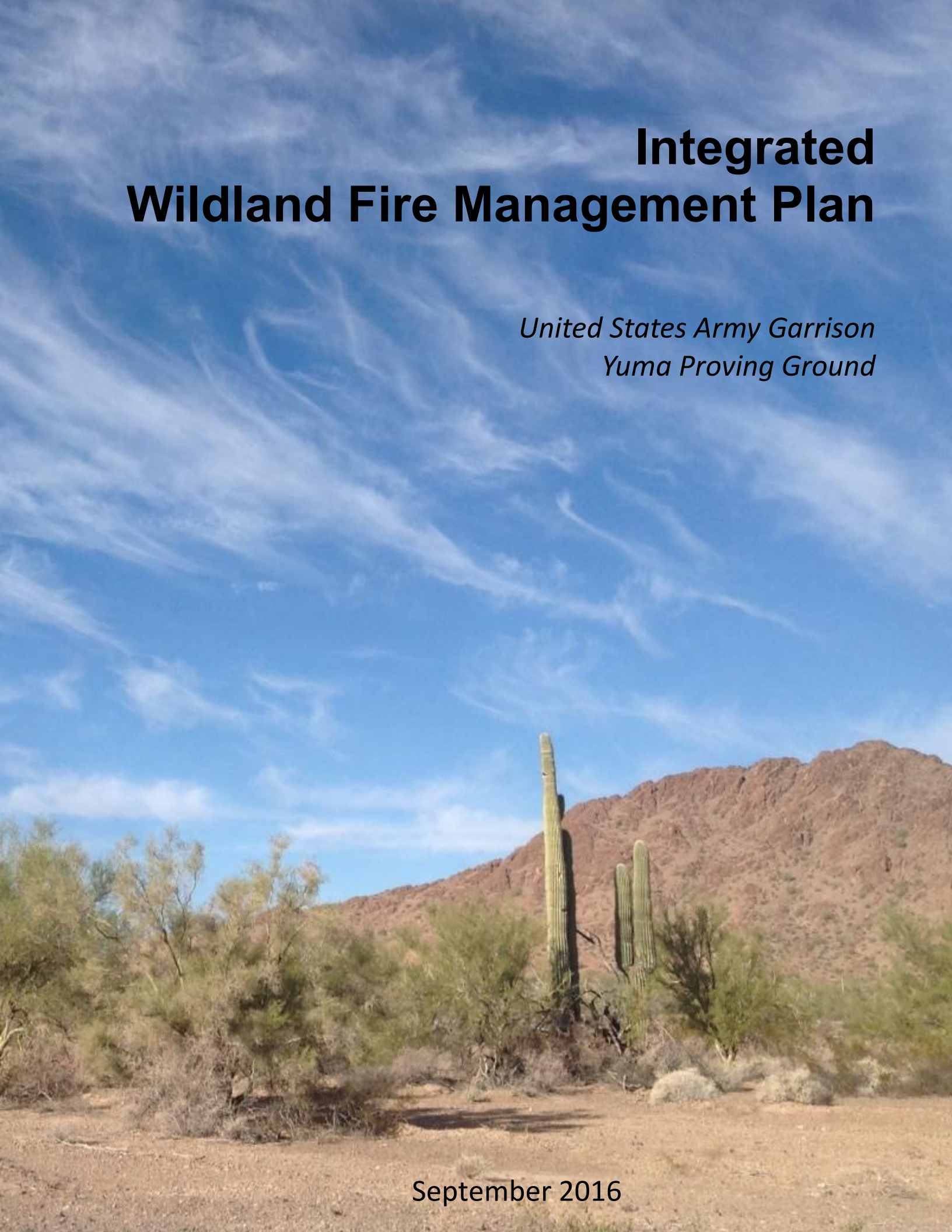
Integrated Wildland Fire Management Plan

United States Army Garrison
Yuma Proving Ground



September 2016

Integrated Wildland Fire Management Plan

United States Army Garrison
Yuma Proving Ground

September 2016

Reviewed by: BALL.GERALD.E.1232251200 Digitally signed by BALL.GERALD.E.1232251200 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=BALL.GERALD.E.1232251200 Date: 2016.11.16 17:22:46 -07'00' Date: _____

Gerald E. Ball
Fire Chief
Fire Department
United States Army Garrison, Yuma Proving Ground

Reviewed by: STEWARD.DANIEL.M.1457921299 Digitally signed by STEWARD.DANIEL.M.1457921299 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=STEWARD.DANIEL.M.1457921299 Date: 2016.11.16 16:57:12 -07'00' Date: _____

Daniel Steward
Chief (Acting)
Directorate of Public Works, Environmental Sciences Division
United States Army Garrison, Yuma Proving Ground

Approved by: ROGERS.GORDON.KEITH.1150031717 Digitally signed by ROGERS.GORDON.KEITH.1150031717 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=ROGERS.GORDON.KEITH.1150031717 Date: 2016.11.17 07:00:52 -07'00' Date: _____

Gordon K. Rogers
Garrison Manager
United States Army Garrison, Yuma Proving Ground

Approved by: MURRAY.RANDY.1059135283 Digitally signed by MURRAY.RANDY.1059135283 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=MURRAY.RANDY.1059135283 Date: 2017.01.16 17:18:38 -07'00' Date: _____

Colonel Randy Murray
Commander
United States Army, Yuma Proving Ground

Executive Summary

Per Army Wildland Fire Policy Guidance dated September 4, 2002 and AR 200-1 Chapter 4, Section 3.d.12 'Wildland Fire Management', and to meet internal land management goals and objectives, the U.S. Army Garrison Yuma Proving Ground (USAG YPG) has developed this Integrated Wildland Fire Management Plan (IWFMP). This plan replaces and supersedes any previous wildland fire policy put forth by YPG, but does not replace or supersede any DOD directive or instruction.

Wildfires are generally too infrequent and limited in extent to pose a significant threat to the sensitive ecosystems, cultural sites, and testing/training lands of USAG YPG. The vast majority of USAG YPG is unburnable except under extreme vegetation growth conditions. However, following unusual periods of excessive rainfall, such as occurred in 2005, very large and destructive wildfires are possible due to the prodigious vegetation that can be produced following such precipitation events. If and when fires of this magnitude do occur, they can be a hindrance to operations.

USAG YPG maintains testing ranges in order to evaluate weapons, vehicles and armament for use by the Army. USAG YPG provides facilities for developmental and operational testing for new systems as well as training for troops. This testing and training requires numerous actions that pose the risk of igniting a wildfire. This IWFMP presents a comprehensive approach to avoiding unwanted wildfires and managing them when they occur to reduce associated costs and damages. USAG YPG will implement this plan in compliance with all applicable laws and regulations, to fulfill the requirements established by the Army Wildland Fire Policy Guidance, and to mitigate the impacts of testing/training-related fires.

This IWFMP is specific to USAG YPG and conveys the methods and procedures necessary to minimize fire frequency, severity, and size while allowing USAG YPG to fulfill its mission as a military testing and training range. It describes the actions to be taken and defines the responsibilities of all offices, departments, and agencies involved. The IWFMP includes information about land use and current conditions, fuels, weather, values at risk, relevant Army and other policies, organization, and specifics on pre-suppression and maintenance actions.

The USAG YPG Fire Department is the proponent for this plan. Individuals responsible for wildland fire management include the Wildland Fire Program Manager (WFPM), the USAG YPG Fire Chief, and the YPG Range Operations Manager. The duties of the WFPM are assigned to the USAG YPG Fire Chief.

This plan will be reviewed every two years and updated every five years to ensure the latest information is consistently incorporated into USAG YPG wildfire prevention and suppression procedures. An ad hoc review committee will be convened by the installation Wildland Fire Program Manager and will consider fire activity, prevention, and response effectiveness. The committee will conduct an audit of fire expenses (e.g., annual budgets, actual expenditures during suppression activities, etc.) and recommend what, if any, changes are necessary to improve the Wildfire Management Program. In addition, this plan may be changed as necessary based on the recommendations of the ad hoc committee to account for the constantly evolving requirements placed on this program.

Table of Contents

List of Figures

List of Tables

List of Acronyms

AAR	After Action Review
ADEQ	Arizona Department of Environmental Quality
AGFD	Arizona Game and Fish Department
AR	Army Regulation
BLM	Bureau of Land Management
DoDI	Department of Defense Instruction
DPW	Directorate Public Works
ESA	Endangered Species Act
FD	Fire Department
FDRS	Fire Danger Rating System
FMA	Fire Management Area
IC	Incident Commander
ICRMP	Integrated Cultural Resources Management Plan
ICS	Incident Command System
IMCOM	Installation Management Command
INRMP	Integrated Natural Resources Management Plan
ITAM	Integrated Training Area Management
IWFMP	Integrated Wildland Fire Management Plan
LCES	Lookouts, Communications, Escape Routes, and Safety Zones
MOU	Memorandum of Understanding
NFPA	National Fire Protection Association
NFIRS	National Fire Incident Reporting System
NIFC	National Interagency Fire Center
NRHP	National Register of Historic Places
NWCG	National Wildfire Coordinating Group
NWR	National Wildlife Refuge
OIC	Officer in Charge
PM10	Particulate matter less than 10 microns in diameter
PPE	Personal Protective Equipment
RAWS	Remote Automated Weather Station
RH	Relative Humidity
SGCN	Species of Greatest Conservation Need
TCP	Traditional Cultural Property
YPG	U.S. Army Garrison Yuma Proving Ground
USFWS	U.S. Fish and Wildlife Service
UXO	Unexploded Ordnance
WFAS	Wildland Fire Assessment System
WFPM	Wildland Fire Program Manager
WIMS	Weather Information Management System
USAG YPG	U.S. Army Garrison Yuma Proving Ground

1 Wildland Fire Management

1.1 Goals and Objectives

1.1.1 Goals

a) Lay out the methods and protocols necessary to control fire frequency, intensity, and size on USAG YPG lands in order to comply with federal and state laws and meet USAG YPG's land stewardship responsibilities.
b) Provide for firefighter and public safety while allowing continuation of military testing and training necessary to maintain a high level of combat readiness.

1.1.2 Objectives

a) Through a program of prevention, pre-suppression, and suppression, protect all installation infrastructure and buildings, and, to the extent possible, natural and cultural resources.
b) Support the goals and objectives of existing USAG YPG land management plans.
c) Coordinate and cooperate where possible and beneficial with other federal, state, and local agencies through mutual aid agreements and/or memoranda of understanding.
d) Base all fire management activities on the best available science.
e) Base fire management decisions on an evaluation of social factors, resource values, and economic considerations.
f) Continually evaluate and improve upon fire management policies and procedures with the goal of constantly improving fire protection for USAG YPG lands and resources.

1.1.3 Specific Objectives

a) No military-related fires starting or burning outside of installation boundaries.
b) Limit all fires to less than 1000 acres.

1.2 Compliance with Policy, Laws, and Regulations

1.2.1 U.S. Army Policy

All policies in this document meet or exceed the requirements established by the Army's Wildland Fire Policy Guidance dated September 2002 and Army Regulation 200-1, and are in compliance with Army Regulation 420-1 Army Facilities Management and DoDI 6055.06 DoD Fire and Emergency Services Program.

1.2.2 Federal Wildland Fire Policy

All policies in this document are in accordance with the 2001 Federal Wildland Fire Management Policy, to which the Department of Defense is a signatory.

1.2.3 U.S. Army Garrison Yuma Proving Ground Policy

The IWFMP also conforms with policies established by the USAG YPG Integrated Natural Resources Management Plan (INRMP) and Integrated Cultural Resources Management Plan (ICRMP).

1.2.4 Federal Regulatory Requirements

There are multiple federal laws that apply to wildland fire management. This IWFMP complies with all portions of all pertinent laws including:

- Endangered Species Act (1973)
- National Historic Preservation Act (1966)
- Clean Air Act (1963)
- Clean Water Act (1972)
- National Environmental Policy Act (1969)
- Migratory Bird Treaty Act (1918)
- Invasive Species Executive Order (1999)
- Sikes Act (1960)

1.3 Location

U.S. Army Garrison Yuma Proving Ground is located in Yuma and La Paz counties in the southwest corner of Arizona, approximately 25 miles (40 kilometers) north of the City of Yuma (Figure 1). The Kofa National Wildlife Refuge (NWR) is nested within the "U" shape of the USAG YPG border. The Cibola and Imperial NWRs are west of USAG YPG and the Imperial NWR shares a portion of its boundary with USAG YPG. Neighboring portions of Kofa and Imperial NWRs are designated as wilderness. BLM wilderness areas in the Trigo Mountains and Muggins Mountains share boundaries with USAG YPG as well.

1.4 Organization and Responsibilities

The responsibilities listed below are a short summary of the major requirements of each individual, directorate, or agency. Additional responsibilities are detailed throughout the IWFMP.

1.4.1 U.S. Army Garrison, Yuma Proving Ground (USAG YPG)

1.4.1.1 USAG YPG, Garrison Manager

The Garrison Manager has overall responsibility for fire prevention and protection requirements. The Garrison Manager will:

- Define the roles and responsibilities that are laid out in this IWFMP.
- Delegate to the Wildland Fire Program Manager to oversee the wildland fire management program.
- Delegate to the USAG YPG Fire Chief to oversee wildland fire prevention and suppression activities.
- Ensure sufficient funding is available to staff and execute the IWFMP.
- Approve the deployment of USAG YPG civilian firefighters to off-installation incidents. Army Wildland Fire Policy Guidance requires the Garrison Manager to approve the deployment of Army civilian firefighters to any off installation incident not covered by a mutual aid agreement.

1.4.1.2 Chief, Yuma Proving Ground Fire Department

The USAG YPG Fire Chief is responsible for the management of fire and emergency services at USAG YPG and serves as a liaison with the U.S. Fish and Wildlife Service (USFWS), U.S. Bureau of Land Management (BLM), and other agencies. The USAG YPG Fire Chief will ensure that supplies, equipment, training, mutual aid agreements, and qualified personnel are available to meet the goals and objectives of the IWFMP at USAG YPG.

Yuma Proving Ground

Figure 1

Integrated Wildland Fire Management Plan

General Location

Legend

USAG YPG Boundary

N
W
E
S

Kilometers
0 30 60 90 120

Miles
0 30 60 90 120

Figure 1. Location of USAG YPG.

The USAG YPG Fire Chief is responsible for ensuring that wildland fire responses at USAG YPG are in accordance with this IWFMP, Army Regulations (AR 420-1), and Department of Defense Instruction (DoDI) 6055.06, Fire Protection Program. The USAG YPG Fire Chief will ensure all USAG YPG FD firefighters are familiar with protocols for firefighting on USAG YPG lands, particularly those governing safety procedures.

The USAG YPG Fire Chief will work with cooperating agencies to ensure an effective response to all wildland fires at USAG YPG.

1.4.1.3 Yuma Proving Ground Wildland Fire Program Manager

The duties of the Wildland Fire Program Manager (WFPM) are the responsibility of the USAG YPG Fire Chief. This individual bears primary responsibility for ensuring the IWFMP is appropriately and expeditiously developed, implemented, and updated. The WFPM will collaborate closely with the Directorate of Public Works Environmental Sciences Division (DPW-ESD) to ensure consistency with the INRMP/ICRMP and other applicable operating instructions such as State and local regulations. The WFPM will also collaborate closely with USAG YPG Range Control.

The WFPM will ensure the priorities and needs of the Wildland Fire Program are communicated to the DPW-ESD Chief for appropriate resourcing and action in order to achieve its goals and objectives.

1.4.1.4 USAG YPG Range Operations Manager

The Range Operations Manager is responsible for supporting the provisions of the IWFMP and enforcing applicable testing/training directives and regulations, including restrictions on, or cessation of, test and training activities based on the need for access to wildland fires to meet fire suppression requirements. The Range Operations Manager ensures fire reporting procedures are adhered to at all installation range areas. The Range Operations Manager will provide range traffic management support during fire incidents.

Range Control personnel will support the IWFMP and the firefighting air and ground response teams. Range Control shall:

- Be familiar with the IWFMP.
- Know who to notify in the event of wildfire and how to notify them.
- Ensure emergency radio traffic is kept to a minimum.

1.4.1.5 USAG YPG Test and Training Supervisors

USAG YPG Test and Training Supervisors are responsible for ensuring proper fire prevention measures are taken by down range personnel at all test and training locations and fires promptly reported. Down-range personnel will provide support to firefighters in the form of communications and safety during wildfire incidents.

1.4.1.6 Chief, USAG YPG Environmental Sciences Division

The USAG YPG Environmental Sciences Division Chief will provide environmental and cultural resources oversight, technical support, and planning assistance to the WFPM.

1.4.1.7 USAG YPG, Director of Installation Safety

The Director of Installation Safety ensures that the IWFMP is carried out in compliance with relevant safety operating procedures.

1.4.1.8 Non-Military Range Users

Non-military range users are responsible for understanding and adhering to fire prevention procedures and immediately reporting all fires to Range Control.

1.4.2 External Stakeholders

1.4.2.1 U.S. Fish and Wildlife Service

The USFWS is charged with ensuring compliance with the protections required by the Endangered Species Act (ESA). USAG YPG works closely with the USFWS to determine what testing/training, natural resource, and fire management actions are necessary and/or acceptable under ESA. USAG YPG currently has a mitigation program defined by the Biological Opinion noted in Section 1.12.1.2. The USFWS is also a partner with USAG YPG in wildland fire mitigation and suppression via a Memorandum of Understanding.

1.4.2.2 U.S. Department of Interior Bureau of Land Management, Yuma Field Office

The Yuma Field Office of BLM administers neighboring public lands and an expected cooperator in efforts to reduce landscape fire risk, as well as a partner with USAG YPG in wildland fire mitigation and suppression via a Memorandum of Understanding.

1.4.2.3 Arizona Game and Fish Department (AZGFD)

The AZGFD is responsible for managing fish and wildlife resources in the state of Arizona. They provide technical expertise and assistance with wildlife habitat management projects as well as conservation.

1.4.2.4 Private Landowners

There are numerous land owners in the immediate vicinity of USAG YPG that may be affected indirectly or directly by wildfires on USAG YPG properties.

1.5 Cooperative Wildland Firefighting Resources

USAG YPG maintains a Memoranda of Understanding (MOU) with the BLM (Appendix 1) and the USFWS. This MOU includes considerations for mutual aid in the event of wildfires. The MOU shall be updated once every five years or as specified in the MOU. It may be updated more frequently at the discretion of the USAG YPG Fire Chief.

1.6 Smoke Management

Given the small size of fires, their rarity, and the relatively remote location of USAG YPG, smoke management is not a major priority for USAG YPG fire managers. Smaller fires may affect Highway 95, but are unlikely to affect any other sensitive resources due to the distance to them and dispersion in between. Within five miles outside of the USAG YPG boundary, there are no population centers of greater than 500 people, no hospitals, no schools, no nursing homes, and no airports, all of which are primary concerns for smoke management.

As is true anywhere, large fires could potentially affect sensitive resources many miles away. The city of Yuma is the closest significant population center and includes hospitals, an airport, schools, nursing homes, numerous roads including an inter-state highway, and other sensitive smoke receptors.

Portions of USAG YPG located in Township 7S, Range 21W fall within the Yuma PM10 Nonattainment Area as defined by the Arizona Department of Environmental Quality and the Environmental Protection Agency (ADEQ 2006). However, no prescribed burning is planned at USAG YPG, and wildfire smoke is not regulated under the Clean Air Act. Therefore, air quality is not a concern at this time.

1.7 Safety and Emergency Operations

1.7.1 General Wildland Fire Safety

Public, employee, and firefighter safety is the first and highest priority. Safety is an attitude that must be promoted at all operational levels and is the responsibility of everyone assigned to a wildfire incident. Once personnel are committed to an incident, they become the most valuable resource to be protected.

Fighting wildfires is inherently dangerous, and firefighters risk injury or even death in these operations. Nationally, there are wildland firefighter fatalities nearly every year. In addition to the danger from the fire itself, the need to use cutting tools, mobile apparatus, heavy equipment, and aircraft add to the risk involved. If firefighters are properly trained and equipped, know how to recognize potentially hazardous situations and how to mitigate them, they can reduce or mitigate much of that risk.

The training program and the qualification and certification process are the foundations of the safety program. Only qualified personnel will be assigned firefighting duties. All firefighters must meet current DoD training standards for wildland fire duties (Section 1.18).

The Incident Commander (IC) on every fire shall ensure that safety briefings occur at all operational levels. The identification and location of escape routes and safety zones will be stressed at every briefing. LCES – Lookouts, Communications, Escape Routes, and Safety Zones – will be briefed and in place at every fire without exception. Fire operations cannot be conducted safely without all four in place. All fire suppression personnel will be knowledgeable of the NWCG “10 Standard Fire Orders” and “18 Watch Out Situations” (Appendix 2).

All Personal Protective Equipment (PPE) shall meet or exceed the NFPA 1977 Standard on Protective Clothing and Equipment for Firefighters (current edition). A list of mandatory PPE is included in Table 1.

Table 1. Mandatory personal protective equipment. All firefighters will carry all of this equipment on every deployment.

Equipment	Required when...
Hard hat. Chinstrap is required for operating in or on a helicopter.	On the fireline; in helicopters; operating portable pumps or chainsaws.
All leather, minimum 8" high boots with slip and melt-resistant soles and heels. No steel toes.	On the fireline.
Flame resistant clothing (*e.g.*, Nomex, Tecasafe). Sleeves should be rolled down.	On the fireline, in helicopters.
Leather or other approved gloves	On the fireline; in helicopters; operating portable pumps or chainsaws.
Eye, face, and neck protection	When necessary.
Fire Shelter (new generation)	On the fireline
Hearing protection	When working with high noise-level firefighting equipment, such as helicopters, air tankers, chain saws, pumps, etc.
Chaps (only required for sawyers and swampers).	When operating or swamping for chainsaws.
Dust mask	When necessary.

It is mandatory that all firefighting personnel be equipped with the proper PPE necessary for fighting wildfires. Wildland firefighters must be intimately familiar with the tools used and PPE worn. Knowledge of proper selection, use, and care of the various tools used in wildland firefighting aids firefighters in performing their job as efficiently and effectively as possible. Likewise, knowledge of the proper donning, care, capabilities, and limitations of PPE gives firefighters a better sense of which situations are tenable and which are not. Firefighting personnel will ensure that proper PPE is worn at all times when actively engaged in firefighting duties.

1.7.2 Unexploded Ordnance (UXO)

Explosive hazards may be encountered at any time at USAG YPG even when no testing/training is occurring. Duds on the ranges and in the testing/training areas and live ammunition or explosives in the possession of military training units on the ranges create extremely hazardous conditions. Unexploded ordnance on the ranges is destabilized when heated by a wildfire and may detonate at any time.

It is the policy of the USAG YPG Fire Department to remain on roads whenever fighting fires within the USAG YPG boundary. Exceptions to this policy are authorized when firefighters are accompanied by demolitions technicians from the Ammunition Recovery Branch. Under these circumstances, firefighting in these areas may be approved if the requirements of Army Reg. DA PAM 386-63 Section 2-1,h are fulfilled. Firefighters will only request entry to UXO areas when fighting a fire there is necessary to establish or maintain control of the perimeter or to protect values at risk (as assessed by the Incident Commander).

1.7.3 Live-Fire Military Testing and Training

Live-fire range facilities are hazardous whenever live-fire is occurring. They are hazardous from the firing line forward (toward the impact area) during live-fire operations. Access to the down range portion of the live-fire ranges to conduct firefighting operations is prohibited to all personnel while live-fire is taking place. A responding IC must ensure that these ranges are in a “check or cease fire” condition before sending fire suppression forces down range. Proper communication with Range Control is essential during firefighting responses on live-fire ranges.

1.8 Risk Analysis

1.8.1 Ignition Sources

Ignition sources on USAG YPG lands include lightning, arson, accidental ignitions, and munitions used in military testing and training. Of these, military munitions cause the majority of ignitions (personal comm., USAG YPG Natural Resources Manager and USAG YPG Fire Chief). Military activities generally require the use of large numbers of potentially fire prone munitions and training aids. Research at other military installations where fire causes are tracked indicates the principal ignition sources are likely to be tracers, pyrotechnics, illumination rounds, and explosive ordnance in order of decreasing likelihood of ignition cause probability. However, USAG YPGs mission as a test facility includes the use of a wider variety of munitions than at most training installations and it is difficult to draw comparisons.

Lightning strike density within USAG YPG is low relative to the rest of the continental U.S., averaging approximately 1 cloud to ground strike per km^2 per year (Vaisala 2011). This is similar to much of the western U.S., which experiences a strike density between 0.1 and 1.0 cloud to ground strikes per km^2 per year (Vaisala 2011). Given that only a small fraction of lightning strikes are positively charged and these are thought to be more likely to produce a fire, the number of lightning strikes likely to start a fire on USAG YPG lands is very low.

Although they do occur, arson and accidental ignitions are rare due to the limited access of the public to USAG YPG lands, and account for only a small portion of the ignitions. Road-related ignitions (i.e., cigarettes, catalytic converters, sparking trailer chains, etc.) are a major ignition source nationwide, and Highway 95, which bisects USAG YPG, could be reasonably expected to be a source of ignitions in the future, but fuel discontinuity adjacent to the highway reduces the overall risk potential.

1.8.2 General Risk Factors

Wildfire risk in the Sonoran Desert is closely related to vegetation and climatic patterns. Patterns of fire frequency, season, size, severity, and uniformity are functions of existing vegetation conditions, weather, elevation, physiographic features, ignition sources, and fire suppression activities. Wildfires on USAG YPG very rarely result from natural causes, such as lightning; they are more often caused by military activities, with ignition a by-product of testing or training actions. Live-fire provides one potential ignition source and the potential for ignition is frequently down-range in very remote areas.

Fuels are sparse throughout USAG YPG, and as a result fires are very rare. Those fires that do occur are naturally limited to a very small area due to a lack of contiguous fuels to sustain fire spread. Fires in washes have the potential to carry for some distance due to the presence of additional vegetation, but this generally requires winds blowing parallel to the wash.

The most significant fuels issue at USAG YPG currently exists along the Colorado River just west of the USAG YPG boundary where extensive vegetation grows due to the proximity to water. The Howard Cantonment area is most at risk from fires originating in these dense fuels. However, the thick fuels along the river become much sparser as they approach the outskirts of the cantonment area, and represent only a minor risk to the structures there. There are few values at risk within the thick fuels along the river corridor.

In the longer term, invasive species will likely begin to invade USAG YPG, particularly in disturbed areas, and provide contiguous fuels through which fire can easily propagate. Similar invasive species invasions in the Great Basin have led to massive wildfires that virtually extirpate native species there, and the desert southwest could experience a similar fate should species such as Buffelgrass (*Pennisetum cilare*) become widespread.

Provided fuel exists for fire propagation, weather conditions are conducive to significant fire spread the majority of the time. Fuel moisture levels are consistently very low (see table 2 in Section 1.11.4), with one hour fuels (fine fuels) maintaining mid-day moisture contents of 3% or less more than 50% of the time. Live herbaceous fuels are consistently cured through the majority of the year. Mid-day relative humidity is consistently less than 20%.

Dominant wind directions will push fires to the northeast and southwest. Fires in the Kofa region thus can pose a significant threat of crossing the installation boundary if started near the boundary.

Taken together, sufficient fire weather and climate conditions exist to support fire, but fire risk is limited by low availability of fuels. It is thus critical for fire managers to be aware of significant precipitation events and their effect on the growth of annual herbaceous fuels.

1.9 Fire History

The following information has been compiled through conversations with the USAG YPG Natural Resources Manager and USAG YPG Fire Chief as well as discussions with individuals from partner agencies.

Although wildfires are a concern, they are rarely a significant problem. At USAG YPG, most wildfires are a result of military activity; the potential for ignition of fires and development of extensive wildfires is greatest in the Kofa and Cibola Regions, where live fire activities occur, but is still very low. Because wildfires are quickly suppressed in the Laguna Region, the potential for wildfire escape there is low as well.

Wildfires can occur any time of the year, but do tend to follow the general bi-modal precipitation pattern of the region (i.e., fewer fires can ignite during the 'wet' season than the 'dry' seasons (see Figure 3 in Section 1.11.4)), although the number of fires varies from year to year. Many fires are less than ten acres, and these fires are commonly isolated to a single tree or bush. Large fire events, while rare, do occur. For example, in early October 2005, a wildfire that originated on USAG YPG burned more than 30,000 ac, including 26,000 ac on Kofa National Wildlife Refuge (U.S. Army Garrison Yuma Proving Ground 2012). These large fires tend to occur when antecedent climatic conditions, particularly rainfall patterns, induce a flush of herbaceous and grassy vegetation that makes the environment much more conducive to fire spread. It is important to note that 2005 is the only year in anyone's recollection that produced fires of this scale.

1.10 Fire Management Areas

Fire Management Areas (FMAs) are often defined in a fire management plan to delineate areas within which fire management protocols differ. In this IWFMP, USAG YPG is considered a single FMA and fire management protocols are equivalent throughout the installation. FMAs are not discussed further in this IWFMP.

1.11 Wildland Fuels Factors and Fire Behavior

1.11.1 General Vegetation and Land Cover

Despite USAG YPG's harsh climate, many plants not only survive but thrive. The extreme aridity characterizing this region is reflected in open plains covered sparsely with drought-tolerant shrubs, grasses, and cacti. Broad flat valleys with low mountain ranges of almost barren rock characterize much of the installation. Three broad, largely unburnable land cover types cover nearly three quarters of USAG YPG's land area: Desert pavements, mountain highlands, and creosote bush scrub. Washes comprise less than 5% of the land area, but represent the majority of the burnable area. The remaining undeveloped areas are a mixture of badlands, dunes, rolling hills, and mesquite bosque.

1.11.2 Fuel Types and Characteristics

Fuel type characterization was completed by an Installation Management Command (IMCOM) Wildfire Risk Assessment, and information from that effort is the primary source for fuels information in this IWFMP (Figure 2, Appendix 3). Fire behavior fuel models (per Scott and Burgan 2005) are denoted by their fire carrying fuel type (i.e., grass – G, grass / shrub – GS, timber – litter, TL) and a numerical identifier (e.g. 'GR2').

The IMCOM Risk Assessment Team found the vast majority of USAG YPG to be unburnable except under the most extreme vegetation conditions. This contrasts from previous assessments by Kaya and Associates, Inc. 2011. The landscape is dominated by vegetation that is too sparse to carry fire and only the washes and some isolated stands of more robust vegetation will produce spreading fires. Only in a highly unusual precipitation year, such as was observed in 2005, will sufficient vegetation be produced in successive months to enable large wildfires. Given the extremely limited potential for fire spread, a full fire behavior analysis was deemed unnecessary for this IWFMP.

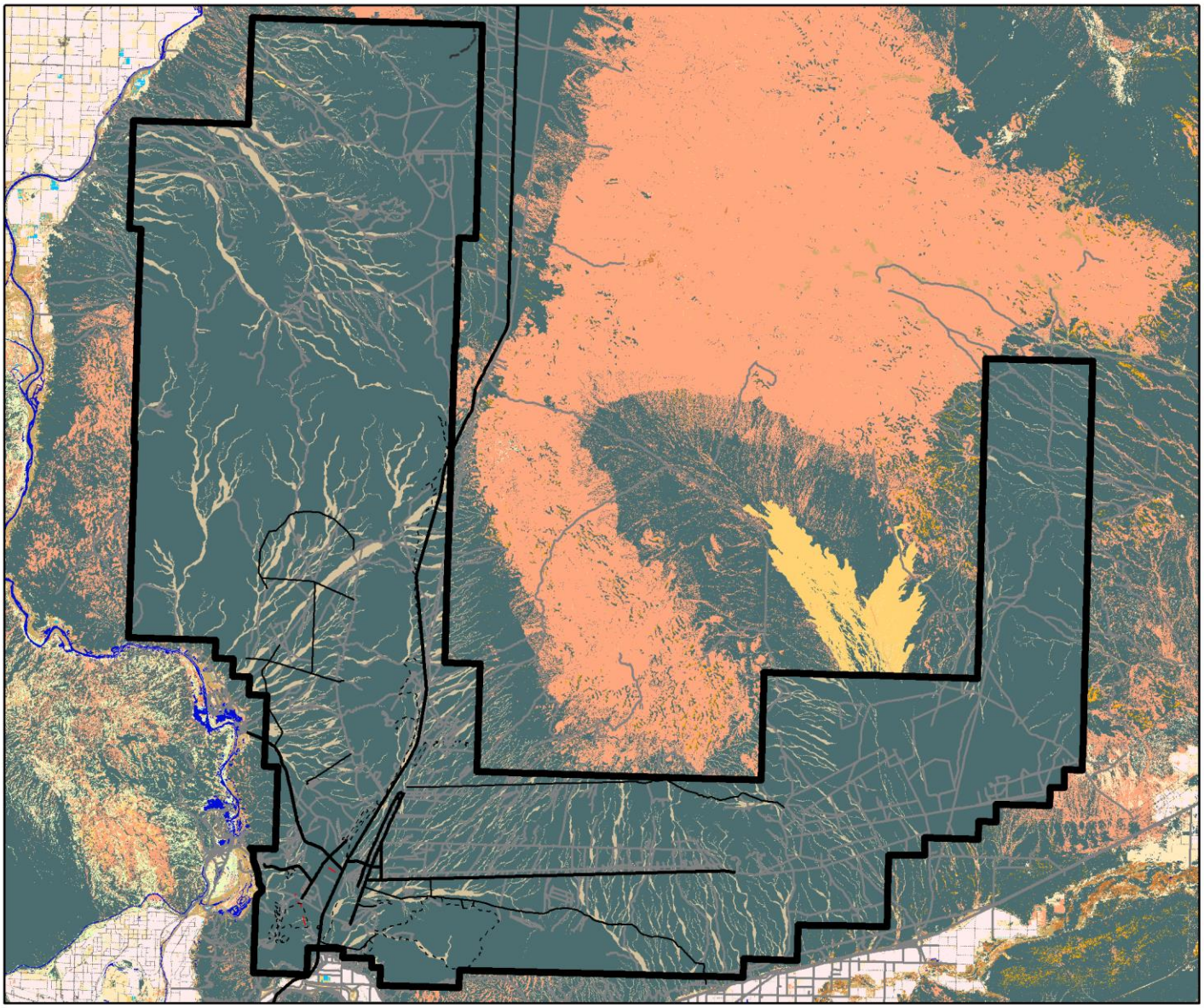
Kaya and Associates Inc. found sufficient fuels throughout USAG YPG to justify using fuel models that allow fire to spread throughout almost the entire installation. While it is not the intent or purpose of this document to critique those findings, it should be noted that there are very substantial differences in the mapped fuels of Kaya and Associates Inc./LANDFIRE versus those mapped by the IMCOM Risk Assessment Team. This could be due to numerous factors including the year and/or month in which the different fuels mapping efforts were carried out, but it is hard to imagine the landscape of USAG YPG carrying wide-ranging fires except under the most prodigious and prolonged of precipitation years.

Yuma Proving Ground

Figure 2

Integrated Wildland Fire Management Plan

Fire Behavior Fuel Model Map



1.11.3 Weather and Climate

USAG YPG is located in the Lower Colorado River subdivision of the Sonoran Desert, the driest and hottest portion of the driest, hottest desert in North America. Clear skies, low relative humidity, slight rainfall, and large daily temperature variations are the norm. This area is characterized by a bimodal precipitation pattern (rainy season in both the winter and summer). The higher elevations typically experience greater amounts of precipitation than lower elevations. Mean monthly precipitation varies from 0.01 to 0.67 inches throughout the area, with average annual precipitation around 3.5 inches per year (Western Regional Climate Center 2015). Summer monsoons bring localized, but violent, thunderstorms. Evaporation rates are approximately 30 times the average annual precipitation (Western Regional Climate Center 2015), which is very high even relative to other areas within the Sonoran Desert. Because of the combination of high temperatures and low precipitation, the Lower Colorado River Valley is the driest subdivision of the Sonoran Desert (Brown 1994).

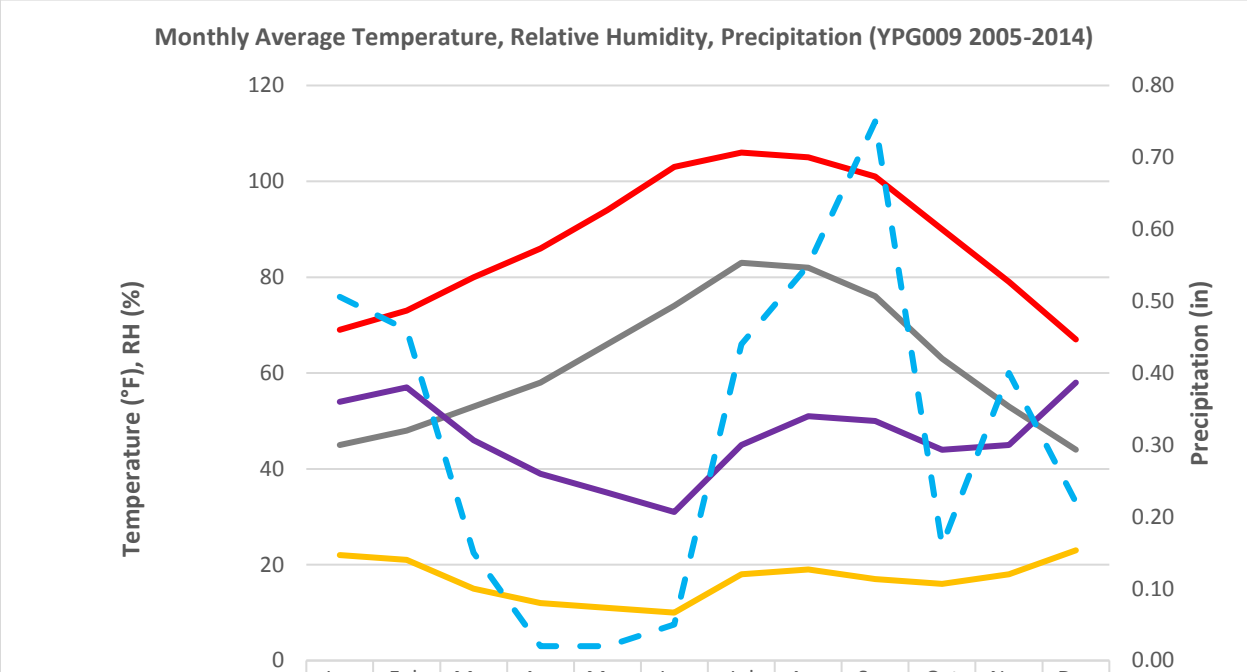
Weather data for Yuma Proving Ground was acquired from three weather stations maintained by USAG YPG (stations 005, 009, and 013). The three are spread across the installation; the data indicate extremely strong correlations, and as a result, only the data from the YPG 009 station, which is in the southwest portion of the installation, is presented here. The YPG 009 station is located at 32.8836°N, 114.3233°W.

Temperature data from the YPG 009 station reflects the very hot summers with average high temperatures in excess of 100° June through September. Average minimum relative humidity is below 20% from March to November, and only increases with the onset of monsoonal moisture through the winter months. This represents a very long period each year during which fire behavior would be expected to be very active.

Precipitation data follow the Sonoran Desert pattern of bimodal rainfall with peaks in the winter and late summer. For the period of record of 2005 to 2014, monthly precipitation is nearly non-existent between April (average 0.02 in) and the end of June (average 0.05 in). The month of September is by far the wettest month with average precipitation of three-quarters of an inch, due to monsoonal moisture events. Total annual precipitation is quite low, averaging 3.78 in.

Winds are dominated by the south through west/southwest, accounting for 37.2% of all hours (Figure 4). Winds greater than 19 mph are very rare, occurring only 0.3% of the time. The strongest winds are typically from the north/northwest through north, quite different than the overall average wind directions. These general trends hold true through the typical fire season of March through June, though the domination of the winds by the southwesterly directions is more pronounced. There is a strong diurnal cycle with daytime winds dominated by very light northeasterly flow. The strong daytime winds are dominated by the southwestern quadrant, and the strongest winds are from the north-northwest. Nighttime winds dominated by southwesterly flow in terms of both time and intensity.

Figure 3. Monthly average minimum and maximum temperature and relative humidity, and monthly average precipitation for the YPG 009 Weather Station 2005 - 2014.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max Temp (°F)	69	73	80	86	94	103	106	105	101	90	79	67
Min Temp (°F)	45	48	53	58	66	74	83	82	76	63	53	44
Max RH (%)	54	57	46	39	35	31	45	51	50	44	45	58
Min RH (%)	22	21	15	12	11	10	18	19	17	16	18	23
Precipitation (in.)	0.51	0.46	0.15	0.02	0.02	0.05	0.44	0.55	0.75	0.16	0.40	0.22

1.11.4 Weather Stations

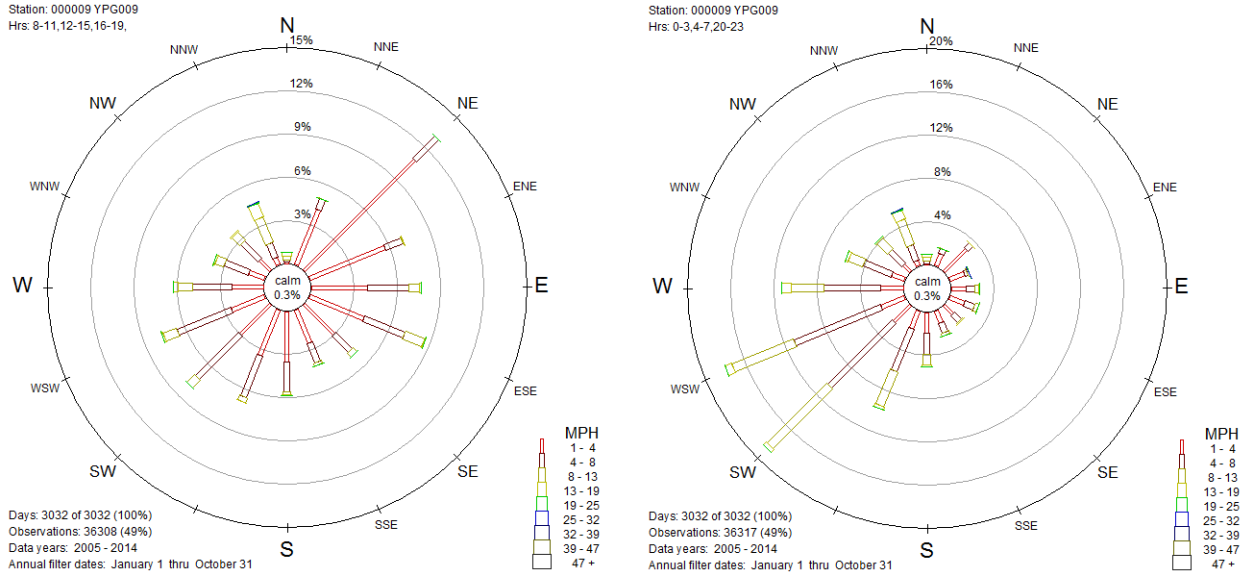
USAG YPG maintains an extensive network of weather stations with a concentration in the southwest portion of the installation. These stations are not designed for fire weather assessment or fire danger rating, but they do record temperature, relative humidity, wind speed and direction, and precipitation, all of which may be useful when considering wildfire potential. They may be accessed by on-post personnel at https://6.11.254.20/.

USAG YPG does not maintain any Remote Automated Weather Stations (RAWS), which are designed for fire danger rating. The Cibola RAWS just west of USAG YPG is likely to be most representative of the conditions at USAG YPG of all the RAWS in the area. It may be accessed through the Weather Information Management System through the NWCG's National Enterprise Support Service Application Portal with a valid Weather Information Management System (WIMS) user ID. The Western Regional Climate Center can provide access to the full archive of weather data. For day-to-day operations, up to two weeks of data is available through Mesowest.com, though fire danger indices are not available through this source.

Table 2. Percentile weather data for the YPG 009 weather station 2005 - 2014.

Percentile	Max Temperature (°F)	Min RH (%)	Wind Speed (mph)	1 hr. Moist. (%)	Live Herb. Moist (%)
50	93	13	4	6	30
80	105	9	8	4	10
90	108	7	10	3	5
97	111	5	13	2	3

Figure 4. Wind rose for daytime (left) and nighttime (right) hours at the YPG 009 weather station 2005 - 2014.



1.12 Natural and Cultural Resource Considerations

1.12.1 Values at Risk

This section describes the features found on USAG YPG that should be considered when establishing fire management alternatives during pre-suppression activities and suppression operations. Ultimately, protection priorities during an incident must be left to the IC. However, the IC should make decisions based in part on input from natural and cultural resources professionals. Generally speaking, after human safety and major infrastructure or housing, natural and cultural resources should be considered the highest priority when fighting fires on USAG YPG lands. Important cultural and natural resources are mapped by the DPW-ESD. This map will be shared with the FD and Environmental Sciences will ensure a basic understanding of the locations of important resources is imparted to Fire Department leadership through means deemed appropriate by DPW-ESD (i.e., maps, briefings, pocket cards, etc.).

In the following sections, a brief description of the values at risk is given. More detail can be found in the respective sections of the INRMPs and the ICRMP. Only those values that exist at the installation are discussed. Readers interested in the specific numbers, locations, or types of species or cultural resources are referred to the most current USAG YPG INRMP or ICRMP respectively.

1.12.1.1 Cultural Resources

Cultural resources include any prehistoric or historic district, site, building, structure, object included, or eligible for inclusion on, the National Register of Historic Places (NRHP), including artifacts, records, and material remains related to such properties or resources. Cultural resources may potentially be found anywhere at USAG YPG. As a result, all fire management activities must comply with the USAG YPG ICRMP. Any non-emergency activity involving vegetation removal or ground disturbance must be coordinated with the Cultural Resources Manager (CRM). Additional information regarding cultural resources and their management can be found in the *Integrated Cultural Resources Management Plan, U.S. Army Garrison Yuma* (U.S. Army Garrison Yuma Proving Ground 2012). The ICRMP provides a discussion of the prehistoric and historic periods in the Yuma area, including the military development of USAG YPG, and detailed information about the laws and regulations applicable to the management of cultural resources.

To the degree feasible, the IC of any fire should coordinate ground disturbing firefighting activities with the CRM as well as follow appropriate "minimum impact suppression techniques". Any cultural resources that are found during fire management activities should always be considered sensitive and be avoided to the degree possible within the constraints of providing for firefighter safety and meeting minimum containment objectives. Any resources found should be brought to the attention of the CRM as soon as is practical. For higher complexity incidents (i.e., extended attack, incidents of complexity 3 or greater, and/or incidents that require the deployment of Incident Management Teams), the IC should consider explicitly involving the CRM as a Resource Adviser (READ) in the Incident Command Structure.

As of 2010, no historic buildings or structures were determined to be eligible for NRHP listing. Nor are there any identified Traditional Cultural Properties (TCPs) eligible for listing in the National Register. However, several local Native American tribes have indicated that they consider the White Tanks area, located in the East Arm, a sacred place (Personal Communication).

1.12.1.2 Rare Species

Special-status and sensitive plant and animal species are protected under state and/or federal law. There are special requirements for avoidance, mitigation, and preservation of these species. Any non-emergency ground or vegetation disturbing activity must be coordinated with the Natural Resources Manager and comply with the *Biological Opinion on Activities and Operations at the United States Army Garrison Yuma Proving Ground* (2014).

Numerous rare species are known to occur or have the potential to occur on USAG YPG. These are federally listed or proposed for listing under the ESA and those that are listed as Species of Greatest Conservation Need (SGCN) by Arizona Game and Fish Department (AGFD). Of the special-status species, two are federally listed threatened or endangered, one is a federal candidate for endangered listing, and six are considered SGCN tier 1a or 1b, with an additional three SGCN that have been observed occasionally and are expected to occur on USAG YPG. More information about these species can be found in the USAG YPG INRMP.

Federally listed species on USAG YPG include Nichol's Turk's head cactus (*Echinocactus horizonthalonius var. nicholii*). The cactus is the only listed plant recorded on the installation. The only other federally listed species that may be expected to occur on USAG YPG in the near future is the Sonoran pronghorn (*Antilocapra americana sonoriensis*), which was re-introduced to Kofa NWR in

2011 (USAG YPG lies within its historic range) and is expected to move onto USAG YPG within the decade. The Sonoran desert tortoise is designated as a candidate for protection under the Endangered Species Act.

The AGFD recognizes species that may be in jeopardy or with known or perceived threats or population declines as SGCN (AGFD 2012). Species with a SGCN designation occurring on USAG YPG include the Sonoran desert tortoise (*Gopherus morafkai*), Mohave fringe-toed lizard (*Uma scoparia*), California leaf-nosed bat (*Macrotus californicus*), western yellow bat (*Lasiurus xanthinus*), American peregrine falcon (*Falco peregrinus*), and osprey (*Pandion haliaetus*).

Several species listed as Birds of Conservation Concern by USFWS (2002) have been documented on USAG YPG including the elf owl (*Micrathene whitneyi*), burrowing owl (*Athene cunicularia*), long-billed curlew (*Numenius americanus*), Gila woodpecker (*Melanerpes uropygialis*), gilded flicker (*Colaptes auratus*), loggerhead shrike (*Lanius ludovicianus*), Bell's vireo (*Vireo bellii*), crissal thrasher (*Toxostoma crissale*), Le Conte's thrasher (*Toxostoma lecontei*), black-chinned sparrow (*Spizella atrogularis*), and sage sparrow (*Amphispiza belli*). The Gila woodpecker, gilded flicker, and Le Conte's thrasher are listed by The Nature Conservancy as members of the bird guild identified as a preliminary conservation element in southwest Arizona (The Nature Conservancy 2004). Additional SGCN found on USAG YPG include the western red bat (*Lasiurus blossevillii*), greater western mastiff bat (*Eumops perotis*), big free-tailed bat (*Nyctiomops macrotis*), Brazilian (Mexican) free-tailed bat (*Tadarida brasiliensis*), and western burrowing owl (*Athene cunicularia*). Addition species of concern that have been observed near USAG YPG are documented in the INRMP.

1.12.2 Fire Ecology of the Sonoran Desert Ecosystem

1.12.2.1 Overview

Native vegetation of the Sonoran Desert is not considered to be fire adapted or dependent. Typical pre-settlement wildfires in the southwestern deserts were of low intensity and confined to small areas, minimizing their impacts.

Invasive species have upset this paradigm by increasing the fuel load and fuel continuity. This has led to increases in the intensity and magnitude of desert fires, potentially altering desert ecosystems at multiple levels (soil microflora, soil crusts, and vegetation, Neary et al. 2005). The desert ecosystem can be permanently changed by frequent or intense fires. For example, post-fire recovery of vegetation in the creosote bush-bursage community, typical of much of USAG YPG, is a long process and may require 100 years (Brown and Smith 2000). Impacts from fires on long-lived species, such as the saguaro (*Carnegia gigantea*) and the Sonoran desert tortoise (*Gopherus morafkai*), are generally considered catastrophic.

The potential for major fires in the southwestern desert is currently largely a function of the short-term climate. When conditions are normal or dry for a period of years, the fuel load is low and disconnected due to sparse vegetation and plant-free gaps. Under these conditions, it is difficult for a wildfire to grow and spread. When conditions are wetter than normal, invasive Mediterranean grass (*Schismus barbatus),* buffelgrass (*Pennisetum cilare*), Sahara mustard (*Brassica tournefortii*), ovate plantain (*Plantago ovata*) and other annual desert vegetation may fill bare areas between perennial vegetation. The resulting increased fuel continuity and fuel load that become dry and flammable when the rains stop allow fires to burn much larger areas (U.S. Army Garrison Yuma Proving Ground 2012) vastly increasing the extent of deleterious fire effects on desert communities.

1.12.2.2 Current Management

USAG YPG has implemented an INRMP (U.S. Army Garrison Yuma Proving Ground 2012) to maintain the natural condition of the installation. Continued implementation of the INRMP includes control and eradication of exotic invasive plant species, which can create very heavy fuel loads if left unchecked. Control of these species reduces the risk of extensive and intense wildfires. In addition, the ITAM program helps maintain natural desert habitats to provide suitable training and operational testing conditions. This program also reduces the potential for extensive and intense wildfires.

Areas that are cleared or disturbed during training or testing exercises would be susceptible to colonization by exotic invasive plant species, which could contribute to long-term elevated risk of wildfire ignition or spread and potentially to increased wildfire severity. Continued implementation of the INRMP and ITAM program would minimize this risk.

1.13 Mission Considerations

The mission of USAG YPG is to conduct tests on a wide range of armored and wheeled vehicles, aircraft targeting systems, parachute systems, and artillery systems. Wildfires have the potential to disrupt this mission in various ways. As is true on almost any live-fire training or testing range, targets, storage areas, hangars, and instrumentation that requires above-ground wiring are all potentially at risk from wildfires. At USAG YPG, there are also numerous sensors, conditioning chambers, and other testing devices. However, given the very low fire probability at USAG YPG due to the sparseness of the vegetation, protecting these resources is likely not necessary except in discrete locations where heavier vegetation exists.

Many fires will be allowed to burn without suppression due to ongoing testing and training until such time as firefighting resources can be allowed down range safely and without interfering with the mission. However, under certain circumstances, the IC will have the authority, via a request through Range Control, to halt military operation in order to ascertain the location and extent of a fire and, if deemed necessary by the IC, carry out suppression actions. The decision process is documented in Section 2.4.2 of this IWFMP.

Safety-related information regarding mission considerations are documented in Section 1.7 of this IWFMP.

1.14 Monitoring Requirements

There are no requirements for environmental monitoring related to wildland fire at USAG YPG. Post-fire monitoring is discussed further in Section 2.8 of this IWFMP.

1.15 Public Relations

Large wildland fires and wildland fires affecting the public at large are rare at USAG YPG. For the most part, no public relations is required. The USAG YPG Fire Chief will ensure that fires greater than 100 acres or fires that are started by USAG YPG activities and burn off-installation are reported to the USAG YPG Public Relations office for dissemination to the public via appropriate channels. The USAG YPG Public Relations Office will determine the appropriate channels of dissemination to be utilized on a case by case basis. Should a larger wildland fire incident occur that necessitates the use of an Incident Management Team (IMT) that includes Public Information Officers (PIOs), the IMT PIOs will liaise with the USAG YPG Public Relations Office to develop appropriate strategies for information dissemination.

1.16 Wildland Urban Interface

Most buildings within the cantonment area are not exposed to potential fire from wildland fuels. There are individual buildings in patches of non-congruent or sparse fuels, but the likelihood of these fuels becoming involved in an ongoing wildfire is very low. There are no residential communities along the border of USAG YPG. Overall, wildland/urban interface with sufficient fuels to carry fire is very limited.

1.17 Funding Requirements

There are no budget items identified in this IWFMP that are not already accounted for in existing USAG YPG directorate budgets. Fuels management and firebreak construction or maintenance are not required by this IWFMP. Firefighter salaries, standard equipment (wildland fire engines, hose, pumps, etc.), and training are funded through the USAG YPG Fire Department budget.

1.18 Firefighter Certification and Training Requirements

The USAG YPG Fire Chief shall ensure that all firefighters participating in wildfire responses meet minimum NWCG and/or DoDI 6055.06 training requirements.

1.18.1 Firefighter Physical Fitness Requirements

All USAG YPG firefighters participating in fireline duties will meet the physical fitness standards established in NFPA 1583, the NWCG Work Capacity Test per PMS 307, and/or the USAG YPG Fire Department physical fitness test. Per PMS 310-1, personnel who may be participating in off-installation wildland fire suppression activities (i.e., mutual aid) must follow all NWCG standards, including the completion of the Work Capacity Test and RT-130 Annual Fireline Safety Refresher Training.

1.19 Programmatic Environmental Assessment

This IWFMP does not require any activity on the land. No permanent firebreaks or fuel breaks will be constructed, no fuels management will be conducted, no prescribed burning will take place, and the changes in the fire regime that may result from this IWFMP are exceedingly small as there are very few fires to begin with. As such, this IWFMP will not result in any environmental impacts.

2 Wildland Fire

2.1 Suppression and Prevention

2.1.1 Responsibilities

The USAG YPG Fire Department is responsible for all wildland fire suppression responses as well as fire prevention and mitigation activities.

2.1.2 Ignition Prevention

There are no ignition prevention requirements established by this IWFMP. There is no Fire Danger Rating System (FDRS) specific to USAG YPG to manage wildfire ignitions. There is an extensive array of weather stations on USAG YPG managed by the USAG YPG Meteorology Department. These stations (Section 1.11.4) can provide basic weather information such as temperature, relative humidity, and wind speed, but are not designed for fire danger rating.

Broad-scale daily fire danger rating is available at through the Wildland Fire Assessment System (WFAS). The Southwest Coordination Center and the Prescott Dispatch Center also maintain voluminous fire information. In terms of fire prevention and predictive services, the 'Fuels/Fire Danger' tab of their websites contain numerous links and data. In addition, fire weather forecasts, including red flag warnings, are available from the National Weather Service.

Table 3. Weather and fire danger website links.

MesoWest	http://mesowest.utah.edu/index.html
NAP Portal	https://nap.nwcg.gov/NAP/
National Weather Service Fire Weather Forecasts	http://www.nws.noaa.gov/view/validProds.php?prod=FWF
Prescott Dispatch Center	http://gacc.nifc.gov/swcc/dc/azpdc/index.php
Southwest Coordination Center	http://gacc.nifc.gov/swcc/index.htm
WFAS Fire Danger Daily Forecast	http://www.wfas.net/index.php/fire-danger-rating-fire-potential--danger-32

2.1.3 Firebreaks, Fuel breaks, and Fuels Management

Significant fire spread potential is low at USAG YPG, a direct result of natural fuel gaps and discontinuity. As a result, USAG YPG does not maintain any firebreaks, fuel breaks, or fuels management areas throughout its landholdings, nor is there an intent to create any. USAG YPG does, however, groom some of their ranges to meet various mission requirements which may reduce fuels on specific impact areas.

If at any time in the future, USAG YPG decides to create and maintain firebreaks, fuel breaks, or fuel management areas, the following restrictions and responsibilities are to be put into effect:

- Firebreak maintenance should be scheduled at times when invasive plant species are not actively producing new seed. The Natural Resources Manager will coordinate with the USAG YPG Fire Chief to coordinate what times of year are best suited to firebreak maintenance, considering both invasive species spread and fire management concerns.
- All ground disturbing activity must be coordinated with the USAG YPG Cultural Resources and Natural Resources Managers no less than 120 days in advance of the expected work dates.
- Ground disturbing activities may require consultation under Section 106 of the National Historic Preservation Act and consultation with Native American tribes. Activities that may affect threatened or endangered species require consultation under Section 7 of the Endangered Species Act. These consultations can be time consuming. Early coordination with the Natural and/or Cultural Resources Managers is critical to ensuring timely completion of the project.

2.1.4 Minimum Staffing Requirements

The USAG YPG Fire Chief shall ensure that staffing, equipment, and fire apparatus requirements are met in accordance with DoDI 6055.06, Fire Protection Program, and established manpower-staffing standards.

2.2 Equipment and Firefighting Resources

2.2.1 Firefighting Apparatus and Tools

The USAG YPG Fire Chief will ensure firefighting apparatus, clothing, personal protective equipment, tools, and other items are maintained in accordance with DoDI 6055.06.

2.2.2 Water Resources

In addition to fire hydrants throughout the cantonment areas, there are several surface water resources on USAG YPG land available for fire suppression use (Table 4).

Table 4. Surface water resources within USAG YPG.

Water Source Name	Latitude	Longitude	MGRS	Size (ac)	Reliability
Lake Alex	N 32 51' 34.499"	W 114 08' 15.079"	11SQS 67869 39352	0.20	Permanent
Ivan's Well	N 32 54' 20.913"	W 113 47' 37.937"	12STB 38688 44307	0.12	Permanent
SWTR Pond	N 32 59' 41.612"	W 113 48' 52.96"	12STB 37002 54240	0.10	Permanent
IRCC Pond	N 33 01' 06.121"	W 114 23' 51.961"	11SQS 43073 56332	0.10	Permanent

2.3 Detection

All wildfires on USAG YPG land must be reported to Range Control (range radio or telephone). If a fire is reported to Range Control, Range Control will notify the Fire Department immediately. Fires may be reported by calling 911 as well however this option may take longer than calling range control directy.

2.4 Dispatch and Fire Suppression Procedures

Reference DoD Instruction 6055.06 and the *Wildland/WUI Operations Fire and Emergency Services SOP* (2016) for current wildfire response protocols at USAG YPG. The USAG YPG Fire Chief shall ensure that these fire response protocols are up to date and in accordance with the latest wildland fire safety and firefighting techniques as defined by NWCG and/or NFPA. This plan identifies proper communications procedures and extended attack procedures as well as general response procedures.

2.4.1 Additional Notifications

In addition to dispatching appropriate resources to wildfires, the USAG YPG Fire Department will notify the Prescott Interagency Dispatch Center of every wildfire that occurs on USAG YPG per the USFWS Biological Opinion.

All wildfires in the King Valley will be reported to the USAG YPG Natural Resources Manager who will, in turn, notify the USFWS, Arizona Ecological Services Field Office by the most expeditious means available.

2.4.2 Protected Resources

USAG YPG lands contain areas of high value natural and cultural resources, some of which are protected by federal law. The USAG YPG Fire Chief will ensure that USAG YPG firefighters are familiar with those locations harboring the most sensitive resources through appropriate briefings, and that protection priorities and suppression strategies reflect their importance. The WFPM shall also ensure that other agency units responding to fires at USAG YPG are familiar with those locations harboring the most sensitive resources (through, for example, briefings), and that protection priorities and suppression strategies reflect their importance.

2.4.3 Enhanced Fire Response Areas

The potential for substantial negative outcomes from fires occurring near the installation boundary or cantonment areas, or in years when excessive vegetation has been produced by above average rainfall, require the full suppression capability of the USAG YPG Fire Department. All fires meeting the following criteria will be met with this enhanced fire response which includes an immediate full suppression response and support from the USAG YPG. Weather criteria referred to in the decision criteria shall be determined via the YPG 009 weather station or by on-site firefighting personnel using hand-held weather instruments.

- Any fire within ½ mile of the installation boundary or within ½ mile of any cantonment area when 20 foot winds are greater than 20 mph AND relative humidity is less than 15%.

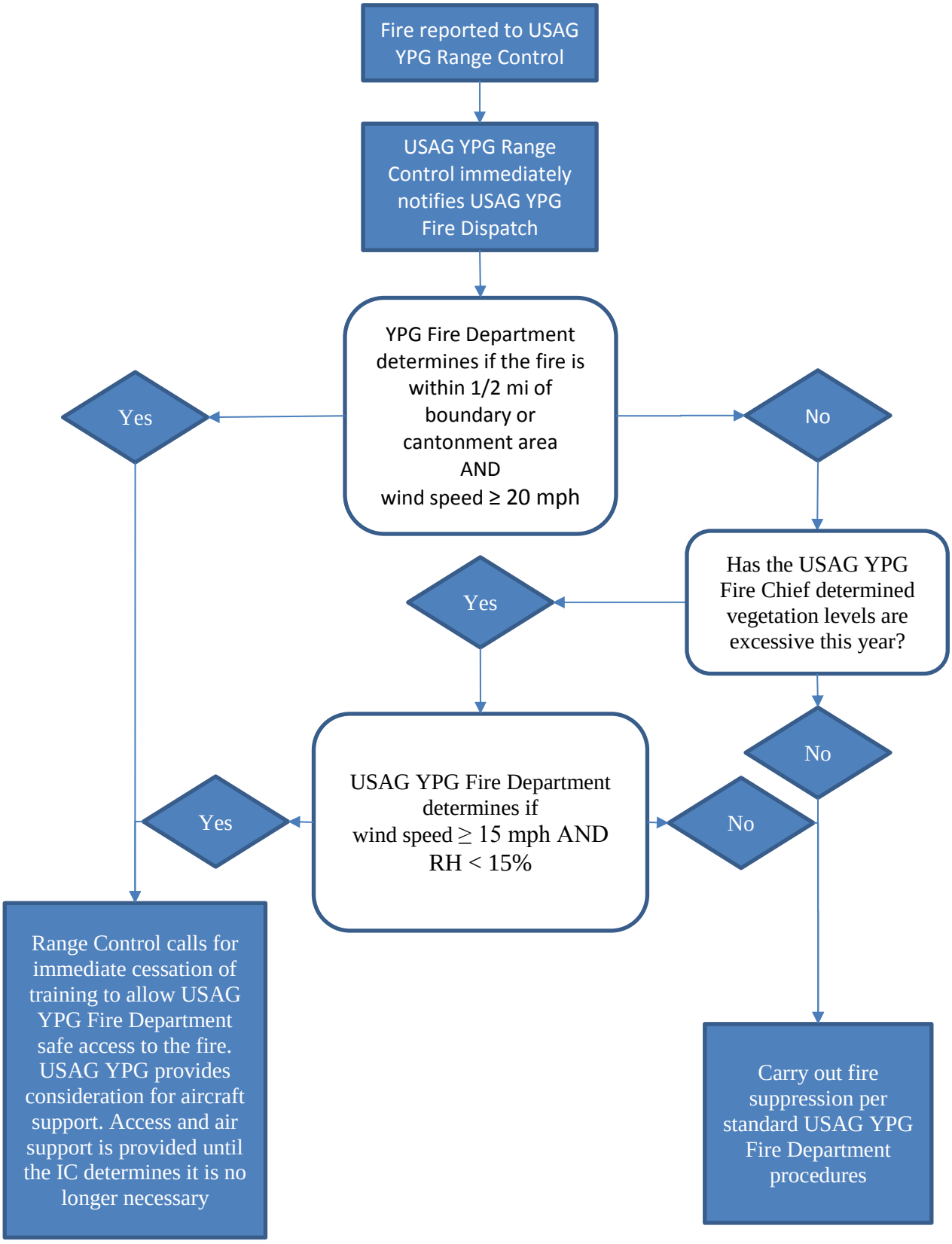
  OR

- All fires, regardless of location, in years when precipitation has produced unusually high volumes of vegetation as determined by the USAG YPG Fire Chief AND when 20 foot winds are greater than 15 mph AND relative humidity is less than 15%.

In either of these circumstances, Range Control will call for a cessation of all training and testing on any ranges necessary in order to allow fire department personnel to safely access and fight the fire. Additionally, when a fire meets criteria for an enhanced fire response, and when aircraft are available, the USAG YPG will provide helicopter air support to the fire department for the purpose of observing the fire. In many cases, it will be necessary to halt training or testing temporarily to determine whether the fire is within ½ mile of the installation boundary. Range Control will provide safe access for the USAG YPG Fire Department to make this determination upon request by the USAG YPG Fire Department.

If the fire does not meet either of these two requirements for an enhanced fire response, the Fire Department will proceed using standard USAG YPG fire suppression protocols as described in the USAG YPG Wildland / WUI Operations Fire and Emergency Services SOP (2016). The USAG YPG Fire Chief or their designee may determine that the fire is not a threat and at that time will communicate with Range Control to facilitate the safe resumption of training or testing.

Figure 5. Decision tree for normal versus enhanced fire response.

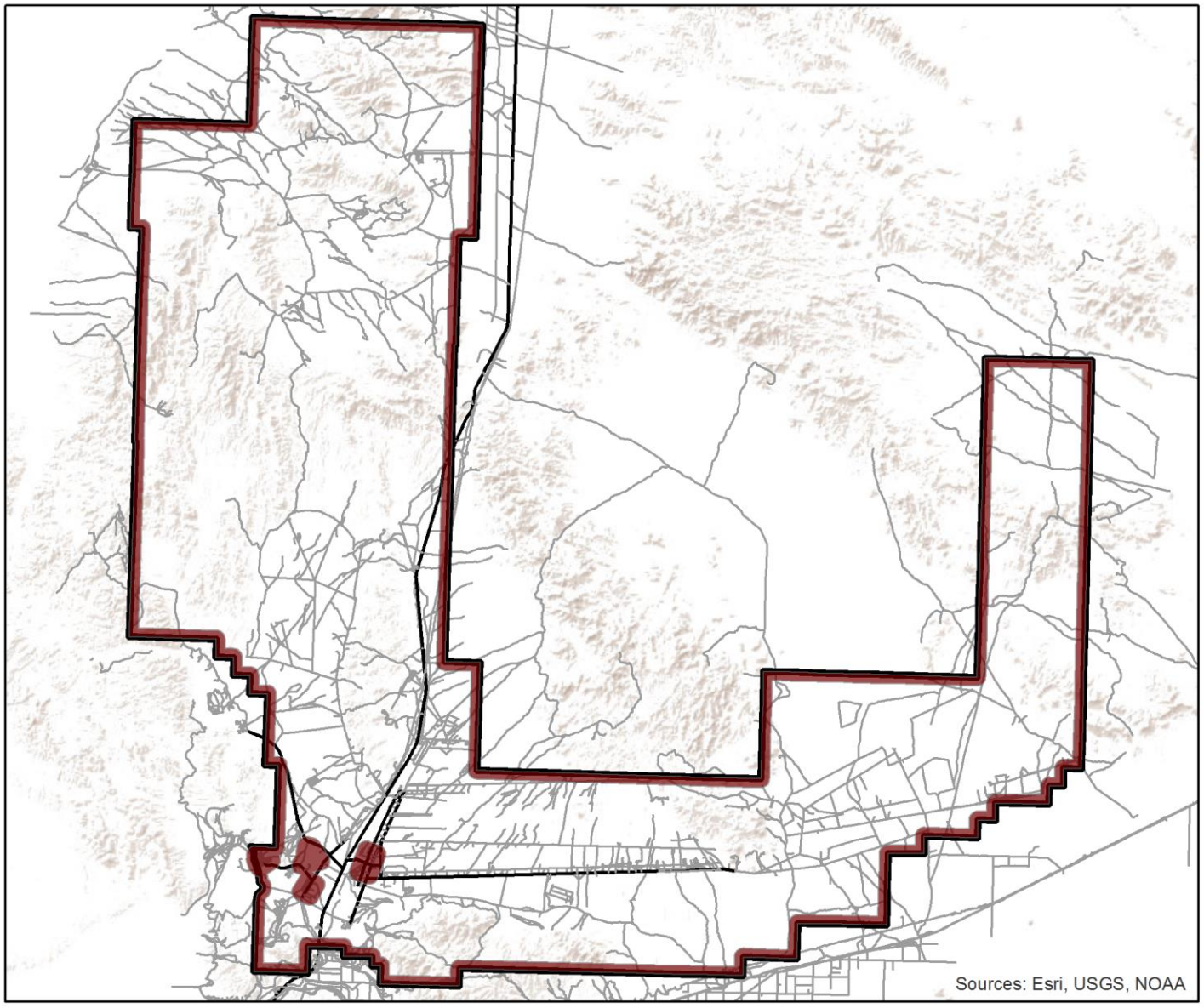


Yuma Proving Ground

Figure 6

Integrated Wildland Fire Management Plan

Enhanced Fire Response Areas



2.5 Rehabilitation Needs and/or Procedures

Some fires may require post-fire restoration, rehabilitation, and/or revegetation to prevent long-term problems with soil erosion and conversion from native to invasive species. Large scale revegetation of burned areas with native vegetation is not always feasible due to cost and limitations in the understanding of native/invasive species competition dynamics. Due to the extremely dry conditions in this region of the Sonoran Desert, revegetation is completely dependent on moisture. Ensuring sufficient moisture is available to revegetated areas requires irrigation or extensive soil preparation to catch and hold natural precipitation. Either method is costly and uncertain and post-fire rehabilitation is a viable option only at very small scales.

2.6 Records and Reports

The USAG YPG Fire Chief will ensure that:

- All wildfire incidents are recorded in accordance with Army record management policy and DoDI 6055.06. The USAG YPG Fire Chief will ensure that all wildfire records are retained indefinitely following DoDI 6055.07.
- All fires are expeditiously reported to the Prescott Interagency Dispatch Center and/or local dispatch offices per the most recent Memorandum of Understanding with the BLM.
- All fires are reported to the National Fire Incident Reporting System (NFIRS).
- The WFPM is provided with a list of all fires at USAG YPG updated every six months.

2.7 Reviews and Formal Investigations

2.7.1 After Action Reviews (AAR)

After every wildland fire, an Active Action Review (AAR) will take place. AARs can also take place at the end of operational periods or at any other times deemed appropriate by fireline leadership (i.e., after a medical incident associated with a wildland fire to make sure specifics of the event were sufficiently captured). AARs will be conducted as constructive critiques aimed at determining the facts related to the specific fire as shortly after the fire as is practical. These will be very quick, usually less than 10 minutes, and will focus on answering the questions:
1) What was planned?
2) What actually happened
3) Why did it happen?
4) What can we do better next time?

These questions are intended to resolve operational issues and reinforce proper tactics, not impose punitive actions.

2.7.2 Fire Reviews.

Following a major wildfire incident, the USAG YPG Fire Chief may conduct a review immediately after containing the fire. At the discretion of the USAG YPG Fire Chief, USAG YPG will also cooperate with any investigations deemed necessary by the BLM or the USFWS for incidents occurring on USAG YPG lands. After Action Reviews are required for fires of 40 hectares (100 acres) or more and/or on which any unusual events occurred or any of the following occurred:

- Failure of wildland fire response personnel to follow issued instructions by fireline leaders (i.e., squad boss, crew boss, etc.)
- Damage or loss of real property exceeding $1,000.
- Fires burning within 1000 feet of USAG YPG property boundaries.
- Excessive response time, as defined by the USAG YPG Fire Chief given the location of the fire.

2.7.3 Investigations

Normal post-fire investigations (similar to structural fires) may be requested by the USAG YPG Fire Chief, the Range Operations Manager, or the ESD Chief. These offices should act together to form a team to investigate and determine the cause of the fire or other issues of concern. A qualified Fire Investigating Officer should head this investigation team. Investigations are required for fires involving any of the following:

- Any fire ignited on USAG YPG lands that grows to greater than 5000 acres.
- Military activity-related fires escaping or starting outside of the boundary of any USAG YPG property.
- Damage or loss of real property exceeding $100,000.00.
- Incidental damage or loss of significant natural or cultural resource.
- Arson.

The USAG YPG Fire Chief, the Range Operations Manager, the ESD Chief, or the Installation Commander may request a formal investigation for any reason. The Installation Commander will decide during or at the conclusion of the incident if a formal investigation is necessary. The Commander may base this decision on advice or recommendations from the fire investigator(s), the USAG YPG Fire Chief, the Environmental Chief, the Range Operations Manager, the Provost Marshal, the Command Judge Advocate, Inspector General, or outside individuals or agencies. Formal investigations are required for fires involving any of the following:

- All entrapments or fire shelter deployments.
- Major injury or fire fatality.

If the Installation Commander deems a formal investigation necessary, an investigating officer or review board shall be assigned to conduct a formal investigation. Formal investigations will be carried out in accordance with Army Regulation (AR) 15-6, "Procedures for Investigating Officers and Board Officers". The Installation Commander shall review the findings and recommendations of the assigned investigating officer or review board. All formal investigations will include an AAR.

2.8 Post-Fire Analysis

2.8.1 Surveys

In addition to the reports and reviews that are completed immediately after a wildfire, a post-fire survey and analysis of the burned area may be required depending on the fire's location and damage caused. Surveys will be performed at the discretion of the USAG YPG Fire Chief or the ESD Natural and Cultural Resources Managers.

A post-fire survey may be combined with any of the informal or formal investigations. A post-fire survey will determine all or some of the following:

- The effect the fire may have had on installation infrastructure, native or alien flora and fauna, and cultural resources.
- The effectiveness of the suppression resources and measures used.
- The effectiveness of the Incident Command System.
- The effectiveness of fire/fuel models used.
- A safety review of suppression actions.
- UXO contamination or potential for UXO clean-up operations.

Other topics of interest may be surveyed as well at the discretion of the USAG YPG Fire Chief, the Range Operations Manager, or the ESD Natural and Cultural Resources Managers.

Post-fire surveys will be conducted in coordination with the DPW-ESD and ITAM offices. Soliciting support from other cooperators or subject matter experts is encouraged. Cooperation may be required with external authorities, such as Special Agents of the USFWS, who may assist USAG YPG personnel in damage assessment. If a UXO survey is desired, then coordination with the Ammunition Recovery Branch is necessary.

The effects of fire on federally protected species and historic properties or effects from catastrophic fire events (e.g., severe erosion or water pollution) must be surveyed at the earliest opportunity.

2.8.2 Monitoring

Post-fire monitoring of vegetation may be appropriate in rare circumstances. Fires can provide opportunities to investigate the effects of burning on native plants, forage for wildlife, habitat use and occupancy, invasive plants, or other topics of interest. Post-fire monitoring may be incorporated into normal land/natural resources condition studies at the discretion of DPW-ESD and/or the ITAM Coordinator.

3 Prescribed Fire

Prescribed fire will not be applied at USAG YPG because it is largely inappropriate for desert ecosystems and unnecessary for hazardous fuels reduction during most years. This subject will not be addressed further in this IWFMP.

References

ADEQ. 2006. Yuma County PM_{10} Maintenance Plan. Available at: https://www.azdeq.gov/environ/air/plan/download/yumaplan.pdf

Arizona Game and Fish Department. 2012. Arizona's State Wildlife Action Plan 2012-2022. Available at: http://www.azgfd.gov/w_c/documents/2012-2022_Arizona_State_Wildlife_Action_Plan.pdf

Brown, J. K. and Smith, J. K. 2000. Wildland fire in ecosystems: effects of fire on flora. Gen. Tech. Rep. RMRS-GTR-42. Volume 2. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 30 p. Available at: http://www.fs.fed.us/rm/pubs/rmrs_gtr042_2.pdf

Environmental Sciences Division, Directorate of Public Works. 2010. Environmental Assessment Impact Areas Expansion. U.S. Army Garrison Yuma Proving Ground, Arizona. On file at: Environmental Sciences Division, U.S. Army Garrison Yuma Proving Ground.

Environmental Sciences Division, Directorate of Public Works. 2012. Integrated Natural Resources Management Plan U.S. Army Garrison Yuma Proving Ground. Yuma and La Paz Counties, AZ. Available at: http://www.yuma.army.mil/portals/0/docs/doc4.pdf

Fire and Emergency Services Division. 2016. Wildland / WUI Operations SOP (Draft). U.S. Army Garrison Yuma Proving Ground, Arizona. On file at: Fire and Emergency Services Division, U.S. Army Garrison Yuma Proving Ground.

IMCOM, McDonald, M, Rhode, D. 2012. Integrated Cultural Resources Management Plan. U.S. Army Garrison Yuma Proving Ground. Available at: http://www.yuma.army.mil/portals/0/docs/doc3.pdf

Neary, Daniel G; Klopatek, C. C.; and L.F. DeBano, editors. 2005. Wildland fire in ecosystems: effects on soil and water. Gen. Tech. Rep. RMRS-GTR-42. Volume 4. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. Available at: http://www.fws.gov/fire/downloads/ES_BAR/WF_Ecosystems_Effects_on_Soil_Water.pdf

Scott, Joe H.; Burgan, Robert E. 2005. Standard fire behavior fuel models: a comprehensive set for use with Rothermel's surface fire spread model. Gen. Tech. Rep. RMRS-GTR-153. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 72 p. Available at: http://www.fs.fed.us/rm/pubs/rmrs_gtr153.pdf

The Nature Conservancy. 2004. Preliminary assessment of biodiversity values and management framework adaptation for the expanded Kofa complex and Yuma resource management area in southwest Arizona. Tucson, Arizona. Available at: http://azconservation.org/dl/TNCAZ_ExpandedKofaComplexAssessment.pdf

USFWS, Arizona Ecological Services Office. 2014. *Biological Opinion on Activities and Operations at the United States Army Garrison Yuma Proving Ground*. Phoenix, AZ. Available at: http://www.fws.gov/southwest/es/arizona/Documents/Biol_Opin/140161_YPG.pdf

Vaisala. 2011. Cloud to ground lightning incidence in the Continental U.S. (1997 – 2010). Vaisala's Lightning Detection Network. http://www.vaisala.com/VaisalaImages/Product%20and%20services/NLDN%20CG%20Flash%20Density%20Km%201997-2010.png Accessed April 2013.

Memorandum of Understanding

Between

Department of Interior
Bureau of Land Management
Colorado River District
Yuma Field Office

Department of the Defense
United States Army
Yuma Proving Ground

I. INTRODUCTION

The Department of Interior and the Department of Defense have mutually agreed to cooperate and collaborate on wildland fire issues on federal lands. The Bureau of Land Management, Colorado River District, Yuma Field Office (BLM) and the United States Army, Yuma Proving Ground (hereafter identified as YPG) have a common goal; which is to minimize the impacts of a wildland fire on the landscape. The mission of YPG is extremely sensitive and the BLM recognize the importance of security procedures and policy. The Public Lands are also exceptionally sensitive to wildfires due to the potential destruction of important wildlife habitat.

All parties have fire organizations specifically designed to support their host agency's mission. Cooperative efforts have already begun between the fire organizations to cross-train when applicable and provide a mutually beneficial service, regardless of jurisdiction as outlined in the Federal Wildland Fire Policy. Firefighter, military personnel and public safety will be the number one priority for all actions.

II. PURPOSE

The purpose of this MOU is to establish a framework for cooperation and coordination on the suppression of wildfires occurring on or adjacent to lands administered by BLM and YPG.

III. AUTHORITY

This MOU is entered into under the Bureau of Land Management policy:

1. Federal Land Policy and Management Act (FLPMA): Preservation and Protection of BLM Lands (43 U.S.C. 1701-52
2. National Wildlife System Administration Act of 1966: Interagency Agreements (42 U.S.C. 668dd)
3. Reciprocal Fire Protection Act of 1955: Reciprocal Fire Protection Agreements (42 U.S.C. 1856 (a)-(d))
4. Federal Grant and Cooperative Act: Intergovernmental Cooperation: Authority to provide Specialized or Technical Services (31 U.S.C. 6505)

This MOU is entered into under the Department of Defense, Yuma Proving Ground policy:

1. Department of Defense Directive 3025.1, *Military Support To Civil Authorities.*
2. Department of Defense Instruction 6055.6, *DoD Fire and Emergency Services Program, Chapter 5.4.14.*
3. Army Regulation 420-1, *Army Facilities Management, Chapter 25-9e.*

IV. STATEMENT OF MUTUAL BENEFIT

Wildfires in southwestern Arizona are a rare event. The landscape and vegetation have not evolved naturally with fire. Periods of unusually high rainfall, coupled with introduced species, produce a serious fire threat and pose a major risk to native plants and animals in the desert environment. Additionally, smoke from wildfires and suppression action may hamper vital national security activities on YPG.

It is in the best interest of all parties to minimize the threat from wildfires and take immediate suppression action when the agreed upon established protocols and safety concerns, as identified in this document, have been fully achieved.

V. RESPONSIBILITIES

A. The BLM will:

1. Continue to provide YPG Fire Department training in wildfire suppression (basic wildfire strategy, tactics) and safety (annual fire refresher) as funding and time permits.

2. Notify YPG Fire of any possible wildland fire on or near YPG.

3. Recognize that access through YPG lands is at the discretion of YPG and access is to be considered a rare and infrequent event and limited to mission critical traffic.

4. Follow all procedures as outlined by post security personnel prior to entering YPG and adhere to the direction of post security, fire department personnel and technical specialists concerning airspace coordination, sensitive material, unexploded ordinance and vehicle and foot traffic while on YPG lands.

5. Provide assistance to YPG Fire Department for wildland fire suppression as requested based upon BLM firefighting resource availability.

6. Follow all Department of Interior, National Wildland Coordination Group, BLM regulations regarding firefighting strategy, tactics and safety while on YPG lands.

7. Utilize Prescott Interagency Dispatch Center (PIDC) to coordinate any and all aviation requests through YPG. In addition, radio communications are considered mission critical for all firefighting resources and PIDC and/or BLM will be the primary contact for all firefighting personnel while on YPG lands.

B. The Yuma Proving Ground will:

1. Provide a 24 hr contact number for YPG Fire and Range Control to coordinate suppression action on or near YPG.

2. Notify PIDC and/or dispatch of any wildfires that originate on YPG lands and coordinate with the responsible dispatch office to ensure effective airspace de-confliction.

3. Provide clear and concise security and safety protocols for BLM fire personnel to follow while on YPG lands. The security and safety protocols will be considered a mandatory supplement to this MOU.

4. Adhere to NWCG guidelines for wildland firefighting while on BLM administer lands or when assisting BLM personnel on a wildland fire within YPG boundaries when BLM personnel have been requested to manage an incident.

5. Respond to wildfires, when available and as requested, on BLM land with qualified individuals that meet the minimum NWCG standards for wildland firefighting.

6. Recognize assisting agencies that have been requested to respond to wildfires (BIA, USFWS and other fire entities) as "BLM cooperators" and covered under this MOU.

:

VI. AGREEMENT TERM

This MOU will remain in force for a period five years from the date of execution. The MOU will be reviewed annually during a pre-determined annual meeting of BLM and YPG fire and safety personnel.

VII. SPECIAL PROVISIONS

A. This MOU is neither a fiscal nor a funds obligation document. Any endeavor involving reimbursement or contribution of funds between parties of this MOU will be handled in accordance with applicable laws, regulations, and procedures.

B. This MOU may be modified or amended as necessary upon written consent of all parties or may be terminated by either party with a 60 day written notice to all other parties.

C. The principle contacts for this MOU are:

Bureau of Land Management

BLM, Yuma Field Office
John MacDonald, Field Manager

2555 Gila Ridge Road
Yuma, AZ 85365
928-317-3201

BLM, Colorado River District
Mike Trent, Fire Management Officer
2610 Sweetwater Ave
Lake Havasu, AZ 86406
(928) 505-1234

Yuma Proving Ground

YPG, Fire and Emergency Services
Don Kist, Fire Chief
301 C Street
Yuma, AZ 85365-9014

WILDFIRE DISPATCH CONTACT INFORMATION:

Prescott Interagency Dispatch Center
344 South Cortez Street
Prescott, Arizona 86303
(928) 777-5700

YPG, Fire and Emergency Services
Building 3013, Campo Avion Rd.
Yuma Proving Ground, AZ 85365
(928) 328-2949

IN WITNESS WHEREOF, the parties hereto have caused this Memorandum of Understanding to be executed as of the date of last signature below.

Bureau of Land Management, Arizona

Signature

Arturo Lopez, Acting Field Manager
Printed Name and Title

5/9/13
Date

Department of Defense, Yuma Proving Ground

Signature

RICHARD MARTIN, Garrison Mgr
Printed Name and Title

1 May 2013
Date

Annual Operating Plan
(Fire Management MOU)

Bureau of Land Management
Yuma/Havasu Colorado River Districts
And
United States Army, Yuma Proving Ground

The Annual Operating Plan (AOP) is established to support the operational aspects of the approved Memorandum of Understanding (MOU). The AOP will provide specific procedures which will provide for safe, efficient operations between agencies. The AOP will be reviewed and approved by December 1st of each calendar year.

I. Mutual Aid

Participating parties should recognize that their may be times when cooperators are involved in emergency or mission critical operations and unable to provide mutual aid. In this case other cooperators may be contacted for assistance.

II. Command Structure

Unified command should be used, as appropriate whenever military and public lands are involved, unless one or more parties request a single agency Incident Commander (IC). If there is a question about jurisdiction, fire managers should mutually decide and agree on the command structure as soon as they arrive on scene. Once the decision has been made, the incident organization in use should be relayed to all units on the incident as well as dispatch centers.

In all cases, the identity of the IC must be made known to all fireline and support personnel.

III. Communications

In mutual aid situations the common radio frequency will be Arizona Mutual Aid. It is critical for operational safety that all department/agencies resources establish this common communication frequency as soon as they arrive on scene. Clear text communication should be used during interagency operations.

When civilian firefighting air resources are requested to assist in suppression operations in restricted/regulated air space the responsible dispatch center will

contact Range Control prior to launching aircraft to the incident. Range Control and the dispatch center will coordinate air space use and aircraft flight following.

Aircraft will establish communication with Range Control to ensure flight plans are authorized prior to entering the air space.

Frequency Identifier	Band Width	TX	TXCG	RX	RXCG
Arizona Mutual Aid	**Broadband**	**154.280**		**154.280**	
Range Control	**VHF - Primary**	**119.0**		**119.0**	
Range Control	**UHF West of Kofa Range**	**248.4**		**284.4**	
Range Control	**UHF East of Kofa Range**	**230.2**		**230.2**	

IV. Boundaries

BLM resource will not enter onto military land for the purpose of wildland fire suppression unless specifically requested and escorted by authorized YPG personnel. The BLM fully recognizes the requirements to maintain base security and the concern of unexploded ordinance (UXO) within the boundaries of YPG. All fire suppression activities on military lands will be coordinated through the YPG Fire Department.

When YPG resources initial attack or suppress fires on public lands, the responding resources will adhere to land management policies and procedures established by the jurisdictional agency.

The majority of the BLM lands adjacent to military lands are protected as wilderness or special management areas that limit or restrict off road travel entirely. Responding YPG resources will contact the appropriate dispatch center to obtain suppression guidelines prior to engaging in off road suppression activities.

The BLM may request access at the full discretion of authorized YPG personnel in an effort to asses and evaluated potential threats of fires burning near the boundary onto public lands.

V. Time/Duration

When fires occur solely on public or military lands and are not considered a mutual threat, cooperating agencies agree, during the first 24 hours of an incident, responding and requesting resources are in a non-reimbursable status.

VI. Qualifications/Minimum Requirements

The BLM, under the National Interagency Incident Management System (NIIMS) concept, has agreed to accept cooperator's standards for fire personnel qualifications and equipment during initial attack. Once jurisdiction is clearly established, then the standards of the agency(s) with jurisdiction prevail.

BLM has subscribed to the National Wildfire Coordinating Group (NWCG) standards and will adhere to these standards regardless of jurisdictional boundaries.

When conducting firefighting operations under the YPG Incident Command System (ICS) or on military lands a BLM liaison will be assigned to the YPG IC to ensure cooperating agencies policies and standards are adhered to. This is also reciprocated when YPG resources are conducting operations under BLM ICS on public lands.

When an incident escapes initial attack and converts to extended attack on public lands, all personnel and equipment assigned to the incident are required to meet NWCG standards.

VII. Reimbursement/Compensation

These costs may be abridged or negated through joint operations and planning between departments. As a general premise reimbursement/compensation will be negotiated on a case by case basis.

VIII. Cooperation

An After Action Review (AAR) will be conducted within 7 days post incident. The AAR is a tool intended for post-evaluation of the incident in order to sustain strengths and improve weaknesses. This process should not be interpreted as an investigational review.

The AAR will be conducted at the field and departmental level. The IC will conduct a review in the field with the operational resources and as scheduled with

the departments/agencies representatives. The IC will be responsible for facilitating, scheduling and contacting each party to conduct the AAR.

The following should be represented during a department/agency AAR:

YPG-Range Control
YPG-Wildlife
YPG-Fire Department
BLM- Colorado River District-Yuma

In an effort to standardize training and meet NWCG fire fighting standards, YPG departments should annually submit a list of wildland fire training needs. When capable, BLM will facilitate the delivery of NWCG 100-200 level courses. The BLM will be the primary contact agency in coordinating training agendas.

IX. Dispatch Centers

To contact/request BLM fire resources:

Prescott Interagency Dispatch Center
344 S. Cortez Street
Prescott, Arizona
1-928-777-5700

To contact/request YPG fire resources:

Yuma Proving Ground, Fire Department
301 C Street, Building 3013
Yuma, AZ 85365-9498
928-328-2851 (Primary)
928-328-2949 (Secondary)

L	C	E	S
Lookouts	Communications	Escape Routes	Safety Zones

The 10 Standard Fire Orders

Fire Behavior

1. Keep informed on fire weather conditions and forecasts.
2. Know what your fire is doing at all times.
3. Base all actions on current and expected behavior of the fire.

Fireline Safety

4. Identify escape routes and safety zones and make them known.
5. Post lookouts when there is possible danger.
6. Be alert. Keep calm. Think clearly. Act decisively.

Organizational Control

7. Maintain prompt communications with your forces, your supervisor and adjoining forces.
8. Give clear instructions and insure they are understood.
9. Maintain control of your forces at all times.

If 1-9 are considered, then...

10. Fight fire aggressively, having provided for safety first.

The 10 Standard Fire Orders are firm. We don't break them; we don't bend them. All firefighters have the right to a safe assignment.

The 18 Watch Out Situations

1. Fire not scouted and sized up.
2. In country not seen in daylight.
3. Safety zones and escape routes not identified.
4. Unfamiliar with weather and local factors influencing fire behavior
5. Uninformed on strategy, tactics, and hazards.
6. Instructions and assignments not clear.
7. No communication link between crewmembers and supervisors.
8. Constructing line without safe anchor point.
9. Building line downhill with fire below.
10. Attempting frontal assault on fire.
11. Unburned fuel between you and the fire.
12. Cannot see main fire, not in contact with anyone who can.
13. On a hillside where rolling material can ignite fuel below.
14. Weather gets hotter and drier.
15. Wind increases and/or changes direction.
16. Getting frequent spot fires across line.
17. Terrain or fuels make escape to safety zones difficult.
18. Feel like taking a nap near fireline.

Fire Behavior Fuel Model	Description	Acres	Percent
SH1	Low load dry climate shrub	671,618.20	80.2%
GS2	Moderate load; dry climate grass-shrub	129,814.40	15.5%
GS1	Low load; dry climate grass-shrub	10,358.72	1.2%
NB9	Barren	9,956.18	1.2%
GR2	Low load; dry climate grass	6,762.96	0.8%
GR1	Short; sparse dry climate grass	6,194.95	0.7%
NB1	Urban	1,803.44	0.2%
SH5	High load; humid climate grass-shrub	638.73	< 0.01
NB3	Agriculture	33.80	< 0.01
NB8	Water	10.45	< 0.01
TL6	Moderate load broadleaf litter	2.67	< 0.01
SH2	Moderate load dry climate shrub	2.22	< 0.01
TL3	Moderate load conifer litter	1.77	< 0.01