3.14 WILDFIRES

3.14.1 Introduction/Region of Influence

This section presents information on the history of wildfires and improvements the Army has made in recent years regarding fire management. Additionally, it provides an overview of the IWFMP, which covers eight Army sites on O‘ahu and the Island of Hawai‘i (USARHAW and 25th ID[L] 2003). It contains a description of each fire management area and SOPs for MMR and PTA and is the primary tool for managing wildfires at MMR and PTA.

Wildfires on O‘ahu typically occur in undeveloped areas where vegetation (especially exotic species) supports ignition and spread of a fire. The ROI for assessing the ignition of wildfires is MMR and the lands immediately surrounding MMR.

PTA is a mosaic of dry habitats that can burn quickly when a fire is ignited. There is a risk that training activities or other unforeseen events (i.e., human error [an errant round or pyrotechnic], discarded cigarette, catalytic converter) could ignite a fire in the proposed PTA CALFAX training footprint or impact area and spread to areas outside of the impact area. In 1994, a fire destroyed 118 individuals of *Tetramolopium arenarium* ssp. *arenarium* eliminating approximately a third of the total population. Once a fire has occurred and the native habitat has been burned, there is the potential for subsequent invasion of non-native plant species (particularly fountain grass [*Pennisetum setaceum*]). These invasive plants increase competition with native plants and degrade the surrounding habitat (USFWS 2003c).

While impacts resulting from the Proposed Action may occur due to trampling, explosions, dust, and other activities, the side effect of training with the most substantial and furthest reaching impacts across PTA’s landscape is fire. For this reason, the potential rate of fire spread based on fuel type and weather conditions were the basis for determining the ROI for wildland fires, as well as the ROI for biological resources. The ROI encompasses the SDZ of the range footprint and extends into and throughout the areas designated as having moderate to high fire spread rates. The area that has the highest potential for impact by fire is the northwest portion of the installation (not including the Ke‘āmuku parcel) (USFWS 2003c). The Kīpuka Kālawamauna Habitat comprises a major portion of this area.

3.14.2 Wildfire History
Mākua Military Reservation

There is an increased threat of damage from fire at MMR for the following reasons:

- Fuels between the Mākua Valley floor and native habitats at higher elevations are highly flammable;
- The rugged terrain limits accessibility for fire suppression efforts;
- The area is susceptible to fires started by nonmilitary sources, such as arson and cigarettes, within or adjacent to MMR; and
- Military use of live ammunition, such as artillery and mortars, increases ignition sources at MMR.

Most of the fires that start on military training lands on O‘ahu are contained within the boundaries of the installation (USARHAW and 25th ID[L] 2001b). However, some fires have burned onto adjacent lands, especially those starting at MMR, which have burned onto the adjacent land of Albert Silva, the Kuaokalā Game Management Area, and the US Air Force Ka‘ena Point Satellite Tracking Station. Most of the training-related fires at MMR start in or escape from the CCAAC, which is where most of the training exercises take place (USARHAW and 25th ID[L] 2003).

Historical fire information obtained from the *Analysis of Fire Management Concerns at Mākua Military Reservation* states that a small number of fires cause a large part of the resource damage (Beavers et al. 1999). Between 1970 and 1998, 276 fires occurred at MMR, with approximately 20 fires (each burning over 100 acres [40 hectares]) causing most of the damage to natural resources. Most fires occurred during February (which is during the wet season), July, August, and September, and most occurred during the peak burning period of 12:00 PM to 4:00 PM. Between August 5, 1970, and September 17, 1998, 59 fires escaped the firebreak. Ten of these fires escaped the firebreak during September. Nine, eight, and seven fires escaped during November, July, and March, respectively.

The most common cause of wildfires on MMR has historically been the use of tracer ammunition (USARHAW and 25th ID[L] 2001b). In September 1998, the Army voluntarily discontinued the use of tracers at MMR. The following summarizes the percentages of historical fires at MMR by source (Beavers et al. 1999):

- Tracer ammunition, 49 percent;
- Anti-tank missiles, including the Dragon and inert TOW missiles, 12 percent;
- Demolition explosives and mines, 6 percent;
- Nonmilitary wildfire ignition sources (civilians or nonmilitary activities), 5 percent;
- Source of ignition is unknown or unrecorded, 6 to 12 percent. White phosphorus is one substance previously used during training that could be the source of an ignition in this category; it can be buried and then could ignite if uncovered; and
- Other ignition sources totaling 16 to 22 percent, each less than 5 percent. These sources include UXO detonation, indirect fire (including mortars and artillery), rockets, fire restart/escape, muzzle flash, and pyrotechnics.

Training was suspended in 1998 but was resumed in October 2001. Between October 2001 and October 2003, 21 CALFEXs were conducted, and one fire occurred during training in 2002, caused by an AT-4 anti-tank rocket and burned a 16-foot- (5-meter-) wide area next to Objective Deer. A commander used his boot to put out the fire (Husemann 2003c). Also, in June 2002, a small flare-up that was not a training-related fire ignited in the north firebreak road. It was not possible to determine how it started or extinguished itself; the flare-up was in a high hazard impact area, and ground visibility was limited due to heavy vegetation (Enriques 2004a). By the time forces arrived, there was no visible smoke or fire. The oxidation of white phosphorus was believed to have initiated the fire, and a lack of vegetation was the probable reason for the fire extinguishing itself.

In addition to fires accidentally started as a result of training, fires have also been intentionally started to perform prescribed burns. The most recent prescribed burn was conducted on July 22, 2003. Preparation and execution of the prescribed burn was performed according to the burn plan prepared by the Army (US Army, undated). The Army coordinated the prescribed burn with the USFWS; US Forest Service; HDOH, Clean Air Branch; State DNLR, Division of Forestry and Wildlife; Federal Fire Department; Honolulu Fire Department; Hickam Fire Department; and the National Weather Service. The prescribed burn was designed to burn between 800 and 900 acres (244 and 274 hectares) (Enriques 2003b). However, the prescribed burn area escaped the firebreak road due to a sudden 180 degree wind shift and an increase in wind speed from 9 miles (14.48 kilometers) per hour to 20 to 25 miles (32.2 to 40.2 kilometers) per

hour within five to ten minutes. As a result, the fire burned uncontrolled for three days and burned 2,100 acres (640 hectares).

The Installation Fire and Safety Office was responsible for the preparation and implementation of the prescribed burn plan for the July 2003 prescribed fire (Enriques 2003b). According to the Integrated Wildland Fire Program Manager, all of the precautionary steps (such as conducting a test burn, reviewing the go-no-go checklist, reviewing the weather forecast, stationing fire fighting resources on-site, and preparing an escape fire situation analysis), as outlined in the prescribed burn plan, were carried out prior to the prescribed burn. To further improve wildfire management for prescribed burns, the Integrated Wildland Fire Program Manager recommended the following actions (Enriques 2003b):

- Install fiber optics to improve local area network telecommunications. Better communications devices would have helped improve response times during the July 2003 prescribed burn.
- Increase staff to assist the Program Manager of the Wildfire Management Program. For example, a contracted or full-time 10-man strike team, whose members are wildland trained and possess red cards, could be used to respond to fires and assist daily in managing other fire prevention areas of the program; the red card is what qualifies a person to fight a fire with a federal agency or on federal land. This would include working at Pōhakuloa and O‘ahu training areas on the RAWS, fire fighting equipment and supply storage (cache), fire vehicle maintenance, wildland fire training, fire bucket repair and maintenance, fire trend analysis, and firebreak and fuelbreak maintenance.
- Consider leasing or procuring an S70A Fire Hawk helicopter that is dedicated to wildland fire standby and response to wildfires on military training lands. This would improve response time and provide dedicated contracted pilots that offer continuity and specialized training for wildland fire suppression.
- Provide IWFMP funding. The IWFMP is currently funded to some degree as an unfinanced requirement or unresourced requirement for fiscal year 2004 (Enriques 2004b). Funding for sustaining daily operations for the IWFMP is programmed in the next Program Objective Memorandum cycle from fiscal year 2005 to 2009. However, critical must-fund projects or contracts (such as for firebreak construction or dip pond/tank construction) are programmed in outgoing years and compete with other critical must-fund projects based on priority and available funds for that

year, and are subject to the approval of the Garrison Commander. Given limited funding, some of the Integrated Wildland Fire Program Manager's projects do not make the priority cutoff (based on other critical mission needs), requiring the manager to either wait for year-end funds or delay the project into the next fiscal year. The IWFMP is described below in Section 3.14.4, Wildfire Management.

- Ensure range use accountability. Range Division must enforce procedures and policies and take appropriate action when range safety procedures and policies are violated. Training units should be disciplined or admonished administratively when procedures and policies are not followed.

The Army is updating the IWFMP as a result of the recently completed Section 7 consultation. Revisions to the Standard Operating Procedures section in the IWFMP will outline the Fire Danger Rating System, revised weapons restrictions, new National Wildlife Coordinating Group (NWCG) qualifications standards and helicopter staffing requirements, fire equipment requirements, new firebreak and fuelbreak installation and maintenance standards, fire reporting responsibilities, and fire prevention, detection, and suppression standards, which will minimize the risk of resource damage due to training-related wildland fires at MMR.

To summarize, activities with highest risk of igniting fires outside the firebreak road are restricted to periods when the grass fuels within the valley are greener and burn more slowly. Weapons more likely to ignite wildland fires are further restricted to periods of the day when wind speeds are lower and relative humidity is higher, when the grass fuels are less likely to ignite, and when fires would be easier to suppress. New fuelbreaks and firebreaks and improved firefighter planning will provide for greater protection for the Kahanahāiki, Kaluakauila, and 'Ōhikilolo management units in the event of a large fire. A staffing guide has been developed to ensure that adequate fire suppression resources are assigned to each live-fire training exercise at MMR. Staffing requirements vary by time of year and weapon system in use in order to ensure that more suppression force is available during dry months or when the weapons being used are likely to ignite fires outside the firebreak road. Whenever a weapon or demolition is fired, MMR would be staffed, at minimum, by five NWCG-qualified, arduous-level, pack-tested, red-carded wildland fire personnel with two Type 6 engines and one water tender. Aerial fire suppression resources would be assigned to exercises in accordance with helicopter staffing guidelines, which depend on live herbaceous fuel moisture, forecasted wind speed and direction, and weapons system in use. More substantial fire suppression helicopter capability is assigned when

grass is more cured, when wind speeds are higher, and when weapons with a higher risk of igniting fires are in use. In the event of a fire at any location, training is stopped immediately and the unit takes all appropriate actions to put out the fire (USFWS 2007b).

Pōhakuloa Training Area

Historically, fire in the area of PTA was rare and of little significance, limited to volcanically started fires and occasional lightning ignitions. There is a high risk of wildfire ignition from the use of aerial flares and similar pyrotechnics (US Army and USACE 2004). Fires caused by tracer ammunition is by far the largest cause of fires at PTA. This comes as no surprise since tracers easily start fires and are one of the most commonly used munitions (USARHAW and 25th ID[L] 2003). Based on fire records, the number of fires per month peaks from March to July (Beavers et al. 2002b). However, because PTA is dry throughout the entire year and the amount of precipitation received during the winter is probably not enough to change the probability of fire by any significant amount, an annual cycle in fire frequency was not expected. Therefore, the main cause of monthly variation in the data is probably the frequency and intensity of use by the military. Eighty percent of all recorded fires between 1987 and 1999 started between 9:00 AM and 5:00 PM (US Army and USACE 2004).

Although military use for live-fire exercises and target practice has increased ignition frequency dramatically and resulted in numerous small fires, a great deal of the threat to endangered species populations is a result of off post ignitions. Fires originating from non-military sources have caused the overwhelming majority of the acres burned at PTA (USARHAW and 25th ID[L] 2003). Since July 1990, over 8,000 acres (3,237 hectares) have been recorded as burned. Of these, over 7,700 acres (3,116 hectares) or 91 percent of all acres burned were burned by fires caused by lightning, arson, or carelessly discarded cigarettes, and the largest of these started off Army lands and later burned onto PTA. Highly flammable fuels and unique weather conditions also lead to high ignition rates. Fires may also originate from sources such as arson, cigarettes, and vehicles with catalytic converters within or adjacent to training areas (US Army and USACE 2004).

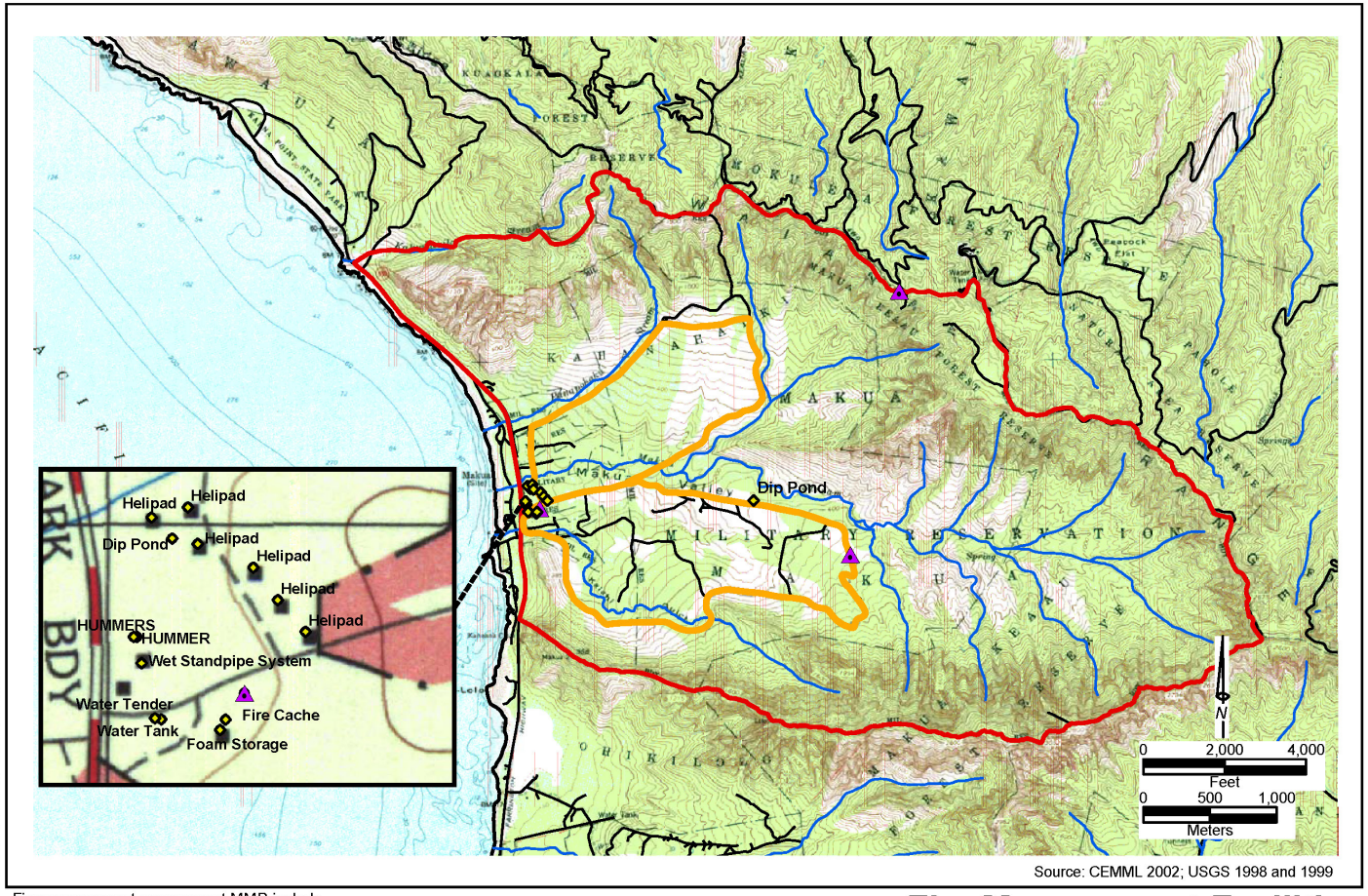
Based on fire history for PTA, the data show that the western and the northern sections of PTA potentially face the greatest threat of wildfire. The high risks inherent in military training activities, the existence of heavy loads of readily ignitable fuel, and the prevalent dry conditions of the area present significant fire management problems for the training area and adjoining lands (USARHAW and 25th ID[L] 2003).

3.14.3 Fire Fighting Resources
Mākua Military Reservation

Figure 3.14-1, Fire Management Facilities shows the location of fire management resources at MMR, which include equipment and materials storage, wheeled vehicles, helicopters, two 300,000-gallon (1,134,000-liter) dip ponds, and three RAWS to aid in determining weather conditions and the wildfire threat conditions (USARHAW and 25th ID[L] 2001b). Staffing requirements vary by time of year and by weapon system in use to ensure that adequate fire suppression force is assigned. During all training exercises when any weapon is being fired (including blanks) and during demolition exercises, MMR would be staffed, at minimum, by five NWCG-qualified, arduous-level, pack-tested, red-carded wildland fire personnel with two Type 6 engines and one water tender. Helicopters or other aircraft would be used for both fire suppression and fire detection at MMR. Fire containment with aircraft resources depends on the ability to perform at a pace in excess of the fire's rate of perimeter increase. Therefore, total combined continuous fireline productivity of on-site and total assigned helicopters would vary by season, forecasted fire weather, and scheduled training activities (USFWS 2007b).

According to the Integrated Wildland Fire Program Manager, the two dip ponds provide adequate water supply for the initial attack during wildland fire fighting activities at MMR, and there is no immediate need to add additional dip ponds (Enriques 2003a). In the event of an extended attack (one or more days) the capability to replenish water in the dip ponds may be compromised due to the high demand flow requirements to support fire bucket operations. The water distribution system is complicated by a restriction of the water flow due to the 1.5-inch (4-centimeter) pipe supplied from the meter to the 30,000-gallon (135,000-liter) water tank that is used to supply the domestic needs of the administration facilities and to refill the lower dip pond. The Army has plans to upgrade the water distribution system (Enriques 2005). The upper dip pond in the valley is filled via water hauling contracts once a year.

A small fire can be extinguished in as little as 30 minutes, whereas a large complex fire can last as long as three days. During a complex fire, helicopters scoop water throughout the daylight hours, refilling the bucket every two to five minutes. The aircraft have to stop approximately every two hours to get fuel (Fancher 2003b). A UH-60, Blackhawk uses a 660-gallon (2,498-liter) Bambi Bucket; a CH-47, Chinook uses a 2,000-gallon (7,570-liter) Bambi bucket, and a Hughes 500-D (Air One of Honolulu Fire Department) uses a 110-gallon (416-liter) Bambi fire bucket (Enriques 2003a).



Fire management resources at MMR include equipment and materials storage (cache), wheeled vehicles, helicopters, dip ponds, and remote automated weather stations.

Legend

- Remote Automated Weather Station
- Fire Suppression Facilities
- Firebreak Roads
- Mākua Military Reservation
- Rivers
- Roads

Fire Management Facilities

Mākua Military Reservation
O'ahu, Hawai'i

Figure 3.14-1 Fire Management Facilities, MMR

In the past, aviation units were capable of using night vision goggles to fight fires at night, but this is considered a high risk due to the light emitted from the fire, which, coupled with the amphitheater valley walls within MMR, make nighttime fire fighting very dangerous. Currently, helicopters are primarily used only during daylight to fight fires and are typically not authorized to fight fires at night unless a risk assessment is conducted and otherwise approved by the Commanding General (Enriques 2003a). Any nighttime fire fighting would be primarily by ground crews, unless otherwise authorized and determined that it can be accomplished without compromise to firefighter safety.

Pōhakuloa Training Area

PTA ensures that wildland fire response requirements are in accordance with the IWFMP, Army Regulations (AR 420-90), and Department of Defense Instruction (DoDI) 6055.6, Fire Protection Program. (WFMP 2003). Four remote weather stations on PTA are used for fire indexing. An auxiliary wildland firefighting force provides an initial attack on a fire before the fire department arrives. The Hawai‘i County Fire Department, HDLNR, and Hawai‘i Volcanoes National Park assist with wildland fire suppression.

An additional position, PTA Wildland Fire Coordinator was added to the PTA Fire Department. The PTA Wildland Fire Coordinator works closely with the Wildland Fire Program Manager to facilitate pre-suppression actions on the Island of Hawai‘i and assists in the fire fighting duties of the PTA Fire Department. (USARHAW and 25th ID[L] 2003).

The Directorate of Plans, Training and Mobilization (DPTM) ensures that PTA has a minimum of six fully qualified and trained fire fighting staff, to include a Humvee equipped to fight fire, available during live-fire training exercises, which includes a radio dispatcher (USARHAW and 25th ID[L] 2003 and USFWS 2003c). At a minimum, six trained fire fighting personnel are required during expected high fire danger rating days and any scheduled live-fire training operation. When deployed to PTA, military training units also provide, upon request, a platoon unit (minimum of 20 members) to assist the PTA Fire Department in fighting wildfires per the PTA IWFMP SOP.

In 1996, the Army constructed six above ground dip tanks (each 80,000-gallon [302.83-liter] capacity) at PTA to enhance its water supply resources and fire fighting capability (USARHAW and 25th ID[L] 2003). One of these dip tanks is located adjacent to the Kīpuka Kālawamauna Endangered Plant Habitat area by the Twin Pu’u range footprint. Another

dip tank is located in the Kīpuka Kālawamauna area within the ROI. There are current plans for 3 more dip tanks at PTA (USARHAW and 25th ID[L] 2003). Two of these would be located along the western boundary of PTA proper, one near the MPRC Quarry and the other near the Old Kona Highway. The third dip tank would be located at the Keʻāmuku Parcel. In addition, there is a non-potable 60,000-gallon [227,124-liter] water storage tank located at Bradshaw Army Airfield. It is equipped with a fire pump capable of providing rapid water resupply services to fire vehicles or water tenders in support of water shuttle delivery to and from the fire area (USARHAW and 25th ID[L] 2003).

Three GSA-leased 5,000-gallon [18,927-liter] water tankers are assigned at PTA. These water tankers are parked at designated spots and are used to shuttle water to refill the dip tanks or provide a water source for ground fire fighting crews. In addition, two HMMWV's or brush engines equipped with a 300-gallon [1,135-liters] slip-on pump unit (Class A foam capable) and one water tender (2,000-gallon [7,571-liter] capacity) or equivalent are assigned and available for initial attack response at PTA. A military helicopter with a certified and trained aircrew capable of performing fire bucket operations are on site at PTA during live-fire training operations. A UH-60, CH-46/7, or CH-53 are on site when Battalion or Brigade sized units deploy to PTA. In addition, a backup helicopter under contract services to the Army is available and able to arrive at PTA within 90 minutes after notification. PTA currently maintains three Bambi fire buckets: two (2) 660-gallon (2,498-liter) and one (1) 2,000-gallon (7,571-liter) for emergency backup use by military UH-60, CH-53, or CH-47 aircraft assigned to conduct fire bucket operations (USARHAW and 25th ID[L] 2003).

Cooperative agreements with other local fire cooperators (Hawaiʻi County Fire Department, National Park Service, State Civil Defense, National Guard, and Division of Forestry and Wildlife) for mutual aid support have been established to provide for multiple agency response and cooperative assistance between agencies. The 25th ID(L) and USARHAW on Oʻahu will also provide additional fire fighting resources upon request.

3.14.4 Integrated Wildland Fire Management Plan

According to the Integrated Wildland Fire Program Manager, the development and enforcement of the Fire Danger Rating System (described below, under standing operating procedures), on-site dip ponds and other required fire fighting resources, and a comprehensive IWFMP have been the most important resources used to prevent the start and spread of wildfires (Enriques 2003a). The IWFMP for the Oʻahu and Pōhakuloa training areas was prepared in October 2003 and approved by

the Installation Commander in December 2003 (USARHAW and 25th ID [L] 2003). It establishes specific guidance, procedures, and protocols for managing wildfires on Army training lands. In support of the most recent Section 7 consultation, the Army, with the assistance of the USFWS, has been updating its IWFMP to incorporate new and additional measures to minimize the risk of resource damage due to training-related wildland fires.

The IWFMP acknowledges that most fire history files are incomplete; the files were retained primarily as manual records and after five years were destroyed, following the disposition of records in accordance with the Modern Army Recordkeeping System (USARHAW and 25th ID [L] 2003). Large gaps in information are frequent, and records prior to 1996 are incomplete (Beavers et al. 1999). Chapter 1 of the IWFMP is provided in Appendix J-1.

Mākua Military Reservation

The IWFMP addresses environmental conditions and fire effects in Hawai‘i, fire prevention, fire suppression, post-fire actions, and fire management areas. The MMR fire management area is described below. Fire prevention includes planning, managing fuels, using prescribed fire, planning water resources, and training firefighters. Fire suppression actions include the following issues:

- Identifying responsibilities, procedures, and strategies for fire suppression;
- Special considerations for suppression on USARHAW lands in order to minimize impacts on natural and cultural resources;
- Fire detection and reporting procedures;
- Initial and extended attack on fires;
- Communication devices used during fires;
- Air operation protocols;
- UXO concerns and safety during fire fighting; and
- Mutual aid support agreements with cooperating agencies.

Records and reports, reviews and formal investigations, and post-fire analysis make up post-fire actions.

The appendices to the IWFMP address standing operating procedures, which are described below (USARHAW and 25th ID[L] 2003). The

appendices also provide additional details pertaining to interagency cooperative agreements and the wildland fire program budget.

IWFMP Fire Management Area

The IWFMP covers eight Army sites on O‘ahu and the Island of Hawai‘i (USARHAW and 25th ID[L] 2003). IWFMP discussion of the MMR fire management area describes baseline site characteristics, wildland fire fuel types, previous fires, the protection of biological and cultural resources, and the firebreak system. MMR-relevant sections of the IWFMP are presented in Appendices J-2 and J-3, which include the MMR fire management area and standing operating procedures.

IWFMP Standard Operating Procedures

The SOPs provide specific requirements that delineate the responsibilities of Federal Fire Department, Range Control personnel, and military training units in the prevention and suppression of fires at MMR. In addition to addressing the environmental setting in the standing operating procedures, specific guidance is provided for fire prevention, fire suppression actions, and post-fire actions at MMR.

After 1998, the fuel model for MMR was changed from L (western perennial grass) to N (sawgrass) for Fire Danger Rating System burn index calculations, because N better represents the fuels at MMR (Beavers et al. 1999). This change provides burn indices that better represent fire behavior. The Fire Danger Rating System uses the following three colors to characterize fire threat conditions, as applicable to the proposed action:

- Green (indicating normal caution during training, burn index of 20 or lower). Weather conditions are favorable for use of most munitions, contingent on completion of conservation/management requirements of the 2007 BO, and smoking is permitted only in designated areas.
- Yellow (indicating caution because fires will start easily, with a burn index of 21 to 47). For this fire danger period, smoking is permitted only in designated areas, and use of certain munitions is permissible only after completion of conservation/management requirements of the 2007 BO. Under yellow conditions, a number of munitions/activities would not be allowed, such as tracers, live M79 and M203 grenade launchers, AT-4/M136 and SMAW, 2.75 rockets, Javelin, inert TOW missiles, and UXO demolition (outside the firebreak road or within 100 meters [328 feet] of the road).
- Red (indicating extreme caution because a fire would be difficult to control, with a burn index of 48 or higher). No smoking is

permitted on the ranges and no munitions or pyrotechnics are allowed. In other words, no live-fire training is allowed and the ranges are closed. Only small arms blanks would be allowed following completion of certain conservation/management requirements and at fuel moisture of 50 percent or higher, per the 2007 BO.

This system is used to inform the Range Control Office and officers in charge about the fire hazard level at the ranges (Beavers et al. 1999; USARHAW and 25th ID[L] 2003).

Because the lowest burn indices are recorded during the morning, most recent training has been conducted during the morning and evening to minimize the ignition of wildfires. Also, training is permitted only under green and yellow fire danger rating conditions, and the Army voluntarily withdrew the use of tracers, inert TOW missiles, and incendiary munitions for recent training exercises. White phosphorus or aerial pyrotechnics are not authorized under any circumstances on MMR (USARHAW and 25th ID[L] 2003).

In the event of a wildfire, MMR range control personnel are required to maintain a log of actions during a fire on DA Form 1594, Daily Journal, or in the Duty Officer's Log. Fire incidences would be assigned a fire number and officially recorded on the standard Wildland Fire Incident Report form for all Army training lands (USARHAW and 25th ID[L] 2003). The fire incident report contains approximately 26 data input categories to be filled out and includes such information as date, fire location, and number of acres burned. Every fire, regardless of size, must be reported immediately to Range Control, and in turn, to the Federal Fire Department (Enriques 2003a). The Wildland Fire Program Manager maintains all wildfire records and submits quarterly reports to the DPW Environmental Division.

According to *Analysis of Fire Management Concerns at Mākua Military Reservation,* additional information should also be retained in the fire records (Beavers et al. 1999). It also states that one of the most frequently cited reasons for the decrease in fire prevention and suppression success in the 1990s has been the lack of a well-trained, devoted fire manager on-site at MMR, who could be relied on to implement the IWFMP (Beavers et al. 1999).

Pōhakuloa Training Area

The IWFMP was identified as a conservation measure in the BO for the PTA's ESA Section 7 formal consultation for the Stryker in 2003; therefore, the implementation of the plan is required under the terms of

consultation. The PTA is required to address and implement the establishment and maintenance of fuel breaks, fire breaks, and fuel management corridors; dip tanks; suppression measures; and a Fire Danger Rating System (USFWS 2003c). The PTA Wildfire SOP establishes, amongst other things, procedures for fire prevention and suppression measures, as well as delineating responsibilities for implementing these actions (USARHAW and 25th ID[L] 2003). As stated earlier in the document, to ensure the efficacy of the IWFMP, the Army has been updating the IWFMP with the assistance of the USFWS.

Impacts of project activities would all occur in locations covered by the IWFMP, and the existing conditions and management strategies are summarized below. Fire prevention includes planning, managing fuels, using prescribed fire, planning water resources, and conducting firefighter training. The actions below are components of the IWFMP and provide the overall framework to address wildfire management (US Army and USAEC 2008).

Planning. Planning activities include procedures, purchases, and budgeting to improve the Army's prevention of and response to wildfires. Procedures include, but are not limited to, implementing the National Fire Danger Rating System (NFDRS), fire reporting procedures, and keeping records on the maintenance of vegetation modifications and wildfire occurrences. Budgeting and purchases include additional funding to hire more firefighters and purchase firefighting equipment.

Fuel Management. Fuel management activities include fire access road and fuel management corridor construction, expansion, and/or maintenance; and fuels management including prescribed burning, construction of dip ponds, and firefighting actions. Fire access road and fuel management corridor expansion, construction, and/or maintenance are slated in one form or another for all Army training areas.

Fuels Modification. Fuels modification is defined as removing and/or modifying an area of flammable vegetation, thereby managing the fire hazard by changing the vegetation type. The goal is to maintain a fuel condition that makes fires easier to control. Mechanical treatments, chemical treatments, biological treatments, and prescribed burns are all implemented as part of the IWFMP.

Dip Ponds. One of the most important resources for firefighters is an ample water supply. Dip ponds are plastic-lined, earthen ponds that serve as a water storage resource and are available for aerial fire bucket operations, thereby enhancing firefighting capabilities.

Firefighting Actions. Firefighting actions may take place at any time and at any installation. This includes helicopter bucket drops of freshwater, retardant, foam, and in emergencies, saltwater. Firefighting activities may also involve cutting fire lines by hand or by bulldozer, burnout operations, and increased traffic in the form of firefighters on foot and in vehicles as well as in the air. Because firefighting is considered an emergency operation, it is exempted from NEPA under 32 CFR 651.11. All reasonable efforts are made to protect natural and cultural resources from unnecessary harm during firefighting operations.

Fires originating on state land west of the installation are a major cause of fire on PTA affecting areas within and around the ROI. To reduce this threat, prescribed burns are proposed for the area lying between the two fire access roads located on and to the west of the installation boundary near Kīpuka Kālawamauna (IWFMP 2003). In addition, a fire break combined with a fuel break extends from the Keʻāmuku lava flow that goes south along the western boundary of PTA and separates the Kīpuka Kālawamauna Endangered Plant Habitat area from state lands. The fire break varies in width, but is not less than 29.5 feet (9 meters) across. The fuel break is 82 feet (25 meters) wide in grassy areas and 147.6 feet (45 meters) wide in shrub or forest areas. Fuels within the fuel break are maintained at less than 20 percent crown cover (USARHAW and 25th ID[L] 2003).

To the west of the Twin Puʻu area, there is currently an 11.5-foot (3.5-meter) fuel break along the MPRC access road. The fuel break is adjacent to the road, which is about 14.8 feet (4.5 meters) wide. The Endangered Plant Habitat is on the west side of the road (Schnell 2008, personal communication). The IWFMP calls for the fire break to be 14.8 feet (4.5 meters) in width and not to be combined with a fuel break, though fuels along the road would be managed via herbicide if populations of listed species are not present (USARHAW and 25th ID[L] 2003). The Draft Programmatic Environmental Assessment for the Implementation of the Integrated Wildland Fire Management Plan states that fire access roads would be established using existing roads and through new construction and would be constructed to be 20 feet (6.1 meters) wide with a buffer area of reduced vegetation extending 10 feet (3.1 meters) to the outside of the road and 30 feet (9.1 meters) inside.

IWFMP Fire Management Area

Five wildfire management areas have been designated, based on existing and planned fuel management corridors (USARHAW and 25th ID [L] 2003). The ordnance impact area is not considered because prevention activities there are not possible and resources at risk are largely unknown.

Each area was assigned an ignition potential, fuels hazard, and habitat value, based on the best currently available information. Representatives of the USFWS and USAG-HI agreed on the ratings. The Kīpuka Kālawamauna, Mauna Kea, and Kīpuka Alala areas have a high wildfire prevention priority. The Ke‘āmuku Parcel and southwestern PTA area have a moderately high wildfire prevention priority (US Army and USACE 2004).

At PTA, the WFMP Fire Danger Rating System breaks up the large expanse of training lands into several smaller fire danger rating areas. The fuels and weather of each of these areas are more homogenous than PTA as a whole, thus making fire danger rating more accurate (USFWS 2003c). The six fire danger rating areas are Ke‘āmuku, PTA West, PTA North, PTA East, impact area, and Kīpuka Alala (USARHAW and 25th ID[L] 2003).

IWFMP Standard Operating Procedures

A Fire Danger Rating System designed specifically for PTA has been developed by the US Forest Service and Colorado State University, based on analysis of PTA’s fire history, fuels, fire behavior models, and weather (USARHAW and 25th ID[L] 2003, PTA-11 and PTA-29). National fire danger rating indices, as recommended by the US Forest Service and Colorado State University, are applied to the predominant fire carrying vegetation in each of six fire danger rating areas. The Fire Danger Rating System uses the following five colors to characterize fire conditions at PTA (US Army and USACE 2004, PTA Human Health and Safety Hazard):

- Blue (indicating low fire danger). No training restrictions.
- Yellow (indicating high fire danger). No tracers or white Green (indicating moderate fire danger). No training restrictions.
- phosphorus are allowed.
- Red (indicating very high fire danger). No pyrotechnics, smoking, or cooking/warming fires are allowed.
- Orange (indicating extreme fire danger). No live-fire, except ball and blank ammunitions, which are allowed only at fixed ranges. Maneuver training is limited to fixed ranges, TAs 7 to9, 12 to 16, and 21.

A supplemental system using wind speed criteria is in place for the restriction and use of pyrotechnics at PTA. Average wind speed (as measured over a 2 minute interval) and location are factors that govern pyrotechnic restrictions on the installation. The average wind speed (in knots) and fire risk factors are as follows:

- 0 to 10 knots (low fire risk)
- 11 to 15 knots (moderate fire risk)
- 16 to 20 knots (high fire risk)
- > 20 knots (very high risk)

All fires, regardless of size, are reported immediately to Range Control and in turn, to the PTA Fire Department. The PTA Deputy Fire Chief or the SFO serves as the Incident Commander (IC) for all wildfires on PTA. Fires started from outside the PTA boundary that have potential to carry into high value resource areas on PTA justify the fullest commitment to aggressive containment and control. The Army works with adjacent landowners to control fires before they escape or reach PTA.

The PTA Fire Department maintains a log of and assigns a number to all fires occurring on the installation. Every fire is officially recorded on the standard Wildland Fire Incident Report (WFIR) form for Army training lands. The Wildland Fire Program Manager and DPW Natural Resource Manager coordinate submission of semi-annual fire incident reports to USFWS NLT 10 July and 10 January of each calendar year (USARHAW and 25th ID[L] 2003).

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