	N/A	T	Migration/stopover only.
Broad-billed hummingbird	*Cyanthus latirostris*	N/A	T	Higher desert canyons and washes, riparian woodlands and foothill woodlands (3,000 to 5,000 feet).
Costa's hummingbird	*Calypte costae bourcier*	N/A	T	Shrublands within dry washes and canyons with southern exposure.
Gray vireo	*Vireo vicinior*	N/A	T	Juniper canyon and foothill woodlands typically with well-developed grass component; San Andres, Oscura and Organ Mountains (4,300 to 7,000 feet).
Varied bunting	*Passerina versicolor*	N/A	T	Dense thorny scrub in canyons; San Andres Mountains.
Loggerhead shrike	*Lanius ludovicianus*	N/A	SGCN	Common at WSMR.
Pinyon jay	*Gymnorhinus cyanocephalus*	N/A	SGCN	Pinyon-juniper woodlands.
Fish				
White Sands pupfish	*Cyprinodon tularosa*	Under review	T	Perennial springs and salt Creek; Tularosa Basin.
Mammals				
Desert pocket gopher	*Geomys arenarius*	N/A	SOC	Disturbed terrain or sandy areas along riverbanks; Tularosa Basin.
Townsend's big-eared bat	*Corynorhinus townsendii*	N/A	SOC	Semi-desert and montane shrublands.
White Sands woodrat	*Neotoma micropus leucophaea*	N/A	SOC	Tularosa Basin from gypsum dune fields and adjacent habitat only.
Organ Mountain Colorado chipmunk	*Neotamias quadrivittatus australis*	N/A	T	Texas Canyon, Organ Mountains (4,219 to 7,464 feet).
Oscura Mountain Colorado chipmunk	*Neotamias quadrivittatus oscuraensis*	N/A	T	Entire known population on WSMR; Oscura Mountains' pinyon-juniper associations.
Spotted bat	*Euderma maculatum*	N/A	T	Rarely detected on WSMR, individuals (n=4) detected at

				Main Mound Spring, Greens Baber Tank, and Oscura pond.
Cave myotis	*Myotis velifer*	N/A	SOC	Lower elevations.
Fringed myotis	*Myotis thysanodes thysanodes*	N/A	SOC	Ponderosa pine or mixed coniferous woodland (roughly 4,000 to 6,900 feet).
Big free-tailed bat	*Nyctinomops macrotis*	N/A	SOC	Rocky cliffs in weathered rock fissures and crevices; roosting in plants including ponderosa pines and desert shrubs.
Little brown bat	*Myotis lucifugus*	N/A	SOC	Mixed shrub habitat in lower elevations below the mesas (elevation less than 6,700 feet).
Long-eared myotis	*Myotis evotis*	N/A	SOC	Pinyon-juniper habitat on benches and mesa tops above 6,700 feet in elevation.
Long-legged myotis	*Myotis volans*	N/A	SOC	Ponderosa pine zone.
Western red bat	*Lasiurus blossevilli*	N/A	SOC	Riparian associations of deciduous trees.
Eastern red bat	*Lasiurus borealis*	N/A	SOC	Riparian associations of deciduous trees.
Western small-footed myotis	*Myotis ciliolabrum melanorhinus*	N/A	SOC	Ponderosa pine zone.
Yuma myotis	*Myotis yumanensis yumanensis*	N/A	SOC	Riparian communities of desert, grassland, and woodland.
Western spotted skunk	*Spilogale gracilis*	N/A	SOC	Rocky bluffs and brush-bordered canyon stream beds.
Common hog-nosed skunk	*Conepatus leuconotus*	N/A	SOC	Rocky foothills and brushy areas.

E – Endangered

T – Threatened

SOC – species of concern

SGCN-Species of Greatest Conservation Need

N/A – not applicable (not listed)

Sources: BISON-M 2012.

Table 2. USFWS IPaC Resource List for proposed activity area in the Oscura Mountains Planning Area, Lincoln and Socorro Counties New Mexico.

Species	Status *	Range/Habitat Requirements	Potential Occurrence	Effects Determination
NM Jumping Mouse	E	No habitat exists in the Oscura Mountains or vicinity for *Zapus* species. Numerous studies for this mouse over two decades have failed to find any *Zapus* within the boundaries of WSMR (Burkett 1997, Sullivan and Wilson 2000, Frey et. al. 2018.)	Does not occur	No effect
Peñasco Least Chipmunk	C	Extensive Surveys over the past 2 plus decades have documented only the Colorado Chipmunk (*Tamias quadrivittatus oscuraensis*) in the proposed activity area (Sullivan and Wilson 2000, Hartsough and Burkett 2008, Perkins-Taylor and Frey 2018).	Does not occur	No effect
Least Tern	E	No habitat exist in the Oscura Mountains. Migratory species that occurs associated with river, lakes, and reservoirs in NM during the breeding season. Very rarely encountered on WSMR during migration.	Unlikely/ transient	No effect
Mexican Spotted Owl	T	Occurs in high-elevation montane forests. Studies report that no suitable breeding habitat exists on	Does not occur	No effect

		WSMR (Sadoti et. al. 2003). Not recorded on WSMR		
N. Aplomado Falcon	ENEP	In New Mexico occurs in desert grasslands habitats. Twenty one years of raptor point count surveys on WSMR grasslands failed to detect resident Aplomado Falcons (Burkett pers. Comm. 2019). Considered a rare transient on WSMR.	Unlikely/ transient	No effect
Piping Plover	T	No habitat exists in the Oscura Mountains. Rare transient in New Mexico. Species has never been recorded on WSMR.	Does not occur	No effect
Southwestern Willow Flycatcher	E	No habitat exists in the Oscura Mountains. Surveys for the species across WSMR have failed to detect the species (Meyer 2005/2006, 2015, Burkett and Hartsough 2015/2016).	Does not occur	No effect
Yellow Billed Cuckoo	T	No habitat exists in the Oscura Mountains. Surveys for the species across WSMR have failed to detect the species during breeding season (Meyer 2005/2006, 2015, Burkett and Hartsough 2015/2016).	Unlikely/ transient	No effect
Chiricahua Leopard Frog	T	No habitat exists in the Oscura Mountains. Amphibian and reptile surveys across WSMR have never detected any true frogs (Burkett and Black 2004)	Does not occur	No effect

Rio Grande Silvery Minnow	E	No habitat exists in the Oscura Mountains.	Does not occur	No effect
Alamosa Springsnail	E	Species known from only one population on private property in Socorro Co (USFWS 1993).	Does not occur	No effect
Chupadera Springsnail	E	Species known from only one population on private property in Socorro Co (USFWS 2012).	Does not occur	No effect
Socorro Springsnail	E	Species known from only one population on private property in Socorro Co (USFWS 2012).	Does not occur	No effect
Socorro Isopod	E	Species known from a single thermal spring on private land near Socorro New Mexico (USFWS 2009).	Does not occur	No effect
Kuenzlers Hedgehog Cactus	T	Species is known from the Sacramento Mountains. Numerous surveys for the species over the past 25 years have resulted in no individuals being found (D. Anderson pers. comm.)	Does not occur	No effect
Pecos Sunflower	T	No habitat occurs in the Oscura Mountains. This plant requires saturated saline soils of desert wetlands.	Does not occur	No effect
Wrights Marsh Thistle	C	No habitat occurs in the Oscura Mountains. This plant requires wet alkaline soils in spring seeps and marshy edges of steams and ponds.	Does not occur	No effect

- C = Candidate Species, E = Endangered, T = Threatened, ENEP = Experimental, Non-essential Population.

Literature Cited

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Sullivan, R.M. and K.W. Wilson. 2000. Characterization of Riparian Small Mammals and Habitats in Selected Basin Drainages on White Sands Missile Range, New Mexico: with Emphasis on Detection of the New Mexico Meadow Jumping Mouse. Prepared for: MEVATEC Corp. Contract DAAD07-95-C-0125.

Sullivan, R.M. and K.W. Wilson. 2000. Conservation and Ecology of the Colorado Chipmunk (Tamias quadrivittatus) in the Organ-San Andres –Oscura Mountains Complex, White Sands Missile Range, New Mexico. Prepared for: MEVATEC Corp. Contract DAAD07-95-C-0125.

U.S. Fish and Wildlife Service. 1993. Alamosa Springsnail (*Tryonia alamosae*) and Socorro Springsnail (*Pyrgulopsis neomexicana*) Draft Recovery Plan. Albuquerque, New Mexico. 24pp.

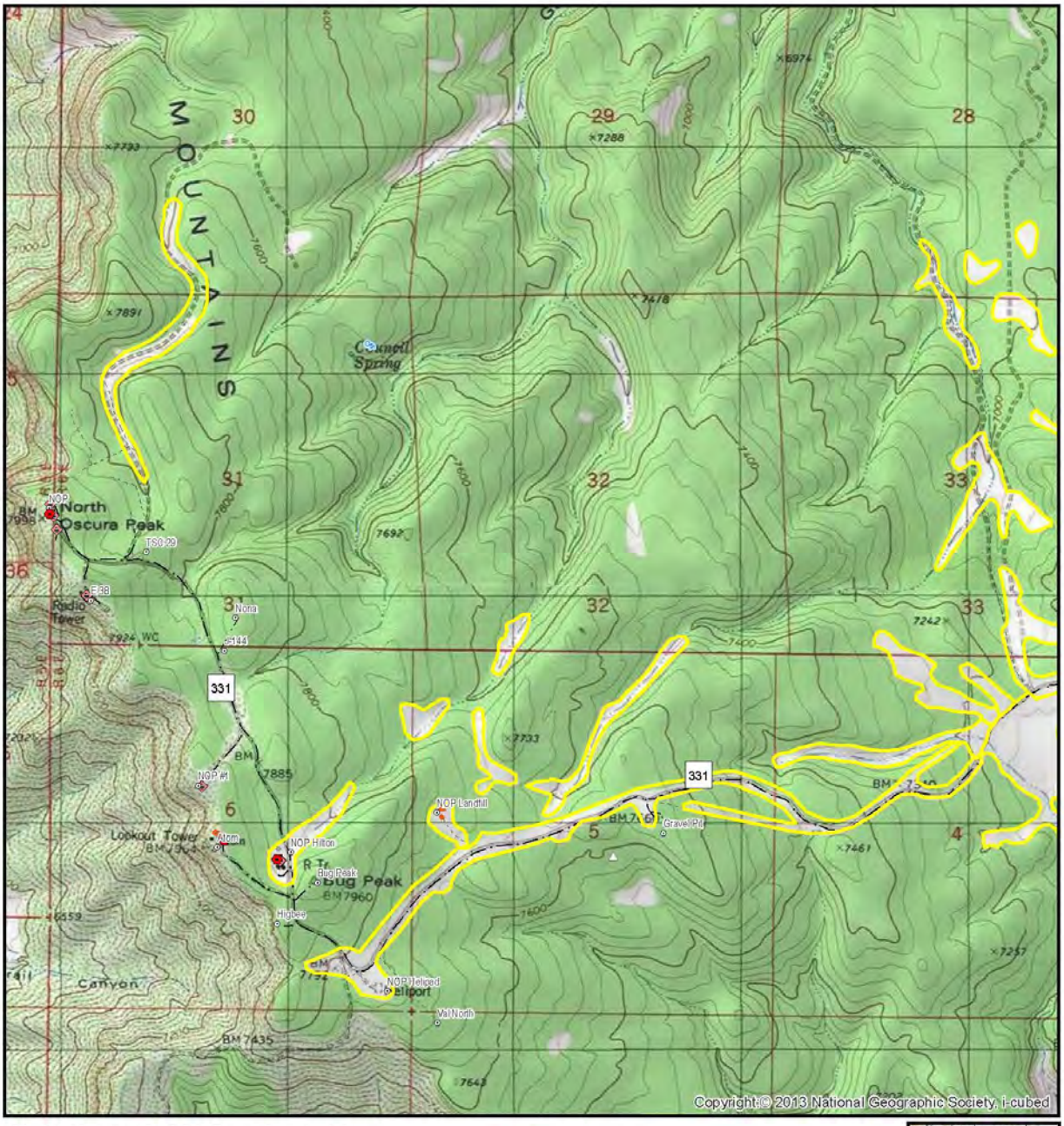
U.S. Fish and Wildlife Service. 2009. Five-year Review of the Socorro isopod (*Thermosphaeroma thermophilum*). 13 pp.

U.S. Fish and Wildlife Service, 2012. Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for the Chupadera Springsnail and Designation of Critical Habitat. A Rule by the Fish and Wildlife Service on 7/12/2012.

Appendix C

Maps of Proposed Actions

(Figures A-E)



WHITE SANDS MISSILE RANGE
Oscura Mountains Ecosystem Mgmt Area
443 Total Acres (East and West areas)
N. Oscura Meadow West Thinning & Burning
4/16/2019

Oscura Mtns. Ecosystem Mgmt. Planning Area
North Oscura Meadow Thinning and Burning

Mine
Propane Tank
Spring
Hauled Water Tank
Military Site

0 0.5 1
Miles

Produced by the GIS Team for the Directorate of Public Works, WSMR.
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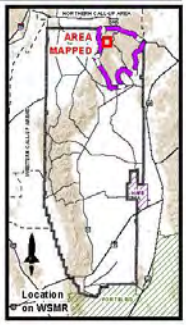
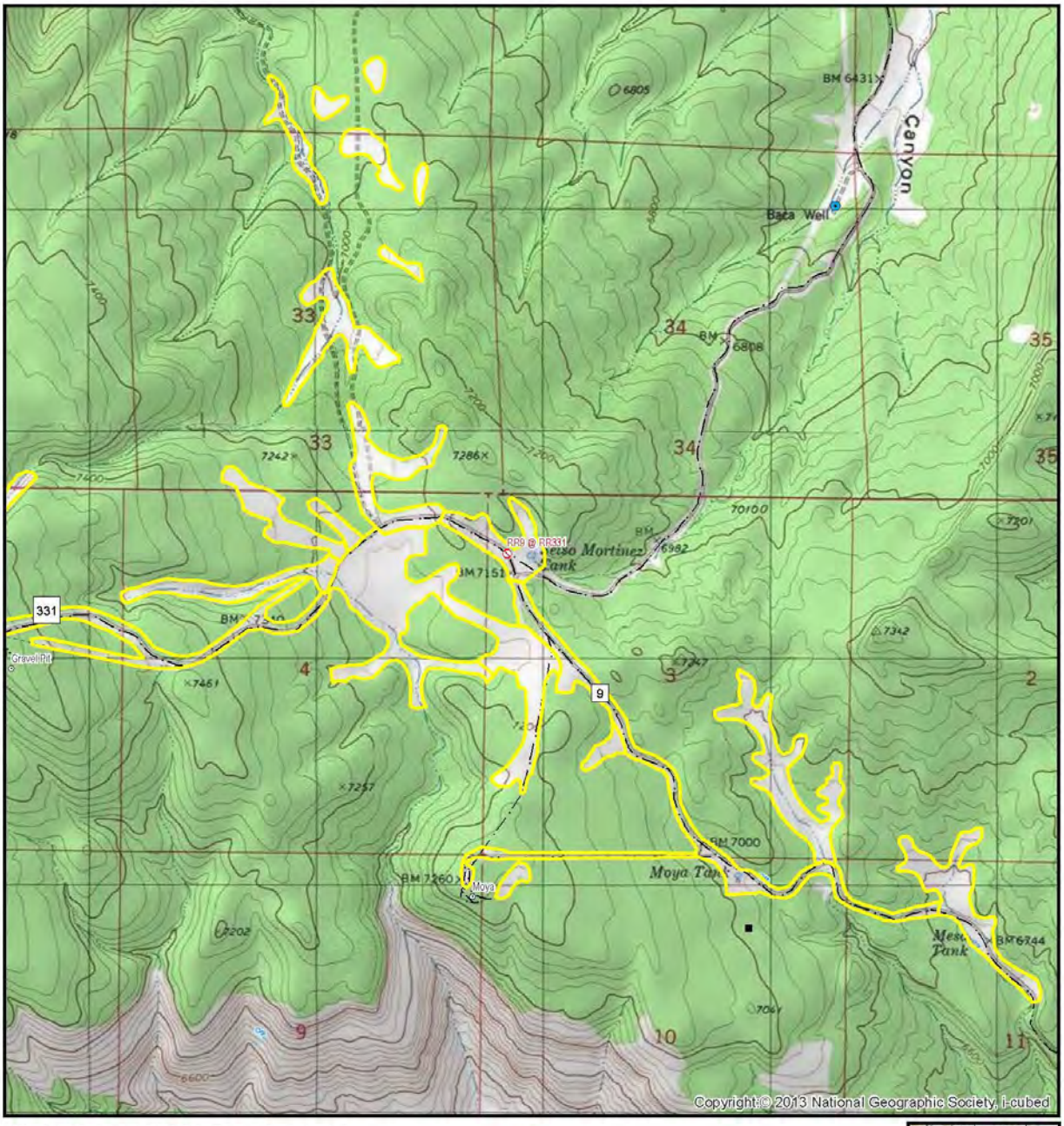


Figure 1A



WHITESANDSMISSILERANGE
Oscura Mountains Ecosystem Mgmt Area
443 Total Acres (East and West areas)
N. Oscura Meadow East Thinning & Burning
4/16/2019

Oscura Mtns. Ecosystem Mgmt. Planning Area
North Oscura Meadow Thinning and Burning

Spring
Wildlife Water Tank
Military Site
Roadblock
Ranch\Structure

0 0.5 1
Miles

Produced by the GIS Team for the Directorate of Public Works, WSMR.
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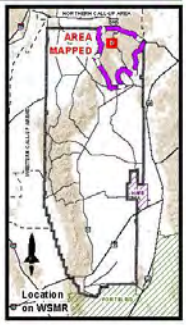
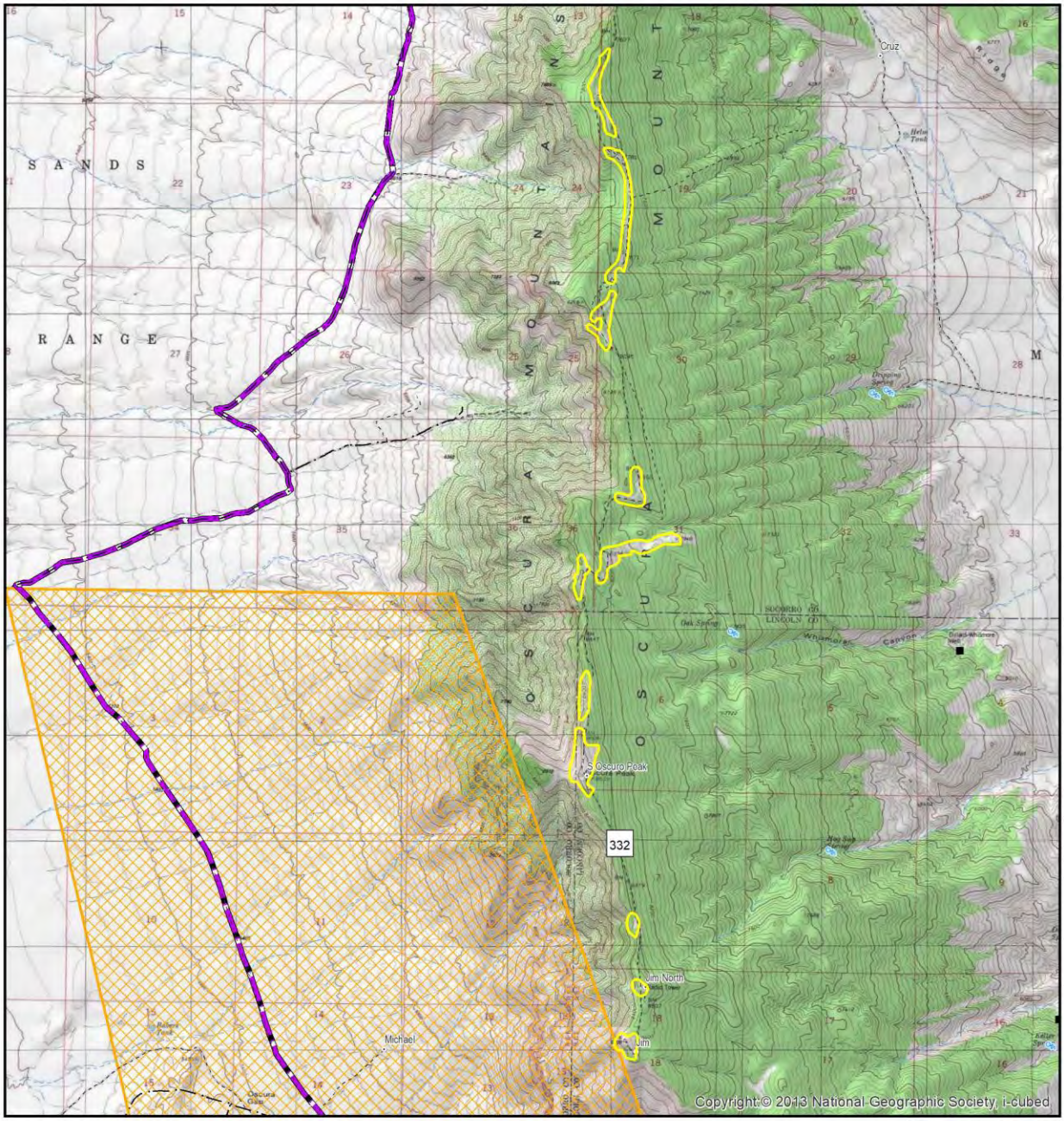


Figure 2A



WHITE SANDS MISSILE RANGE
Oscura Mountains Ecosystem Mgmt. Area
159 Acres
S. Oscura Meadow Thinning & Burning
11/15/2018

0 0.5 1 2
Miles

Produced by the GIS Team for the Directorate of Public Works, WSMR.
File Location:Projects\FirePlan\OscuraMts_N_Oscura_Meadow_Thin_Burn_85x11.mxd

- Oscura Mtns. Ecosystem Mgmt. Planning Area
- South Oscura Meadow Thinning and Burning
- UXO Cat 3 - Special UXO Brief Reqd.
- Spring
- Military Site
- Ranch\Structure

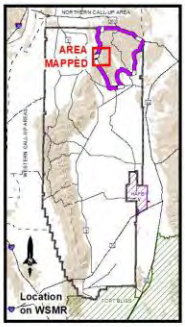
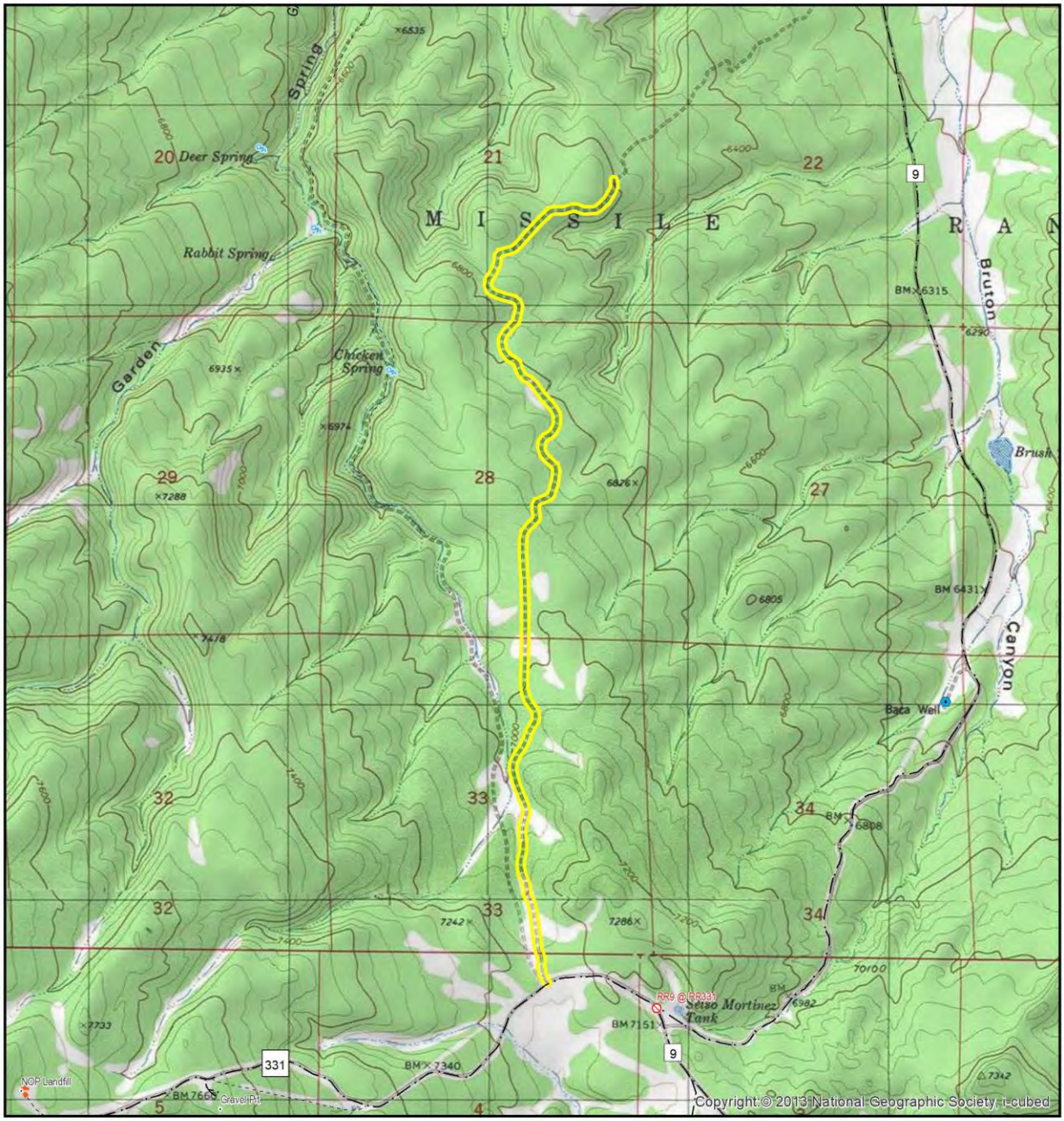


Figure B



WHITE SANDS MISSILE RANGE
Oscura Mountains Ecosystem Mgmt. Area
Firebreak - Thinning and Burning
44 Acres
11/15/2018

0 0.5 1
Miles

Produced by the GIS Team for the Directorate of Public Works, WSMR.

File Location:Projects\FirePlan\OscuraMts_Firebreak_Thinning_Burning_85x11.mxd

- Oscura Mtns. Ecosystem Mgmt. Planning Area
- WSMR Boundary/ Call-Up Area
- Firebreak Area (60 foot buffer)
- Streams
- Spring
- Wildlife Water Tank
- Military Site
- Roadblock

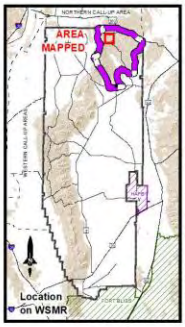
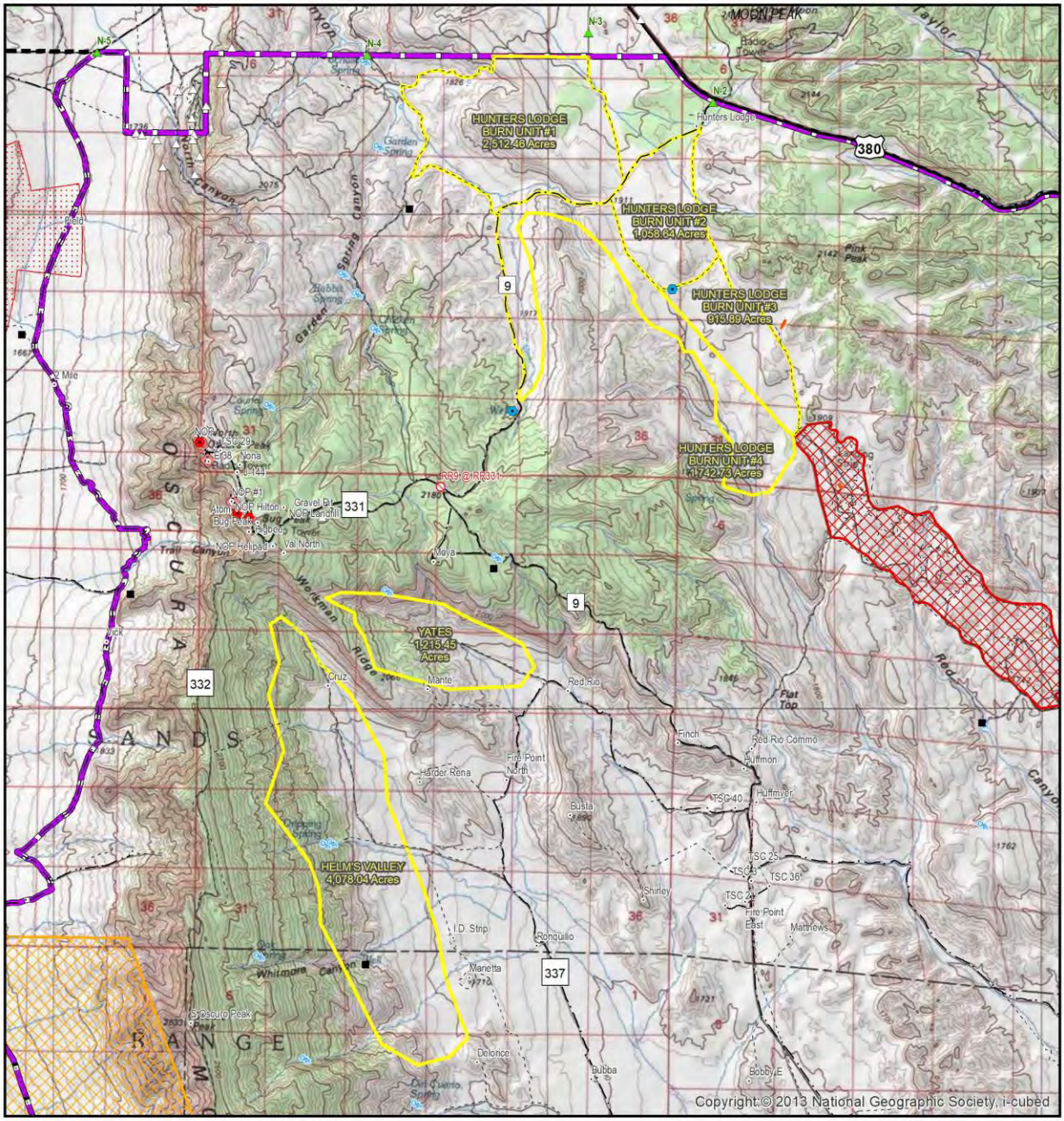


Figure C



WHITE SANDS MISSILE RANGE
Oscura Mountains Ecosystem Mgmt. Area
Planned/Prescribed Fire Areas
11,523 Acres
11/15/2018

0 0.5 1
Miles

Produced by the GIS Team for the Directorate of Public Works, WSMR.

File Location:Projects\FirePlan\OscuraMts_Firebreak_Thinning_Burning_85x11.mxd

- Oscura Mtns. Ecosystem Mgmt. Planning Area
- WSMR Boundary/ Call-Up Area
- Planned/Prescribed Fire Areas
- UXO Cat 1 - Escort Reqd.
- UXO Cat 3 - Special UXO Brief Reqd.
- Solid Waste Management Unit
- Maximum Outline of SDZ
- Streams
- Mine
- Gate
- Propane Tank
- Spring
- Hauled Water Tank
- Wildlife Water Tank
- Military Site
- Roadblock
- Ranch\Structure

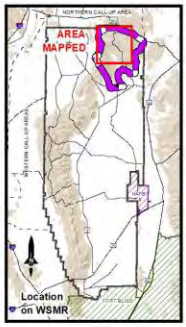
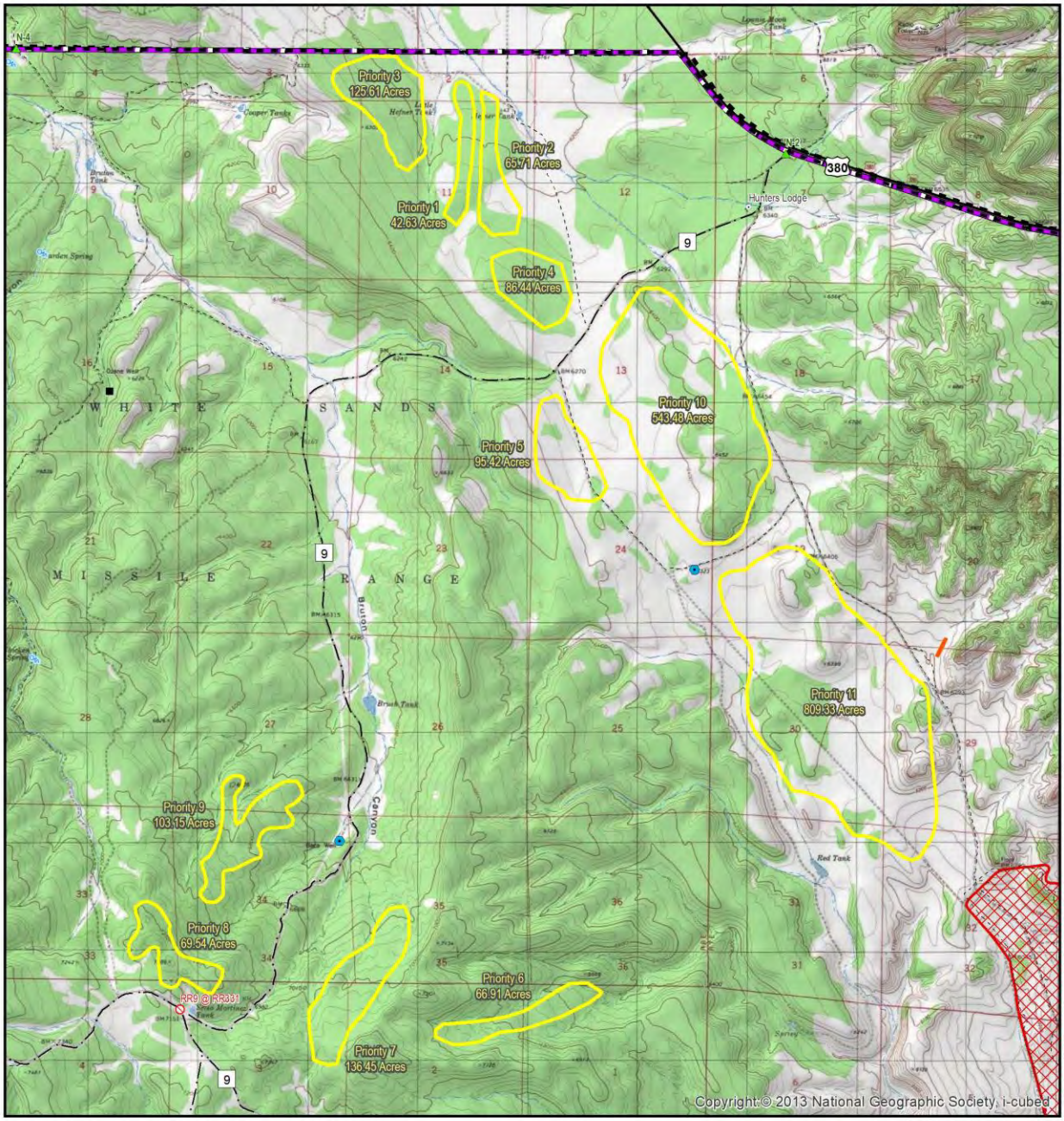


Figure D



WHITE SANDS MISSILE RANGE
Oscura Mountains Ecosystem Mgmt. Area
Herbicide Treatment Areas
2,145 Total Acres
11/15/2018

0 0.5 1
Miles

Produced by the GIS Team for the Directorate of Public Works, WSMR.

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- Oscura Mtns. Ecosystem Mgmt. Planning Area
- WSMR Boundary/ Call-Up Area
- Herbicide Treatment Areas
- UXO Cat 1 - Escort Reqd.
- Solid Waste Management Unit
- Streams
- Gate
- Spring
- Wildlife Water Tank
- Military Site
- Roadblock
- Ranch\Structure

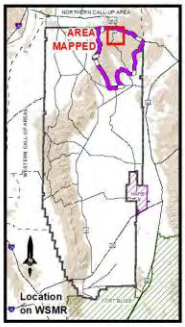

Figure E

Appendix D

Public Coordination

Reviewer	Location (Page, section, line, e.g.)	Reviewer Comment	WSMR Response
USFWS Reg 2, Migratory Bird Office Corrie Borgman 4 Mar 19		Request copy of the EA. Stated that name on notice was incorrect (Bergman instead of Borgman)	Copy sent on 4 Mar 19 via email by D. Nethers
Ft. Bliss John Kipp 13 Mar 19		Fort Bliss Environmental has no comments (i.e., concurs) with the Draft EA	
Mesilla Valley Audubon Society Coleman Goin 15 Mar 19		Request a copy of the document	Copy sent on 15 Mar 19 via email. By D. Nethers
Natural Heritage NM / UNM Kristine Johnson 13 Mar 19		An environmental assessment (EA) should be based on the best available science, and statements should be supported by references to scientific studies. This draft lacks references for many statements regarding the current state of the woodlands, the expected effects of the treatments, alternative outcomes if the treatments are not conducted, and benefits to wildlife if they are conducted. To strongly support the currently unsupported assertions, the document should have additional references.	Sources of statements were added.
Natural Heritage NM / UNM Kristine Johnson 13 Mar 19		Second, an EA should be more specific regarding treatments. What percent of the total of each vegetation type does the treatment include? What is the degree of treatment? For example, what is the current tree density in an area targeted for treatment, and what is the target density? What is the tree/shrub density in proposed burn areas, and what is the target density after treatment? What are tree/shrub sizes and densities in the areas targeted for chemical treatment, and what is the desired density after treatment? And most importantly, what is the scientific justification for treating areas with these characteristics for these particular outcomes?	A forest level survey and health assessment will be collected and incorporated into management decisions in accordance with the Army's Record of Environmental Consideration (REC) process. Existing tree density, target density, and desired outcomes will be evaluated on a project-by-project basis.

Reviewer	Location (Page, section, line, e.g.)	Reviewer Comment	WSMR Response
Natural Heritage NM / UNM Kristine Johnson 13 Mar 19		Third, an EA should specifically address the species of conservation concern which could potentially be affected by the proposed actions. This draft is lacks discussion of most of the relevant animal species, including species at risk (SAR). At least, a list of potential species of conservation concern is expected. The document says that 55 animal species could be affected. Which species at risk occur in the project area? What aspects of their biology place them at potential risk or free of risk?	Species of Concern are addressed in the EA. Original list of 55 species was too broad and has been reduced to reflect species that could occur in the Oscura mountains. Additional information has been added to Appendix B.
Natural Heritage NM / UNM Kristine Johnson 13 Mar 19	P. 6, L. 15-16.	Please provide scientific justification (citations) for these FRIs.	Addressed in the EA, pg. 6 lines 19-23.
Natural Heritage NM / UNM Kristine Johnson 13 Mar 19	P. 8, Figure 2.	Areas in Figure 2 near the top of NOP and continuing into mid-elevations are already densely covered in piñon woodland and piñon-juniper woodland. Hence, it is implausible that these areas have high potential for juniper encroachment. How can junipers encroach into dense piñon-juniper woodland? Not only soils, but existing vegetation cover should be considered in modeling the potential for juniper encroachment.	Noted.
Natural Heritage NM / UNM Kristine Johnson 13 Mar 19	P. 9, L. 20-33.	This scenario is presented without a single reference. What is the scientific evidence that these changes have occurred in the past and will continue to occur? This paragraph provides an illustration of the absence of supporting evidence that occurs throughout this EA, which diminishes its credibility.	Sources for statements provided.
Natural Heritage NM / UNM Kristine Johnson 13 Mar 19	P. 10, L. 11-17.	What is the evidence that the 100' cleared area and 300' thinned area will be necessary or sufficient to stop or slow a crown fire? Again, there is an absence of evidence to justify the proposed measures. Has no one researched fire behavior in similar habitats? Pinyon Jays do not simply nest in single trees. They are colonial nesters, hence require colony sites of suitable habitat sufficient in area to support an entire nesting colony (usually from 30-50 ha). They nest in areas of relatively high canopy cover and change their nest sites from year to year. Simply retaining trees previously used for nesting is an entirely inadequate conservation measure for Pinyon Jay nesting habitat. Pinyon Jay habitat should be conserved at the colony scale.	Addressed in EA, pg. 12 lines 6-8, 29-33
Natural Heritage NM / UNM Kristine Johnson 13 Mar 19	P. 13, L. 34.	What are the target tree densities? Tree density likely varies across treatment areas. Instead of reducing all tree densities by the same percentage, there should be a goal for final tree densities, and these densities should be justified based on wildlife habitat or ecological studies. As it is, these target percentages appear to be arbitrary. Provide justification from the literature for final target densities.	Planned forest inventory survey will provide information to inform management decisions.

Reviewer	Location (Page, section, line, e.g.)	Reviewer Comment	WSMR Response
Natural Heritage NM / UNM Kristine Johnson 13 Mar 19	P. 14, Section 2.2.2.3	Again, there is no evidence provided to support the statements. What is evidence for soil erosion? Has infiltration into the water table been studied? What about water quality? Has a hydrology study been conducted? If there is evidence to support these statements, please provide it. If not, better not to include these assertions.	Noted.
Natural Heritage NM / UNM Kristine Johnson 13 Mar 19	P. 15. L. 12.	Existing erosion appears to be a consideration (see above comment), but erosion potentially arising from tree and shrub loss is not considered here or in section 3.2.1.3. Please address effects of the loss of soil-stabilizing vegetation on soil erosion.	Addressed in EA, pg. 15-16, lines 35-40, 1-2.
Natural Heritage NM / UNM Kristine Johnson 13 Mar 19	P. 21.	"If populations of these plants are discovered within project areas, then protection mitigations would be proposed." Has no floristic survey been conducted in the project areas? Who is to "discover" these plants if they do occur within project areas? Clearance surveys for the sensitive plant species likely to occur in the area should be conducted before treating these areas.	Noted.
Natural Heritage NM / UNM Kristine Johnson 13 Mar 19	P. 24, L. 21-32.	The study further suggests a potentially positive connection for lightly thinning overly dense piñon pines, thereby increasing vigor in remaining mature, less dense trees and possibly leading to increased piñon nut production and a corresponding increase in habitat use by Pinyon jays." This statement is an interpretation by the authors of the EA and not a conclusion of Johnson et al. 2018 and should be removed. It is common to assume that thinning piñon trees will result in a reduction of underground competition and enhance the health of remaining trees. *This has not been established scientifically*. The effects of thinning on mast production and tree health are largely unexplored, but a few studies suggest thinning may not improve tree health or survival and may be detrimental by increasing evapotranspiration (Greenwood and Weisberg 2007, Morillas et al. 2017). And differential effects of various degrees of thinning on trees and Pinyon Jays are unknown.	Sentence referred to here is removed.
Natural Heritage NM / UNM Kristine Johnson 13 Mar 19	P. 29, L. 7-11.	Each of these sensitive species should be addressed in this EA. Only four bird species and bats as a group are mentioned here. What about the other sensitive species? Are the project-specific RECs to be assessed by outside reviewers? Otherwise, there is no oversight regarding mitigation for the sensitive species which are not mentioned (but for which mitigation is required).	Additional information on species has been added to Appendix B. Project surveys during the Army REC process will assure T and E and sensitive species are addressed.

Reviewer	Location (Page, section, line, e.g.)	Reviewer Comment	WSMR Response
Natural Heritage NM / UNM Kristine Johnson 13 Mar 19	P. 31, L. 13-15.	All of the seven areas proposed for thinning are likely to be occupied by chipmunks. Four have chipmunks documented within their boundaries and the remaining three have not been surveyed for chipmunks." These treatments will certainly result in loss of Oscura Mountains chipmunk habitat and directly and indirectly impact the chipmunk population at NOP. A 40 m buffer on the escarpment edge is insufficient to protect chipmunks and their habitats, and the treatment polygons shown in Appendix A appear to leave no such 40 m buffer anyway. Certainly alternative measures could be taken to protect structures without destroying these highly sensitive chipmunks and their habitat. At least new surveys should be conducted before treating this chipmunk habitat. Vegetation-free buffers exist around all structures on NOP. What is the evidence that these existing buffers would be inadequate to delay a fire? What is the evidence that the proposed treatments would be adequate to delay a fire? These polygons appear to be arbitrarily delineated. If intentional destruction of sensitive species and their habitats is probable, you should provide evidentiary justification that the proposed treatment polygons will achieve the stated goals.	Removed thinning from upper NOP stands until forest inventory and analysis is complete.
Natural Heritage NM / UNM Kristine Johnson 13 Mar 19	P. 34, L. 20-22.	The low-lying piñon and juniper savanna habitats targeted for burn and chemical treatment constitute potential Gray Vireo nesting habitat. Clearance surveys should be completed *before* any treatments of these large polygons are conducted. Previous studies of Gray Vireos on DoD lands have established that they nest in larger trees in denser areas (Johnson et al. 2014). Any areas occupied by Gray Vireos should not be treated.	Noted.
Natural Heritage NM / UNM Kristine Johnson 13 Mar 19	Pp. 32-34 and Figure 4.	The most recent data on Pinyon Jays nesting at NOP are from 2012. These nesting areas may currently be occupied or the jays may have moved their nesting sites. It should be stated that no treatments will be conducted in previously- or currently-occupied Pinyon Jay nesting areas and that the target treatments are subject to revision, pending 2019 and 2020 surveys for nesting Pinyon Jays. No consideration is given to mast-producing piñon trees. Larger trees (see Parmenter et al. 2018 Ecosphere paper on mast production) are the best cone producers. Cutting large mast-producing trees impacts foraging habitat of Pinyon Jays; it has been established that population viability of Pinyon Jays is tied to piñon seed productivity (see references by Ligon 1978, Marzluff and Balda 1992) Why does the treatment plan for Pinyon Jay nesting habitat not adhere to recommendations of the Pinyon Jay Multi-State Working Group, or those of expert researchers? Ignoring habitat management recommendations for this highly sensitive species runs counter to habitat conservation goals for DoD sensitive species, and those guidelines should be followed. The draft Pinyon Jay strategy will be complete by the end of 2019, allowing WSMR to implement management recommendations by a highly qualified group of scientists and agency biologists..	Addressed in the EA, pg. 33. Management recommendations from the Pinyon Jay Working Group will be incorporated into treatment projects.

Reviewer	Location (Page, section, line, e.g.)	Reviewer Comment	WSMR Response
Natural Heritage NM / UNM Kristine Johnson 13 Mar 19	P. 36, L. 9-10.	If bats or bat roosts are encountered by personnel they will be avoided and reported to Army Environmental personnel." Who are the "personnel" expected to find and report bats - those conducting treatments? Inexpert personnel are not qualified to detect bats. If several bat species have potential to occur in treatment areas, these areas should be surveyed by bat experts using accepted survey methods.	Addressed in the EA, pg. 36, lines 35-38.
Natural Heritage NM / UNM Kristine Johnson 13 Mar 19	P. 36, L. 34-37.	There could be some mortality to pre-fledgling birds in nests based on the timing of the prescribed fire but the magnitude of impact would not approach the local population level of any species. There is a potential for mortality to bats (especially young bats) if smoke is dense in day or maternity roosts." Per protections in the Migratory Bird Treaty Act, burning should simply be avoided during the bird nesting season. This applies to bat maternity roosts as well.	Addressed in the EA, pg. 35.
Natural Heritage NM / UNM Kristine Johnson 13 Mar 19	P. 38, L. 10-31.	An 11-year-old EIS for BLM lands is cited as support for chemical treatments in P-J woodlands, in lieu of evaluating possible effects of chemical treatment in the project area. What are the risks of using tebuthiuron on these specific WSMR lands, considering soils, vegetation, topography, hydrology?	Addressed in the EA, pg. 27, lines 34-39.
Natural Heritage NM / UNM Kristine Johnson 13 Mar 19	P. 40, Section 3.6	The potential effects of deforestation are downplayed. Erosion from cutting, burning, and chemical treatment could be considerable and affect ground and surface water quality. Wildlife use surface water and area springs for drinking. A period of 1-5 years is a long time for wildlife to go without clean water. As elsewhere, there is no scientific justification provided for the assertion that these treatments would have little effect on water resources.	Noted.
Dr. Jennifer Frey NMSU Dept. of Fish, Wildlife and Conservation 20 Mar 19		The document lacked consistency among sections. For instance, section 1.1 listed 5 objectives, none of which concern watershed health or soil. Yet, one of the main proposed actions concerns treatments to enhance watershed and stabilize soil. This is an example. Such problems were common throughout the document.	Addresses in the EA, added Objective #6 in Sec. 1.1
Dr. Jennifer Frey NMSU Dept. of Fish, Wildlife and Conservation 20 Mar 19		Section 1.1 provides no justification for objectives 2 and 3 and scant justification for objectives 4 and 5. Objectives 3 and 5 are essentially the same thing.	Addressed in the EA, pgs. 6 and 7, lines 21-36 and 1-3

Reviewer	Location (Page, section, line, e.g.)	Reviewer Comment	WSMR Response
Dr. Jennifer Frey NMSU Dept. of Fish, Wildlife and Conservation 20 Mar 19		There was little scientifically defensible justification for some of the stated objectives or for the proposed management actions. This is the most serious and pervasive flaw with the document. With exception of a few short sections, there was essentially no attempt to back up statements with citations from the recent peer-reviewed scientific literature. Statements were made as if they were fact. Yet, the recent scientific literature will show that many of the statements are overly broad and/or factually incorrect, rather representing unsubstantiated "common knowledge" that is often refuted by rigorous contemporary science. If speculating, then that should be made clear and the basis of those speculations should be stated. For instance, the draft frequently states that creating openings in the PJ will create wildlife habitat. What wildlife? How will this create habitat for them? Is this actually even desirable? A species that uses such open habitats (e.g., mule deer) is not likely to have conservation issues in the Oscura Mountains (i.e., it already has plenty of habitat). On the other hand, those species that are of conservation concern are those that require old pinyon juniper woodlands such as the chipmunk and pinyon jay. Openings may be detrimental to those species.	Addressed in the EA. Sources for statements added throughout the document.
Dr. Jennifer Frey NMSU Dept. of Fish, Wildlife and Conservation 20 Mar 19		The term "persistent woodland" or "persistent pinon-juniper woodland" as used in the first few sections needs to be defined. I see no advantage to this term in context of the EA.	Noted.
Dr. Jennifer Frey NMSU Dept. of Fish, Wildlife and Conservation 20 Mar 19		The text makes many statements about management actions along primitive roads (e.g., pg 12 line 38). Yet, the map shows management actions along only one road in the far northeast part of the area.	Noted. Maps show the primitive roads to be treated.
Dr. Jennifer Frey NMSU Dept. of Fish, Wildlife and Conservation 20 Mar 19		I see no scientifically justifiable rationale for how the proposed actions will protect the pinyon-juniper woodlands by reducing threat for crown fires. With respect to fire breaks, are there fire models to demonstrate likely path of fire and where such breaks should be implemented to actually protect structures or large areas of PJ? With respect to thinning in the PJ, what evidence is there that this will reduced threat of wildfire? In this fire adapted system, thinning to the point of reducing fire might create an artificial system that no longer functions like a PJ woodland nor is capable of supporting PJ adapted species such as chipmunks, pinyon jays, or black bears.	Noted.

Reviewer	Location (Page, section, line, e.g.)	Reviewer Comment	WSMR Response
Dr. Jennifer Frey NMSU Dept. of Fish, Wildlife and Conservation 20 Mar 19		No evidence is provided on the location and nature of historical "meadows" within the PJ woodlands. Were there any? If so, why did they degrade? Will cause be corrected by thinning?	Locations shown in the EA Appendix C, Figures 1A, 2A, B
Dr. Jennifer Frey NMSU Dept. of Fish, Wildlife and Conservation 20 Mar 19		No information was presented on impact of fragmentation to PJ species caused by road fuel breaks.	Noted.
Dr. Jennifer Frey NMSU Dept. of Fish, Wildlife and Conservation 20 Mar 19		What will happen to slash due to manual thinning in PJ? Lop and scatter can cause outbreaks of Ips. Fuel can increase fire risk. Mulch can increase Ips and inhibit plant regeneration. I did not think these issues were covered in enough detail or rational.	Noted.
Dr. Jennifer Frey NMSU Dept. of Fish, Wildlife and Conservation 20 Mar 19		Is there evidence that placing slash into arroyos actually reduces erosion? I believe there is evidence that in some cases this can actually increase erosion	Addressed in the EA.
Dr. Jennifer Frey NMSU Dept. of Fish, Wildlife and Conservation 20 Mar 19		The document often discusses shrubs as "undesirable" and provides management goals for reducing them. That might be true in some lower elevation grassland vegetation where shrub encroachment is occurring via desertification. However, in the upper elevations of the Oscuras shrubs are some of the most important habitat elements as they are the sole berry-producing plants that afford food and a critical source of moisture for a host of species including the chipmunk. A one size fits all approach to shrubs is not advisable and berry and hard mast producing shrubs should be conserved. What evidence do you have that most shrubs will resprout from root collar?	Noted.
Dr. Jennifer Frey NMSU Dept. of Fish, Wildlife and Conservation 20 Mar 19		How are "juniper invaded grasslands" identified?	Described in EA pgs. 6-7.

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Dr. Jennifer Frey NMSU Dept. of Fish, Wildlife and Conservation 20 Mar 19		The plan states that pinyons with highest vigor will be conserved. Yet, Pg 24 discusses that larger trees are most likely to be of declining vigor. That would suggest that the largest trees would actually be the ones removed due to declining vigor. Declining vigor is a natural consequence of aging. Yet, the largest oldest trees produce the most seeds and should be conserved.	Noted.
Dr. Jennifer Frey NMSU Dept. of Fish, Wildlife and Conservation 20 Mar 19		As currently proposed, the Oscura Mountain chipmunk is likely to be the species most impacted by the plan. This species is state Threatened and a SAR. Rigorous analysis indicates that its site occupancy is dependent on pinyon woodlands and detection on mature pinyons (Perkins-Taylor and Frey). The woodlands occupied by the species in that study were unthinned and it is not known to what extent thinning will impact the species. The 40 m buffer of no pinyon cut from edge of escarpment may not be adequate to protect the species depending on the extent of the disturbance within that zone. The rationale and justifications for the thinning to improve wildlife habitat are not well justified and may not compensate for the risk to PJ dependent species such as the chipmunk and pinyon jay. No fire models were cited that can demonstrate that thinning in this habitat would reduce risk of wildfire	Addressed in EA. Removed proposed thinning from the NOP area (except 100 ft. around structures), and changed the buffer for no thinning to be 150 meters from escarpment edge.
Marie Sauter Superintendent White Sands National Monument 28 mar 19		Thank you for the opportunity to review and comment. At this time White Sands National Monument, National Park Service has no comments.	Thank you.

Reviewer	Location (Page, section, line, e.g.)	Reviewer Comment	WSMR Response
Cheryl T. Seager Director Compliance Assurance and Enforcement Division United States Environmental Protection Agency 30 Mar 19		The U.S. Environmental Protection Agency (EPA) has reviewed the Draft Environmental Assessment (EA) to the Oscura Mountains Ecosystem Management Planning Area. Our review is provided pursuant to the National Environmental Policy Act (NEPA), the Council on Environmental Quality (CEQ) regulations (40 CFR Pmis 1500 - 1508), and our NEPA review authority under Section 309 of the Clean Air Act. This EA evaluates the potential outcomes of a range of ecosystem management projects with the goal of sustain the training grounds for our military, while protecting valuable military structures from wildfire damage within the Oscura Mountains Planning Area. The proposed action consists of a combination of manual, mechanical, prescribed fire and chemical treatment methods to reduce hazardous fuels and restore ecological components and maintain natural fire regimes and native ecosystems. Based upon our review of the environmental analysis provided, EPA has no comments on the proposed action. We appreciate the opportunity to review this document.	Thank you.
Lindsay Smythe Refuge Manager San Andres NWR 8 Apr 19		I was unable to review the draft EA for the Oscura Mountains Ecosystem Management Planning Area in a timely manner; however I did review the draft FONSI and noticed that there is thinning of pinon-juniper stands proposed to meet a variety of objectives. I would like to bring to your attention the attached literature review on mechanical vegetation treatments of pinyon-juniper communities. This document was only released on February 25 and so not available for the drafting of this EA; however I would like to pass it along it hopes that the recommendations can be incorporated into future planning documents. Do Mechanical Vegetation Treatments of Pinyon-Juniper and Sagebrush Communities Work? A Review of the Literature February 2019	Thank you.

Reviewer	Location (Page, section, line, e.g.)	Reviewer Comment	WSMR Response
Matt Wunder Chief Ecological and Environmental Planning Division New Mexico Game and Fish 29 Mar 19		Page 10 states that the total footprint of the thinning needed for protection of facilities would not exceed 120 acres located near the escarpment at the top of the Oscura Mountains. Page 11, lines 5-6, state that the prescription for thinning would leave the largest, healthiest pinyon trees intact, with leave trees or clumps of trees distributed so that open space exists between remaining tree crowns. Lines 11-12 state that within 100-300 feet of structures, the goal of thinning is to produce a gap of 7 to 10 feet between the crowns of each tree or between clumps of trees. Lines 24-25 state that leave trees in the 100-300 foot treatment zone may be left in small clumps or as single trees. To reduce adverse effects to wildlife species of concern within the project area, the Department recommends that all treatments maintain clumps of trees rather than isolated single trees. We believe a clustered prescription is especially important to provide cover and nesting habitat for Oscura Mountains Colorado chipmunks *(Tamias quadrivittatus oscuraensis)* and pinyon jays *(Gymnorhinus cyanocephalus)* which have been documented within and around proposed treatment areas. The chipmunk is state listed as Threatened under the New Mexico Wildlife Conservation Act, and is considered by WSMR to be a Priority Species at Risk. Both species re designated as Category 1 (Immediate Priority) Species of Greatest Conservation Need (SGCN) in the State Wildlife Action Plan for New Mexico (NMDGF 2016). The Department therefore requests maintaining clumps of a minimum 3 to 5 trees that include the largest and oldest pinyon trees, especially around pinyon jay nests in or near the treatment polygons.	Addressed in EA, pg. 12, lines 10-12.
Matt Wunder Chief Ecological and Environmental Planning Division New Mexico Game and Fish 29 Mar 19	Page 12 Lines 1-2	Page 12, lines 1-2, state that a monitoring program designed to measure vegetation and wildlife response to disturbance (thinning) would be incorporated into the project-specific plan. Because of the rapid decline of pinyon jays within New Mexico, as stated on p. 32 of the DEA, the Department specifically requests that WSMR conduct post-treatment monitoring of pinyon jay nest sites to determine if pre-treatment nesting areas continue to be utilized following treatment. Collection of pre-treatment nest site use data in 2019 would provide important baseline data to assess effects of treatments. The Department also requests that WSMR assess the effects of thinning/fuels treatments on Oscura Mountains Colorado chipmunk and gray vireo *(Vireo vicinior),* a state Threatened species and Category 1 (Immediate Priority) SGCN (NMDGF 2016). This information would be extremely valuable for future management planning efforts.	Addressed in EA, pg. 13, lines 12-18.

Reviewer	Location (Page, section, line, e.g.)	Reviewer Comment	WSMR Response
Matt Wunder Chief Ecological and Environmental Planning Division New Mexico Game and Fish 29 Mar 19	Page 12 Lines 10-11	Page 12, lines 10-11, states that prescribed burning would occur from fall through early spring after fuels have cured, and outside of the primary nesting season for migratory birds. Because multiple pinyon jay nest trees are within or near the proposed meadow treatment north of Oscura Peak and other treatment polygons, and pinyon jays may initiate nests as early as February, prescribed burns should be avoided at these sites in early spring (i.e., treatments should occur in fall/winter to reduce impacts).	Addressed in EA, removed wording for burning in early spring around pinyon jay nest colony areas.
Matt Wunder Chief Ecological and Environmental Planning Division New Mexico Game and Fish 29 Mar 19	Page 12 Lines 30-31	Page 12, lines 30-31, state that tree thinning will exclude trees used for nesting by pinyon jays, and will occur outside of the nesting season (February through August). Exclusions to thinning should include pinyon jay nest trees and adjacent trees to maintain current canopy cover conditions at individual nest sites, and reduce potential adverse impacts to the colony. Thinning that removes all but lone nest trees may also increase vulnerability of nests to predation. To reduce the potential for mortality to Oscura Mountains chipmunk, and disturbance to nesting pinyon jays, the Department concurs with the commitment on p. 12, lines 35-36, that pile burning would occur during the fall/winter period after fuels have cured, and avoid the migratory bird nesting season. Fall burning would occur when young of the year chipmunks are active and could escape piles used for cover.	Addressed in EA, pg. 14, lines 6-7.
Matt Wunder Chief Ecological and Environmental Planning Division New Mexico Game and Fish	Page 13 Lines 21-23	Page 13, lines 21-23, state that fire-killed trees will be left standing to benefit birds. The Department recommends retaining existing pinyon and juniper snags in addition to fire-killed trees, to benefit wildlife such as bats and pinyon-juniper obligate nesting birds. Retaining mature juniper trees is also important to provide nesting trees for migratory birds and mast crops for wildlife.	Addressed in EA, pg.15, lines 1-2.
Matt Wunder Chief Ecological and Environmental Planning Division New Mexico Game and Fish 29 Mar 19	Page 14 Lines 4-6	Page 14, lines 4-6, state that juniper woodlands in the project area are potential habitat for gray vireos, and that prior to thinning, gray vireo surveys will be conducted and nest areas will be excluded from treatment. The DEA further states that the distance from nests to be excluded from thinning will be determined in cooperation with the Department and the U.S. Fish and Wildlife Service. The Department looks forward to determining the most effective buffers to protect gray vireo nest sites before project implementation occurs.	WSMR concurs with NMDGF and will contact USFWS and NMDGF for help in determining appropriate buffers if our surveys detect gray vireos and their nests.

Reviewer	Location (Page, section, line, e.g.)	Reviewer Comment	WSMR Response
Matt Wunder Chief Ecological and Environmental Planning Division New Mexico Game and Fish 29 Mar 19	Page 24 Lines 30-32	Page 24, lines 30-32, discuss the results of a 2004-2012 study by Johnson et al. (2017) suggesting that lightly thinning overly dense pinyon pine stands can increase pinyon nut mast crops and benefit pinyon jays and other wildlife. We provide the following additional information to guide treatment selection of pinyon pine leave trees. Pinyon pines have good nut productivity between 75-160 years of age, maximum productivity between 160-200 years, and declining productivity after 200 years (U.S. Forest Service Fire Effects Information System, https://www.fs.fed.us/database/feis/plants/tree/pinedu/all.html). The Department therefore recommends that treatments retain the most productive pinyon nut crop trees and the oldest, largest pinyons to maximize pinyon nut mast crops for wildlife. Higher basal area trees should be retained based on their selection by pinyon jays for use as nest trees (Johnson et al. 2018), and dense canopies around these nest trees should be retained to provide cover from nest predation.	Addressed in EA, pg. 26, lines 32-38.
Matt Wunder Chief Ecological and Environmental Planning Division New Mexico Game and Fish	Page 33 Lines 4-12	Page 33, lines 4-12, reference the draft pinyon jay conservation strategy. The final version of this strategy may not contain the recommendations as described in the DEA. Please eliminate the reference to this document and instead utilize the suggested recommendations as personal communications only.	Addressed in EA, removed reference to draft pinyon jay conservation strategy.
Matt Wunder Chief Ecological and Environmental Planning Division New Mexico Game and Fish	Page 34 Figure 4	Page 34, Figure 4, identifies multiple pinyon jay nest sites within or very near treatment area polygons. To minimize the potential for adverse effects to nesting pinyon jays, the Department recommends modifying polygon boundaries to completely exclude nest sites.	Addressed in EA by eliminating proposed thinning in the NOP area (except 100 ft. zone around buildings) and treatment areas near historic Pinyon jay nest areas.
Matt Wunder Chief Ecological and Environmental Planning Division New Mexico Game and Fish	Page 35 Lines 20-21	Page 35, lines 20-21, refer to retaining areas used for nesting by gray vireos. As stated above, we look forward to working with WSMR to determine appropriate treatment buffers around gray vireo nests, and re-iterate that it is important for wildlife to retain mature and productive juniper for the mast crop it produces.	Noted.

Reviewer	Location (Page, section, line, e.g.)	Reviewer Comment	WSMR Response
Matt Wunder Chief Ecological and Environmental Planning Division New Mexico Game and Fish	Page 52 Lines 27-29	Page 52, lines 27-29, references avoidance of "active nests." Treatments should not occur during the breeding season. Any trees with historic or recently used pinyon jay nests should be retained.	Addressed in EA , pg. 53, lines 27-29.
Matt Wunder Chief Ecological and Environmental Planning Division New Mexico Game and Fish	Page 54 Line 38	Page 54, line 38, should acknowledge that snags are also important for cavity nesting birds.	Addressed in EA, pg. 55, line 12.
Matt Wunder Chief Ecological and Environmental Planning Division New Mexico Game and Fish	Appendix B	Appendix B contains several errors regarding state status of wildlife species. The following species should be listed as SGCN: Mexican spotted owl, mountain plover, yellow-billed cuckoo, burrowing owl, loggerhead shrike, and pinyon jay. Additionally, black tern is not a state Species of Concern or SGCN.	Corrected as suggested in Appendix B.
Dr. Louis Bender 18 Apr 19		Discussion continues over appropriate management of woodlands in the Oscuras. This has resulted in comments that are intended to better inform management v. preservation discussions, including information that has been used to modify the original Oscuras Habitat Plan. Key issues include: 1. Is the information presented RE: species-of-concern “needs” in the Oscuras and subsequent “management implications” reliable? 2. What is the likely future of pinyon woodland in the Oscuras under a “preservation” approach as advocated by some publics? The species driving debate seem to be Oscura Mountain chipmunks and pinyon jays. In the following I briefly address these issues, including the reliability of the recent chipmunk information from the J. Frey study (Perkins-Taylor and Frey 2018). I do not address jays here because that bird has literally flown the coop, almost certainly due to the loss of its food source (healthy super-dominant pinyon and what should be abundant nut crops produced by these trees).	Noted.

Reviewer	**Location** (Page, section, line, e.g.)	**Reviewer Comment**	**WSMR Response**
Dr. Louis Bender 18 Apr 19		For chipmunk distribution and management of Oscuras habitat, the pertinent information is in Table 3 (Perkin-Taylor and Frey 2018), which lists the variables in the "best" supported occupancy models. The pertinent material here is the occupancy variables (detection is irrelevant, especially since the design ignored annual [seasonal] variation, which is likely the most important source of variation in chipmunk detection/distribution; see below). Of habitat variables in both models, 5 of 6 are uninformative (in **BOLD** below). Uninformative means that the CIs of variables included 0; that, in turn, means that the effect of variables cannot be excluded from no effect. 95% CI 90% Variable Beta SE Lower Upper Lower Upper Pinyon (Mod 1) 2.65 1.08 2.12 0.53 4.77 1.78 0.87 4.43 Pinyon (Mod 2) 2.99 2.12 4.16 **-1.17 7.15** 3.49 **-0.50 6.48** Scarp (Mod 1) 9.47 29.92 58.64 **-49.17 68.11** 49.22 **-39.75 58.69** Scarp (Mod 2) 6.79 4.08 8.00 **-1.21 14.79** 6.71 0.08 13.50 Elevation 3.26 2.37 4.65 **-1.39 7.91** 3.90 **-0.64 7.16** Pinyon* elevation -3.04 2.39 4.68 **-7.72 1.64** 3.93 **-6.97 0.89** To illustrate, consider the logit of the best supported model and predicted probability of presence. Evaluating the effect of the individual variables, the only informative variable is presence of pinyon veg class, and the point estimate indicates that if pinyon is present there is only a 29.5% likelihood of presence of chipmunk. The scarp variable alone indicates a 99.7% probability of chipmunk presence if within 150 m. If both variables are included, point estimate of probability of presence (i.e., not including the variability or dispersion in the estimate) is 100%. Obviously, model predictions are dominated by the scarp variable, which as noted above is completely uninformative.	Noted.

Reviewer	Location (Page, section, line, e.g.)	Reviewer Comment	WSMR Response
Dr. Louis Bender 18 Apr 19		Now, consider the logit of the best supported model but incorporating variance (i.e., the SE or 90% CIs) into model predictions. Without either variable, the model indicates that you could be 90% confident that the true probability of chipmunk presence is between <1 to 14%. Within 150 m of a scarp, you could be 90% confident that the true probability of chipmunk presence is between 0% and 100% (actually, without any study at all, you could do better; you could be 100% certain that the likelihood of chipmunk presence is between 0 and 100%). This illustrates why the scarp variable is uninformative; supported predictions span the continuum from absolutely not present (Prob = 0) to absolutely present (Prob =1). Acceptable CIs (i.e., 90% or better) of chipmunk presence will always include 0 if this variable is included. If classed as pinyon, you could be 90% confident that the true probability of chipmunk presence is between 6.6% and 71.3%! This variable also provides little useful information given how broad its prediction band is (it to largely spans the continuum from very likely not present to likely present. A model comprised of uninformative variables produces no informative or reliable information on chipmunk distribution, all illustrated above (Although not assessed here, the same issues regarding uncertainty apply to the MaxEnt model [there was no information presented as to model fit] and the power analysis to detect trend).	Noted.
Dr. Louis Bender 18 Apr 19		**Ignoring annual variation in distribution.** As seen in previous occupancy studies in the SAM/Oscuras, season (year) significantly affects distribution as species expand/contract numbers/distributions in response to resource availability. For chipmunks, an extremely r-selected species that can easily double or halve their numbers and distribution annually, annual variation in resource availability likely has the strongest impact on distribution/numbers. The pooled rotating sampling used with chipmunks ignored responses to annual variation both within years and among years. ((For example, the distribution and capture/camera night of turkeys differed significantly for each year of the Frey study based on captures from the Oscura Mega-carnivore grid. Turkey share many habitat affinities with chipmunks and/or pinyon jays, i.e., need for large super-dominant trees (roost and food), dependence on hard and soft mass for nutrition, etc. Trend and distribution of turkey waxed and waned with precipitation and resultant impacts on foods (indexed by pinyon nut crop) in the Oscuras)).	Noted.

Reviewer	Location (Page, section, line, e.g.)	Reviewer Comment	WSMR Response
Dr. Louis Bender 18 Apr 19		**Meaningless cover class (pinyon woodland from Muldavin).** Note that use of any other vegetation type map (i.e., GAP, etc.) would have resulted in an entirely different cover type association for chipmunks! Limitations of the Muldavin veg classification have been repeatedly discussed and are well known. As classed by Muldavin, the "pinyon" classes include a range of <1% pinyon to ca. 60% pinyon based on random (as opposed to stratified) sampling, so the class does not imply even significant pinyon presence, let alone pinyon-dominated woodland. This is further illustrated by the lack of influence of the Muldavin veg classes in terms of assessing vigor of pinyon as indexed by nut crop. In the Oscuras, nut crop was not related to the Muldavin classification, but was related to elevation and aspect. Thus, Muldavin classes apparently have little or no relationship to actual ecological site quality of pinyon in the Oscuras.	Noted.
Dr. Louis Bender 18 Apr 19		**Rigorous sampling?** It has been advocated that the Frey study included more accurate identification of chipmunks than previous work. However, no data has ever been produced to show that previous workers could not accurately identify chipmunks (or that the Frey study did). It is certainly possible to identify chipmunks from sightings as I have ca. 50 observations of chipmunks in the Oscuras in the last 4 y. While not all individuals seen can be reliably identified from the ground, to assume that data used in previous work is not supported by any data.	Noted.
Dr. Louis Bender 18 Apr 19		Based on some comments on and edits to the Plan, it is disturbing to think that many natural resources professionals believe that environments are static, and that if left alone the current pinyon-juniper woodland in the Oscuras will remain in a state similar to the current state. This shows a profound degree of ignorance of silvics of pinyon (see, for example, cursory review in USFS 1990) and the ecological history of pinyon-juniper woodland in the Southwest (without even considering the overwhelming influence of anthropogenic influences including fire). Just limiting focus to the ecologically static "preservation" paradigm, a number of reliable climate models now predict that the North American Southwest will become hotter and drier (Briske et al. 2015, Polley et al. 2013); that variability in annual precipitation will increase (Gherdi and Sala 2015); and that the onset of monsoon rains will occur later in the growing season (Cook and Seager 2013). This has significant implications for pinyon woodland in the Oscuras and elsewhere.	Noted.
Dr. Louis Bender 18 Apr 19		The climate in which pinyon was established in the Oscuras no longer exists. Trends in climate are challenging the ecological amplitude of pinyon, with pinyon being effectively "pushed" higher in elevation to maintain a suitable climate (hydrological) regime. There is no further "up" to go in the Oscuras. Under a "preservation" paradigm, pinyon will inevitably be lost in the hotter, drier climate regimes because of loss of its ecological state and competition from juniper.	Noted.

Reviewer	Location (Page, section, line, e.g.)	Reviewer Comment	WSMR Response
Dr. Louis Bender 18 Apr 19		Current super-dominant pinyon is dead or dying in the Oscuras. These will not be replaced under current climate and climate trends given current stand structure and density in the Oscuras. This effect is both water-related (less, more competition from juniper) and shade-tolerance related (while requiring a cover crop for establishment, pinyon is shade intolerant and does not have the ability to achieve canopy dominance or super-dominance in dense canopies because of extremely slow or negligible growth rates if not freed from competition). The remaining live higher-elevation canopy currently shows little nut production while lower elevation and thinned areas have shown large crops in similar sites, illustrating the stress currently experienced by larger pinyon in dense stands in the Oscuras. The high mortality of the super-dominant pinyon canopy similarly illustrates this, as does the degree of stress of canopy codominant pinyon. This stress will only increase with current climatic trends.	Noted.
Dr. Louis Bender 18 Apr 19		Even if the nonsense (including extreme interpretations of the "persistent pinyon-juniper woodland" theory) advocated and used to justify the "preservation" paradigm was true, the climatic conditions that produced the current pinyon woodland no longer exist. Without significant actions to (re)establish a stand structure to allow permit more rapid growth, pinyon will be lost due to climatic change. This is clearly evident in pinyon woodlands through the Oscuras and New Mexico, which are stressed due to moisture competition and disease-ridden. They will not persist under current trends.	Noted.
Dr. Louis Bender 18 Apr 19		This is true for the highest elevations of the Oscuras as well. These are the areas in close proximity to the scarp (i.e., within several hundred meters) and are the last refuge for pinyon in terms of its ecological amplitude (ecological requirements) with respect to hydrological regime. Withholding management aimed at decreasing competition to increase pinyon growth in these areas is a mistake and makes it highly likely that pinyon super-dominants will no longer occur in the Oscuras. The loss and stress faced by this element has already likely driven the loss of pinyon jay (no suitable food resources for the jay remain). That element cannot be reestablished by "preserving" current stand structure in the only areas that can best provide suitable ecological requirements for pinyon in the Oscuras. If functional pinyon woodlands are to be maintained in the Oscuras (and thereby species that depend upon mature functional pinyon, such as the pinyon jay and [possibly] Oscura Mountain chipmunk), pinyon in this area must be carefully freed from competition to maximize growth under the current climate.	Noted.

Reviewer	**Location** (Page, section, line, e.g.)	**Reviewer Comment**	**WSMR Response**
Dr. Louis Bender 18 Apr 19		Lit Referenced Briske DD et al. 2015. Climate-change adaptation on rangelands: linking regional exposure with diverse adaptive capacity. *Frontiers in Ecology and the Environment.* 13:249-256. Cook BI, Seager R. 2013. The response of the North American Monsoon to increased greenhouse gas forcing. *Journal of Geophysical Research: Atmospheres* 118:1690-1699. Gherardi LA, Sala OE. 2015. Enhanced precipitation variability decreases grass- and increases shrub-productivity. *Proceedings of the National Academy of Sciences* 112(41):12735-12740. Perkins-Taylor I., Frey J. 2018. Ecological factors……. Journal of Wildlife Management 82:1466-1499. Polley HW et al. 2013. Climate Change and North American Rangelands: Trends, Projections, and Implications. *Rangeland Ecology & Management* 66:493-511. USFS. 1990. Silvics of North America. Agricultural Handbook 654.	
USFWS, Region 2 Office of Migratory Birds 18 Apr 19	Sec. 3.4.0	Surveys for active nests for Pinyon Jays and avoidance of nests (new and old) should also be included in this section. I found it somewhere else but, as you did with grey vireos, suggest it be placed here too. Any treatments should be outside of the active nesting season (Feb-August; they can be very early nesters; though with surveys beforehand you can track that activity).	Addressed in EA, pg. 35, lines 18-21.