

# STATE OF THE RESERVATION REPORT

TRAINING YEAR 2020 • CAMP EDWARDS  
FINAL





Final Annual State of the Reservation Report, Camp Edwards, Training Year 2020  
March 2021



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# PREFACE

The *Annual State of the Reservation Report* (the Annual Report), established by the Massachusetts Environmental Policy Act process and required by state law (Chapter 47 of the Acts of 2002), is the result of many years of environmental reviews and submissions by the Massachusetts Army National Guard.

The Annual Report describes the nature and extent of military training and other activities taking place in the Camp Edwards Training Area/Upper Cape Water Supply Reserve. In addition, it describes the status of the Massachusetts Army National Guard's compliance with environmental laws, regulations and the Environmental Performance Standards, a set of 19 standards established in Chapter 47 of the Acts of 2002 guiding military and civilian usage of the Camp Edwards Training Area/Upper Cape Water Supply Reserve (Training Area/Reserve). The Annual Report illustrates that military training can occur in the Camp Edwards Training Area/Upper Cape Water Supply Reserve in a manner that is compatible with the natural resources purposes of water supply and wildlife habitat protection.

The *Annual State of the Reservation Report* covers the Massachusetts National Guard's Training Year 2020, which ran from October 1, 2019 to September 30, 2020; therefore, information provided in this report generally encompasses an individual training year rather than calendar year. The report's primary focus is the review of the Massachusetts Army National Guard's environmental programs relative to compliance with applicable local, state, and federal regulations. Each year, the report provides information on military training levels, range area usage, resource management activities, environmental indicators for training activities, and coordination among other activities and projects, such as the regional water supply and the remediation program activities. Cape Cod Air Force Station and the US Coast Guard Communications Station are both located within the boundary of the Upper Cape Water Supply Reserve; however, they are not subject to Chapter 47 of the Acts of 2002 and the Environmental Performance Standards (Chapter 47 of the Acts of 2002, Section 15).

The report also provides information on environmental reviews for proposed Massachusetts National Guard and other projects within the Upper Cape Water Supply Reserve.

The Annual Report is structured as follows:

Section 1, Introduction, discusses the structure of Joint Base Cape Cod and the environmental management structure pertaining to activities in the northern training areas of Camp Edwards.

Section 2, Small Arms Ranges and Military Training Activities, provides an update on the return to live fire at the Small Arms Ranges at Camp Edwards and associated activities. This section also provides information on military training that occurred in the Training Area/Reserve during Training Year 2020. Data is provided on the levels of training in the various training areas in the Training Area/Reserve and range usage, as well as at the various training support area facilities in the Cantonment Area on Camp Edwards.

Section 3, Environmental Program Management, focuses on environmental management programs operated by the Massachusetts Army National Guard in the Training Area/Reserve and program compliance with the Environmental Performance Standards for the Training Area/Reserve for the training year.

Section 4, Remediation Program Activities, provides a summary of remediation activities undertaken in the Training Area/Reserve during the training year by the Installation Restoration Program and the Impact Area Groundwater Study Program.

Section 5, Miscellaneous Military and Civilian Activities and Environmental Program Priorities, provides information on major activities undertaken during Training Year 2020 that may not be directly related to a

Massachusetts Army National Guard environmental management program, actions in the Training Area/Reserve, or specific Environmental Performance Standards for the Training Area/Reserve.

The Annual Report is the culmination of a year-long effort by the military and civilian employees of the Massachusetts Army National Guard, Training Site Camp Edwards, the Environmental & Readiness Center, the Natural Resource Program, and the Environmental Management Commission to provide valuable information on the state of the Training Area/Reserve to interested stakeholders and the community at large. In good faith, the Annual Report is provided to the Environmental Management Commission's Environmental Officer, and the Commission's Science Advisory Council and Community Advisory Council for their input.

## Annual State of the Reservation Report Key Terms

### Upper Cape Water Supply Reserve

The Upper Cape Water Supply Reserve was established by Chapter 47 of the Acts of 2002 as public conservation land dedicated to three primary purposes: water supply and wildlife habitat protection; the development and construction of public water supply systems, and the use and training of the military forces of the commonwealth; provided that, such military use and training is compatible with the natural resource purposes of water supply and wildlife habitat protection. It comprises—and for the purposes of this report, may be synonymous with—Camp Edwards' 14,886-acre northern training area. Cape Cod Air Force Station and US Coast Guard Communications Station Boston are both located within the boundary of the Upper Cape Water Supply Reserve; however, they are not subject to the Environmental Performance Standards.

### Camp Edwards Training Area

The Massachusetts Army National Guard Camp Edwards Training Site (Camp Edwards Training Area) is the major training area for Army National Guard soldiers in the Northeast. It is approximately 14,886 acres located on the northern portion of Joint Base Cape Cod. At Camp Edwards, soldiers practice maneuvering exercises, bivouacking, and use the small arms ranges. The Upper Cape Water Supply Reserve also is located on the 14,886 acres of Camp Edwards. It comprises—and for the purposes of this report, may be synonymous with—Camp Edwards' 14,886-acre northern training area.

### Environmental Performance Standards

The Environmental Performance Standards (Appendix A) are a list of requirements, or standards for performance, that guide both military and other users in the protection of Camp Edwards' natural and cultural resources and the groundwater beneath the Training Area/Reserve. The Environmental Performance Standards are based in large part on existing federal, state, and Department of Defense regulations. In some cases, the protections offered by the performance standards are more stringent than those offered by other regulations. These standards apply to the Upper Cape Water Supply Reserve within the Camp Edwards Training Area. Although Cape Cod Air Force Station and the US Coast Guard Communications Station are located within the boundary of the Upper Cape Water Supply Reserve, the Environmental Performance Standards do not apply to them as they were excluded by Chapter 47 of the Acts of 2002.

### Training Year

A training year runs from October 1 to September 30 and is based on the federal fiscal year. Information found in the annual *State of the Reservation Report* is compiled by training year. This *Annual State of the Reservation Report* is for Training Year 2020 (October 1, 2019 – September 30, 2020).

## Training Support Area

There are separate facilities and equipment that can simulate live military training; these are grouped under the Training Support Area. The majority of the training activities associated with these facilities are conducted in the Cantonment Area of Camp Edwards. Training Support Areas include Kelley Tactical Training Base, the Calero Mobile Military Operations on Urban Terrain Site, the Engagement Skills Trainer, and the Virtual Convoy Operations Trainer.

## Small Arms Ranges

Small arms ranges allow live-fire qualification training with weapons of a small caliber, i.e., pistols, rifles and semi-automatic and automatic rifles. Small arms training is designed to train a soldier to be “qualified” in the use and maintenance of his or her assigned weapon. There are four active small arms ranges on Camp Edwards, which the Massachusetts Army National Guard uses for weapons familiarization, weapons zeroing (essentially customizing it to give the soldier a more accurate shot) and qualification.

## Impact Area

The 2,200-acre Impact Area is located in the center of the Upper Cape Water Supply Reserve/Camp Edwards Training Site. The small arms ranges are situated around the perimeter of the Impact Area, with range firing toward the Impact Area. The 330-acre Central Impact Area is located within the Impact Area; it was the primary target area for artillery, mortar, and other firing activities from the early 1900s until firing ceased in 1997.

## Cantonment Area

The southern 7,200-acre developed area of Joint Base Cape Cod with roads, utilities, office and classroom buildings, training support areas, and housing. There are numerous federal, state and county entities located there.

## Referenced Documents

The Annual *State of the Reservation* report encompasses a large amount of information and makes reference to many letters, reports and other documents that were developed over the course of Training Year 2020. Many of these are available on-line and any letter, document or report referenced in the *Annual State of the Reservation Report* is available by contacting Emily Kelly, Community Involvement Specialist, Massachusetts National Guard Environmental & Readiness Center, 339-202-9341, emily.d.kelly2.nfg@mail.mil.

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# ACRONYMS

AFCEC	Air Force Civil Engineer Center
AFS	Air Force Station
ANGB	Air National Guard Base
AR	Army Regulation
ATV	All Terrain Vehicle
BMP	Best Management Practice
BP	Battle Position
CAA	Clean Air Act
CAC	Community Advisory Council
CAX	Combined Arms Exercise
CER	Camp Edwards Regulation
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulation
CIA	Central Impact Area
CMP	Conservation and Management Plan
CMR	Code of Massachusetts Regulations
CPMPP	Construction Period Monitoring and Protection Plan
CPQC	Combat Pistol Qualification Course
CRREL	Cold Regions Research and Engineering Laboratory
CS	Chemical Spill
CSE	Comprehensive Site Evaluation
DBH	Diameter at Breast Height
DCR	Department of Conservation and Recreation
DFG	Department of Fish and Game
DFW	Division of Fisheries and Wildlife
DNA	Deoxyribonucleic acid
DoD	Department of Defense
E&RC	Environmental & Readiness Center
EMC	Environmental Management Commission
EPA	Environmental Protection Agency
EPS	Environmental Performance Standard
FAA	Federal Aviation Administration
FS	Fuel Spill
GLU	Cantonment Grasslands
HMMWV	High Mobility Multipurpose Wheeled Vehicle
IAGWSP	Impact Area Groundwater Study Program
IED	Improvised Explosive Device
IMT	Individual Movement Techniques

**Acronyms, continued**

INRMP	Integrated Natural Resources Management Plan
IRP	Installation Restoration Program
ISWM	Integrated Solid Waste Management Site
ITAM	Integrated Training Area Management
JBCC	Joint Base Cape Cod
JLUS	Joint Land Use Study
LQG	Large Quantity Generator
MANG	Massachusetts National Guard
MAANG	Massachusetts Air National Guard
MAARNG	Massachusetts Army National Guard
MassDEP	Massachusetts Department of Environmental Protection
MassDOT	Massachusetts Department of Transportation
MA SHPO	Massachusetts State Historic Preservation Office
MCP	Massachusetts Contingency Plan
MEC	Munitions and Explosives of Concern
MEPA	Massachusetts Environmental Policy Act
MESA	Massachusetts Endangered Species Act
MGL	Massachusetts General Law
MIPAG	Massachusetts Invasive Plants Advisory Group
mm	millimeter
MMCL	Massachusetts Maximum Contaminant Level
MMR	Massachusetts Military Reservation
MMRP	Military Munitions Response Program
MPMG	Multipurpose Machine Gun Range
NBC	Nuclear-Biological-Chemical
NEPA	National Environmental Policy Act
NHESP	Natural Heritage and Endangered Species Program
NLEB	Northern Long-eared Bat
OB/OD	Open Burning/Open Detonation
OEA	Office of Economic Adjustment
OMMP	Operation, Maintenance and Monitoring Plan
P2	Pollution Prevention
PAVE PAWS	Precision Acquisition Vehicle Entry – Phased Array Warning System
PAI	Pounds of active ingredient
ppb	parts per billion
ppm	parts per million
PAN	Percussion Actuated Neutralizer
PFAS	Per- and polyfluoroalkyl substances
RDX	Royal Demolition Explosive

**Acronyms, continued**

REC	Record of Environmental Consideration
RI/FS	Remedial Investigation/Feasibility Study
ROA	Record of Action
ROTC	Reserve Officers Training Corps
RTI	Regional Training Institute
SAC	Science Advisory Council
SEMASS RRF	Southeastern Massachusetts Resource Recovery Facility
SGCN	Species of Greatest Conservation Need
SPVS	Solar Photovoltaic System
SR/ES	Source Registration/Emissions Statement
SVL	Soldier Validation Lane
TA	Training Area
TSA	Training Support Area
TTB	Tactical Training Base
TY	Training Year
UAS	Unmanned Aerial System
URI	University of Rhode Island
USCG	United States Coast Guard
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UTES	Unit Training and Equipment Site
UTM	Ultimate Training Munition
WFPC	Wildland Fire Program Coordinator
WPA	Wetlands Protection Act
WWTP	Waste Water Treatment Plant
XRF	X-Ray Fluorescence

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# SECTION 1

## INTRODUCTION

### 1.0 INTRODUCTION

This section of the Annual *State of the Reservation Report* (Annual Report) provides information on Joint Base Cape Cod (JBCC) and the environmental management structure overseeing activities in the approximately 14,886-acre Camp Edwards Training Area/Upper Cape Water Supply Reserve (Training Area/Reserve). The Upper Cape Water Supply Reserve is located on, and is contiguous with, the 14,886 acres of the Camp Edwards Training Area. Excluded from the Upper Cape Water Supply Reserve are areas outside of the operational control of the Massachusetts National Guard (See Section 1.1 and Figure 1-1).

### 1.1 JOINT BASE CAPE COD STRUCTURE

Joint Base Cape Cod is a multi-service military installation and is home to the Massachusetts Army National Guard's (MAARNG) Camp Edwards, the Massachusetts Air National Guard's (MAANG) Otis Air National Guard Base (ANGB), the United States Coast Guard's (USCG) Base Cape Cod, the U.S. Air Force's Cape Cod Air Force Station (AFS), and the Department of Veterans Affairs Cemetery. Joint Base Cape Cod is located in the upper western portion of Cape Cod, immediately south of the Cape Cod Canal in Barnstable County, Massachusetts. It includes parts of the towns of Bourne, Mashpee and Sandwich, and abuts the Town of Falmouth. Joint Base Cape Cod covers nearly 21,000 acres – approximately 30 square miles (Figure 1-1).

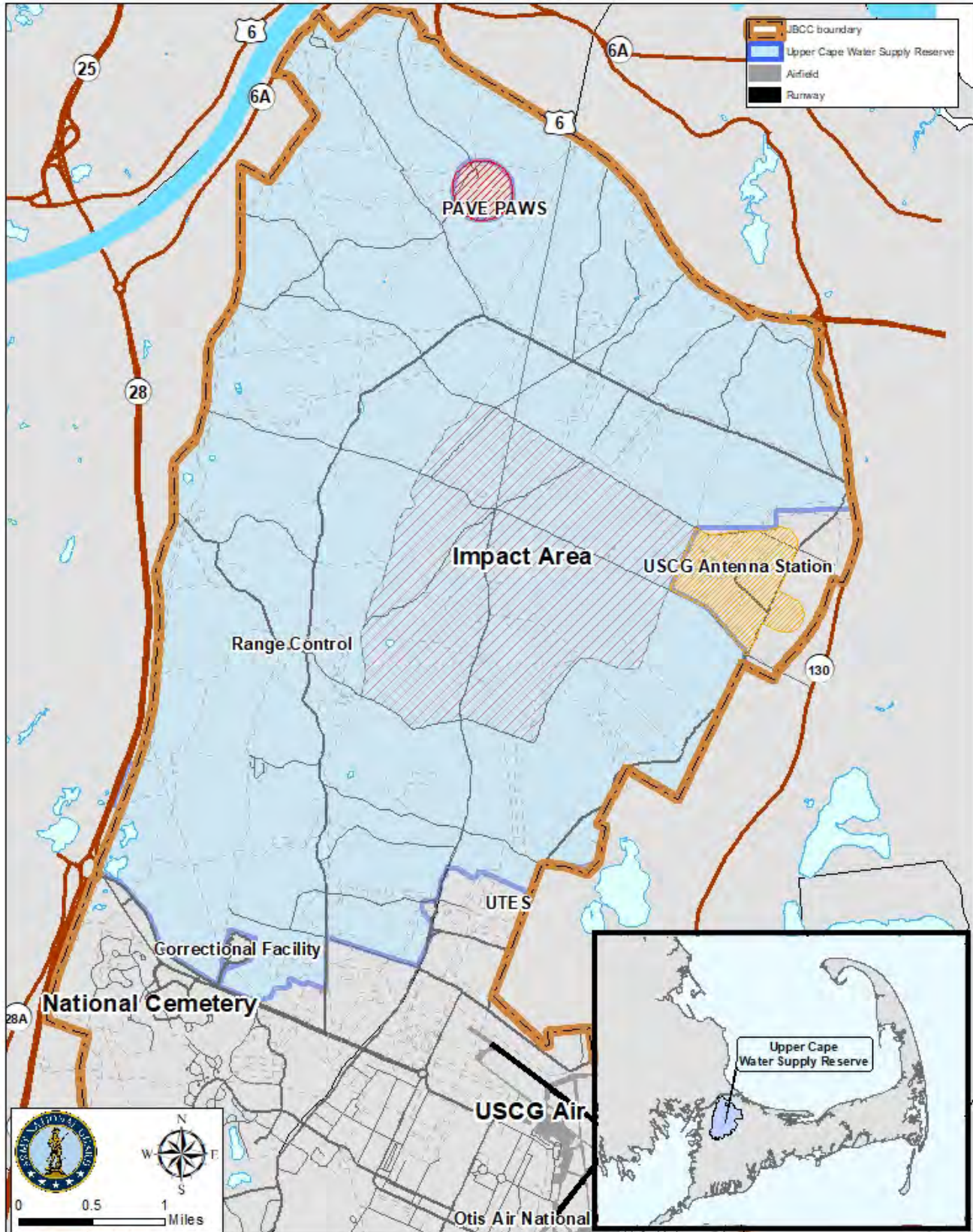
The Camp Edwards Training Area comprises 14,886 acres of the northern portion of JBCC. The remaining Camp Edwards military-controlled area of JBCC lies in the southern portion, or Cantonment Area. The Commonwealth of Massachusetts owns the land comprising Camp Edwards and leases the property to the Department of the Army, who in turn licenses the land to MAARNG for training.

The MAARNG and MAANG are part of the Commonwealth of Massachusetts Military Division. However, federal law largely dictates their activities, make-up, training, and functions. For example, most of the day-to-day activities conducted at JBCC by the National Guard, including annual and weekend training, are federal military activities funded by the federal government. In conducting federal military activities, the National Guard is required by federal law to follow Department of Defense (DoD) regulations, Army regulations, Air Force instructions, and applicable federal and state laws and regulations.

There are three major facilities in the northern portion of JBCC that are not on land under the operational control of the Massachusetts National Guard. Cape Cod AFS, which includes the PAVE PAWS ballistic missile early warning radar system, is located on an 87-acre parcel of land on the northwest corner of the Training Area/Reserve. The USCG's Communications Station is located on a 542-acre parcel along the northeastern side of the Training Area/Reserve. A Barnstable County Correctional Facility that opened in 2004 is located on a 29-acre parcel of land just north of Connery Avenue, just outside the southern edge of the Training Area/Reserve. The locations of these facilities are shown in Figure 1-1. Because these facilities are located on land not under the control of the Massachusetts National Guard, and because the Environmental Performance Standards (EPSs) (see Appendix A) established through Chapter 47 of the Acts of 2002 do not apply to these organizations and facilities, detailed information concerning activities at these facilities is not included in the Annual Report. Questions pertaining to activities at Cape Cod AFS, the Coast Guard Communications Station, and the Barnstable County Correctional Facility should be addressed to the persons listed in Appendix B of this report.



Figure 1-1 Map of Joint Base Cape Cod



The Commonwealth of Massachusetts has issued three utility easements on its state-owned property in the Training Area/Reserve: an electrical power line easement (Eversource), a natural gas pipeline easement (National Grid), and a natural gas pipeline easement (Algonquin - that partially overlays the National Grid easement). Additionally, there are easements issued to the Upper Cape Regional Water Supply Cooperative and to the Bourne Water District. The locations of the utilities and facilities are shown in Figure 1-2.

## 1.2 ENVIRONMENTAL MANAGEMENT STRUCTURE

### 1.2.1 Environmental Management Commission

Chapter 47 of the Acts of 2002 established the Environmental Management Commission (EMC), consisting of the Commissioner of the Department of Fish and Game (DFG), the Commissioner of the Massachusetts Department of Environmental Protection (MassDEP), and the Commissioner of the Department of Conservation and Recreation (DCR). The EMC oversees compliance with and enforcement of the EPSs in the Training Area/Reserve, coordinates the actions of environmental agencies of the Commonwealth in the enforcement of environmental laws and regulations in the Training Area/Reserve, as appropriate, and facilitates an open and public review of all activities in the Training Area/Reserve. The legislation also states that the environmental agencies on the EMC retain all their respective, independent enforcement authority.

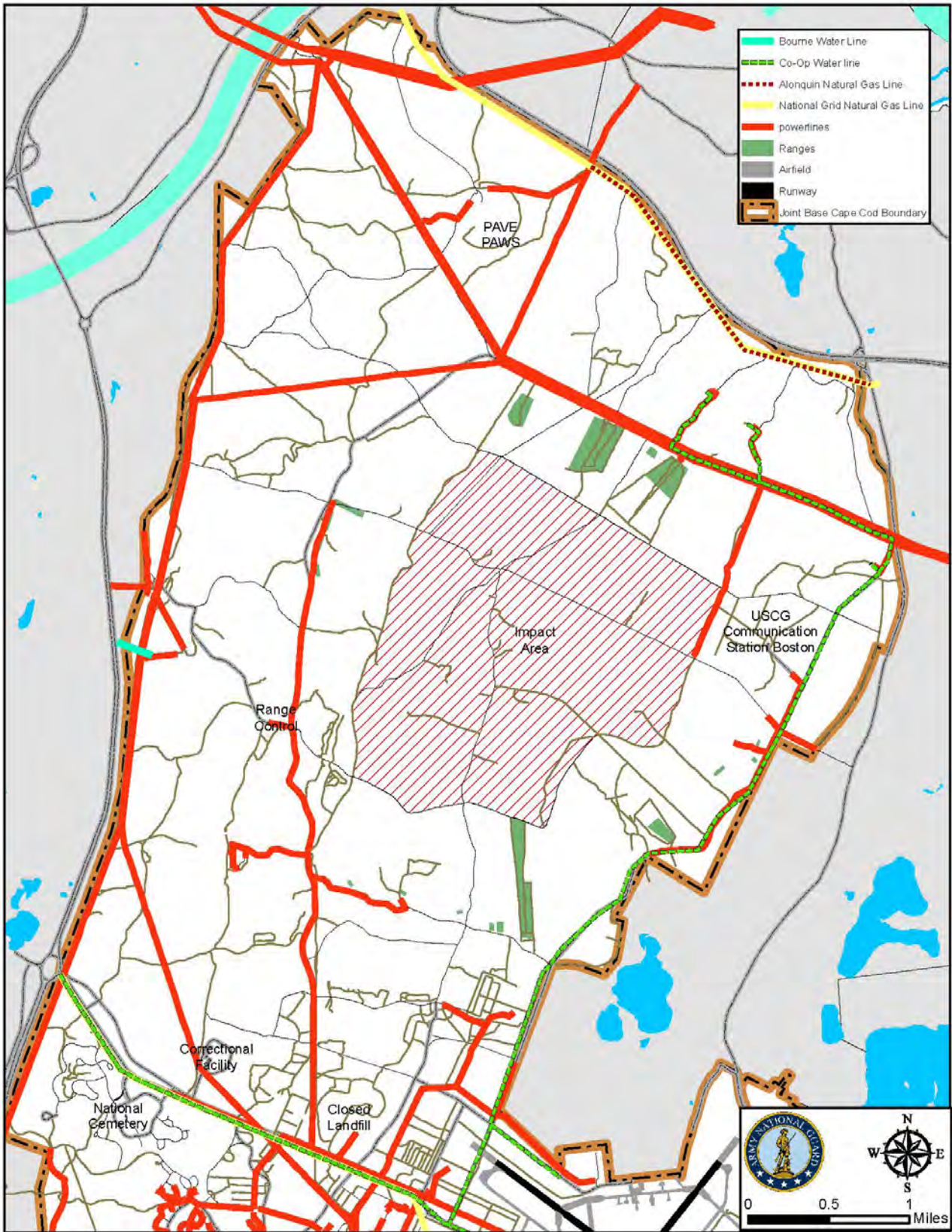
Chapter 47 of the Acts of 2002 also directed that the EMC be assisted by two advisory councils, appointed by the Governor of Massachusetts. The Community Advisory Council (CAC), consisting of 15 members, assists the EMC by providing advice on issues related to the protection of the water supply and wildlife habitat within the Training Area/Reserve. The Science Advisory Council (SAC), consisting of up to nine members, assists the EMC by providing scientific and technical advice relating to the protection of the drinking water supply and wildlife habitat within the Training Area/Reserve.

Chapter 47 of the Acts of 2002 also established an Environmental Officer for the Training Area/Reserve. Mr. Leonard Pinaud of MassDEP is the Environmental Officer. In this capacity, he provides monitoring of military and civilian activities on and uses of the Training Area/Reserve and the impact of those activities and uses on the water supply and wildlife habitat. Working directly for the EMC, the Environmental Officer has unrestricted access to all data and information from the various environmental and management programs in the Training Area/Reserve. He has full access to all points in the Training Area/Reserve and conducts inspections at any time in order to monitor, oversee, evaluate, and report to the EMC on the environmental impact of military training and other activities. His on-site monitoring occurs prior to, during, and immediately following training and other activities. The Environmental Officer's monitoring activities include but are not limited to: training sites, pollution prevention and habitat protection activities for both military and military contractors in the Training Area/Reserve, as well as coordinating with and consulting with the Massachusetts National Guard Environmental & Readiness Center (E&RC) on various projects, initiatives and issues.

The Environmental Officer acts as a liaison between the EMC, SAC, CAC, military, general public, and various state agencies. He identifies and monitors ongoing issues regarding training procedures and the environment in the Training Area/Reserve and keeps the EMC, SAC and CAC apprised of the progress of these issues in addition to bringing issues to the E&RC for resolution. He also participates in community outreach activities with the E&RC and facilitates the EMC, SAC and CAC public meetings under the legislation.

The EMC, SAC and CAC met a total of three times during Training Year (TY) 2020. The groups discussed a number of topics, all of which are covered in this report. In November 2017, an Ad Hoc Committee to the Science Advisory Council was established. Please see Section 2.3 for further discussion. Minutes from the meetings may be found at [https://www.massnationalguard.org/ERC/advisory\\_groups\\_minutes.htm#emc](https://www.massnationalguard.org/ERC/advisory_groups_minutes.htm#emc)

Figure 1-2 Utility Easements and Leases



### 1.3 COVID IMPACTS AT CAMP EDWARDS

As in the rest of the world, the impacts of the Covid-19 pandemic were felt on Camp Edwards during TY 2020. Many Massachusetts Army National Guard Units originally scheduled for annual training at Camp Edwards were instead deployed to help with the Covid-19 nursing home testing effort. Currently many are still deployed providing trained expertise to give vaccines to soldiers, nursing home residents, and others. Other units, when their out-of-state training was canceled, were redirected to train at Camp Edwards leading to an increase in training at the Camp.

The pandemic not only affected soldier training but also had impacts on environmental monitoring and management. Most environmental management and monitoring took place as usual although some activities, such as prescribed fire, had to be reduced or canceled due to the necessity of instituting safe Covid practices. The table below summarizes those impacts as noted in the Annual Report.

Antimony Speciation: Lab closure	Section 2.3
Training: Title 32 orders for Covid response	Section 2.9
Training: Increase in pyrotechnic use due to out-of-state training being redirected to Camp Edwards	Section 2.11
Monitoring: Reduced frequency of snake surveys	Section 3.3
Monitoring: Surveys performed by a single observer	Section 3.3.8
Management: In-house herbicide treatment not performed in TY 2020	Section 3.5.2
Management: No prescribed burn operations conducted in TY 2020	Section 3.6.1
Wildland Fire Training: No fire training Spring 2020/no Fall Fire Academy	Section 3.6.2
Hunting: Hunts will proceed if Massachusetts is in Phase 3, but not in lower phases.	Section 3.5.4
Hunting: The wild turkey hunt was canceled in TY 2020.	Section 3.5.5
Monitoring: Personnel support reduced for a joint research project.	Section 3.3.8

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# SECTION 2

## SMALL ARMS RANGES AND MILITARY TRAINING ACTIVITIES

### 2.0 INTRODUCTION

Section 2 of the Annual Report provides an update on actions associated with active small arms ranges in the Training Area/Reserve including range maintenance, environmental sampling, and levels of military and civilian use of the ranges.

This section also provides information on the use of Training Areas, Training Support Areas (TSA) in the Cantonment Area of Camp Edwards, information on simulated munitions, the Soldier Validation Lane (SVL), and off-site training during TY 2020.

The Massachusetts National Guard (MANG) reports on some Cantonment Area training activities to provide context for why soldiers then move into the Training Area/Reserve to conduct the most realistic training possible to provide for trained and ready soldiers. In the words of the MAARNG trainers, soldiers are provided training in a “crawl, walk, run” scenario. The crawl phase is in the classroom where they learn theory and the basics of the training they are about to undertake; the walk phase is where soldiers can literally walk through the training event in a classroom setting, use simulators, or go into the field and walk through a scenario. Finally, the run phase is where the crawl and the walk phase are put into the most realistic field setting possible in the Training Area/Reserve.

### 2.1 CAMP EDWARDS TRAINING AREA/UPPER CAPE WATER SUPPLY RESERVE

#### 2.1.1 Military and Civilian Use

The MAARNG has approximately 5,621 soldiers who train on average one weekend per month and one two-week cycle during a training year. The Training Area/Reserve is also utilized by other Department of Defense (DoD) and law enforcement agencies (i.e.: Marines, US Coast Guard, Barnstable County Sheriff's Department, and local police departments). Units start planning their training several years in advance of the year in which they actually conduct their training. The unit leadership assesses the strengths and limitations of its personnel and begins to schedule training sites and resources to best support the training their units require. During the year prior (TY 2019) to the year of execution (TY 2020) units confirm geographical areas and training sites within the Training Area/Reserve.

Military training activities in the Training Area/Reserve are tracked by Range Control based on individual training area use and the number of personnel participating in this use. This method records the number of times each training area is utilized and the number of personnel and vehicles utilizing the areas for each event. Figure 2-1 shows the locations of the major training areas and small arms ranges in the Training Area/Reserve.

Camp Edwards Range Control manages and tracks training area use. For example, Table 2-1 shows the overall utilization of the ranges, training areas and training support areas during TY 2020, while Table 2-2 shows their utilization for each of the past ten training years. For specific training area use for TY 2020 see Table 2-3 and for the ten year totals for training area use see Table 2-4. Range Control is operational 24 hours per day when units are training and, during the course of a training day, personnel from Range Control will observe units at various locations to ensure that they are following range, safety and environmental regulations.

Military training activities in the Training Area/Reserve are tracked by the number of times each training area is utilized per day and by the number of personnel and vehicles utilizing the areas for each use. In many cases personnel and vehicles utilize more than one training area per day. Figure 2-2 shows color-coded personnel use by training area for TY 2020. Figure 2-3 shows a color-coded personnel use by training area for each of the past ten training years. Figure 2-4 provides a color-coded ten year personnel use by training for the past ten training years. Figure 2-5 shows color-coded daily usage by training area for TY 2020. Figure 2-6 shows a color-coded daily usage by training area for each of the past ten training years with Figure 2-7 providing a color-coded ten year daily usage by training area for the past ten training years. For example, as seen in Figure 2-7, training areas B-8 and B-9 were not used, and area B-11 shows a dramatic increase in use; this is a result of the closing and opening of these training areas due to the proximity to the Monument Beach Sportsman’s Club’s (Club) firing range. These training areas are within the Surface Danger Zone (SDZ) for the rifle range and therefor are closed when the club’s range is operational. An SDZ is a notional, undisturbed safety area extending out from a small arms range where there is a one-in-a-million chance that a bullet may land. The MAARNG and the Club coordinate schedules to ensure safety of Soldiers and Club members.

Graph 2-1 shows personnel use by training area for TY 2020 and the average personnel use by training area for TY 2011 to TY 2020; Graph 2-2 shows days used by training area for TY 2020 and the average days used by training area for TY 2011 to TY 2020. Use of specific training areas is dependent upon its capacity to hold Soldiers, its terrain to support a given training exercise, and restoration of training venues through the cleanup and the ITAM programs. Over the last several years training has focused on collective exercises where training areas that can support these training events are used.

As units become aware that the ranges and other training venues at Camp Edwards meet qualification standards, the use of the areas where these venues are located will increase. Fluctuations in training usage is also largely influenced by deployment cycles and changes to training doctrine and directives. In addition, over the past two decades, legacy contamination cleanup activities (managed by Air Force Civil Engineer Center/Impact Area Groundwater Study Program [See Section 4.0]) in the Training Area/Reserve have resulted in small arms ranges and other training venues being unavailable for use. However, as clean-up activities have been completed these training venues are again available for compatible military use. So, with new ranges, training venues, and eventual completion of the cleanup program, Training Area use and numbers will fluctuate accordingly.

In the Table 2-1 and Table 2-2, civilian use includes use of the ranges and training areas in the Training Area/Reserve and the Training Support Areas (TSA) in the Cantonment Area; civilian use ranges from unmanned aircraft systems ground operations and flight testing, to practicing land navigation, to training in the Calero Mobile Military Operations on Urban Terrain Site, to use of classrooms and other facilities. In addition, there were also public deer and turkey hunting seasons during TY 2020. Information on these activities is provided in Sections 3.5.4 and 3.5.5 of this report. Fluctuations in training days and event numbers from year to year is a result of differing unit training requirements, combined training needs, and deployment cycles.

TABLE 2-1 OVERVIEW OF TRAINING USE - TY 2020

Area	Training Days/Events	PERSONNEL	
		Military Personnel	Civilian Personnel
Ranges	192	5,314	701
Training Areas	918	61,574	294
Training Support Areas	1,931	71,586	5,833
<b>TOTAL</b>	<b>3,041</b>	<b>138,474</b>	<b>6,828</b>

Figure 2-1 Camp Edwards Training Area and Ranges

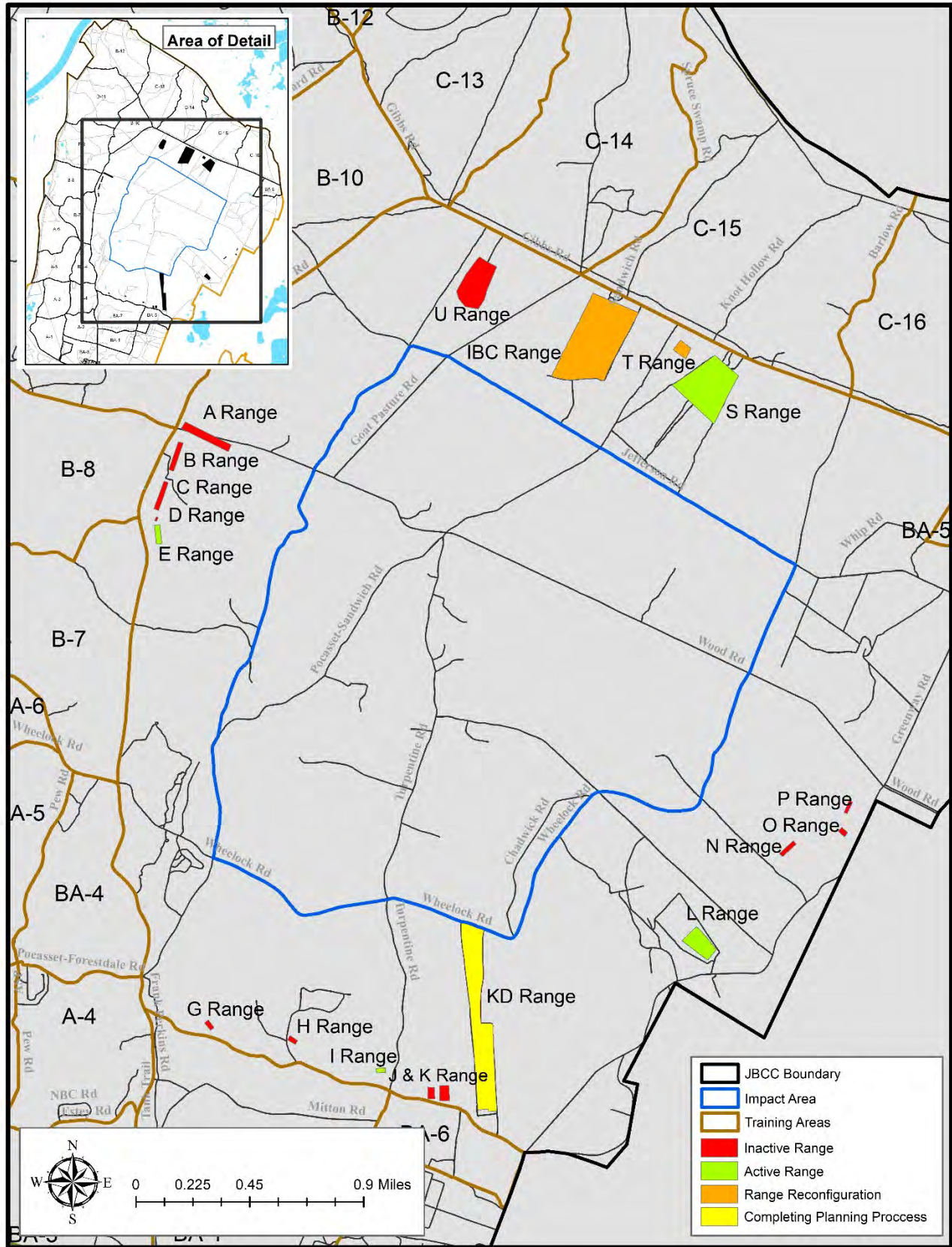




Figure 2-2 Personnel Usage by Training Area in the Training Area/Reserve, TY 2020

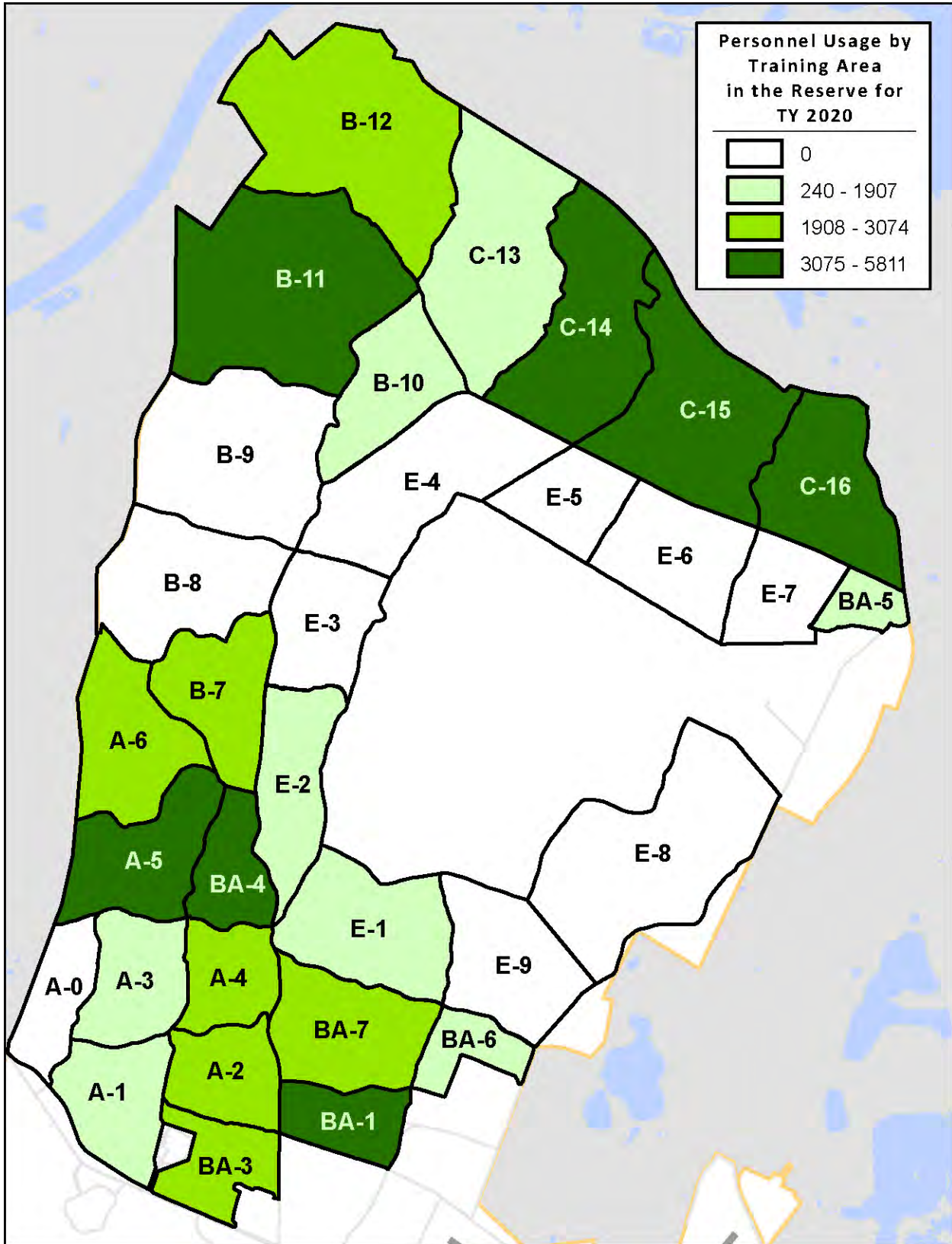
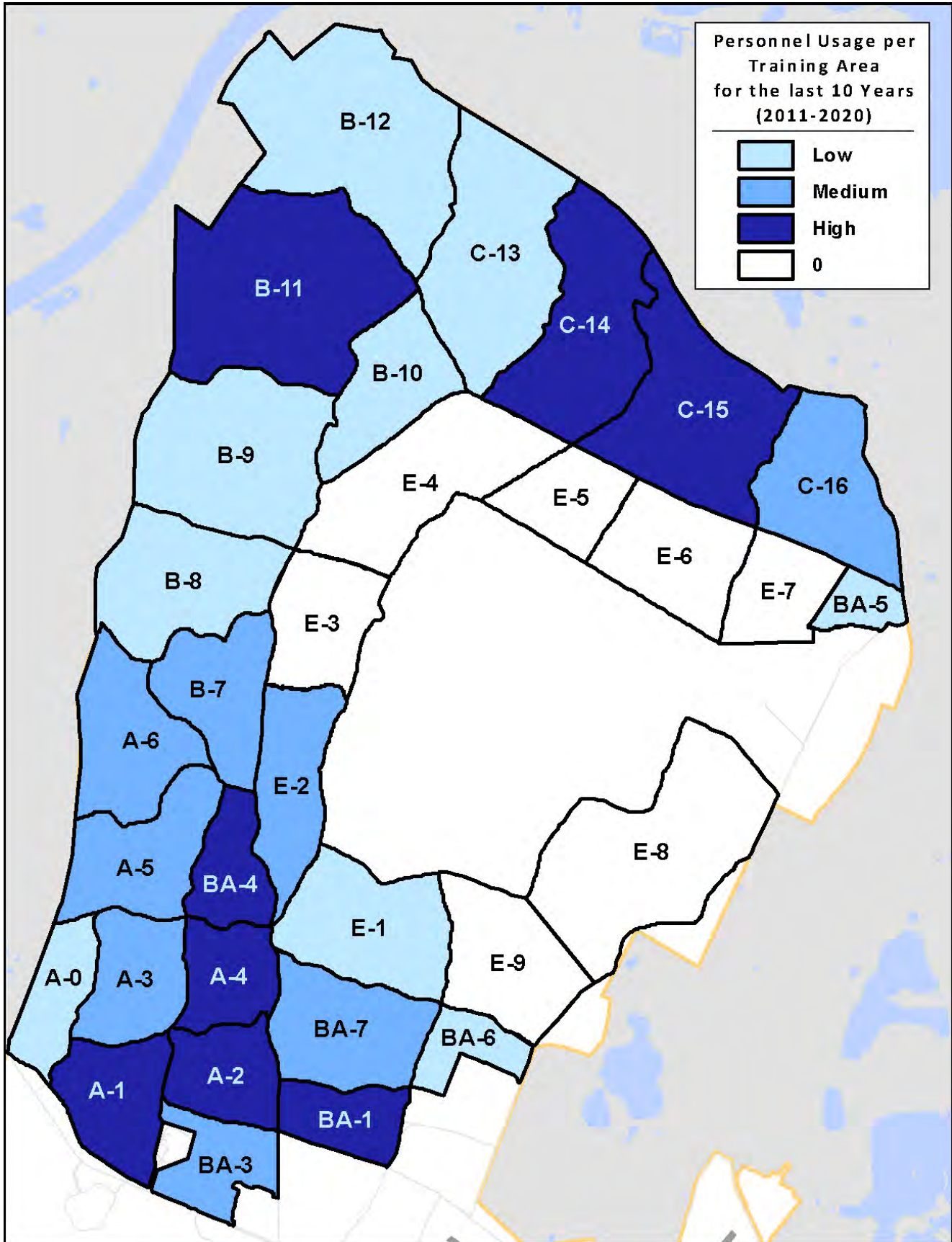
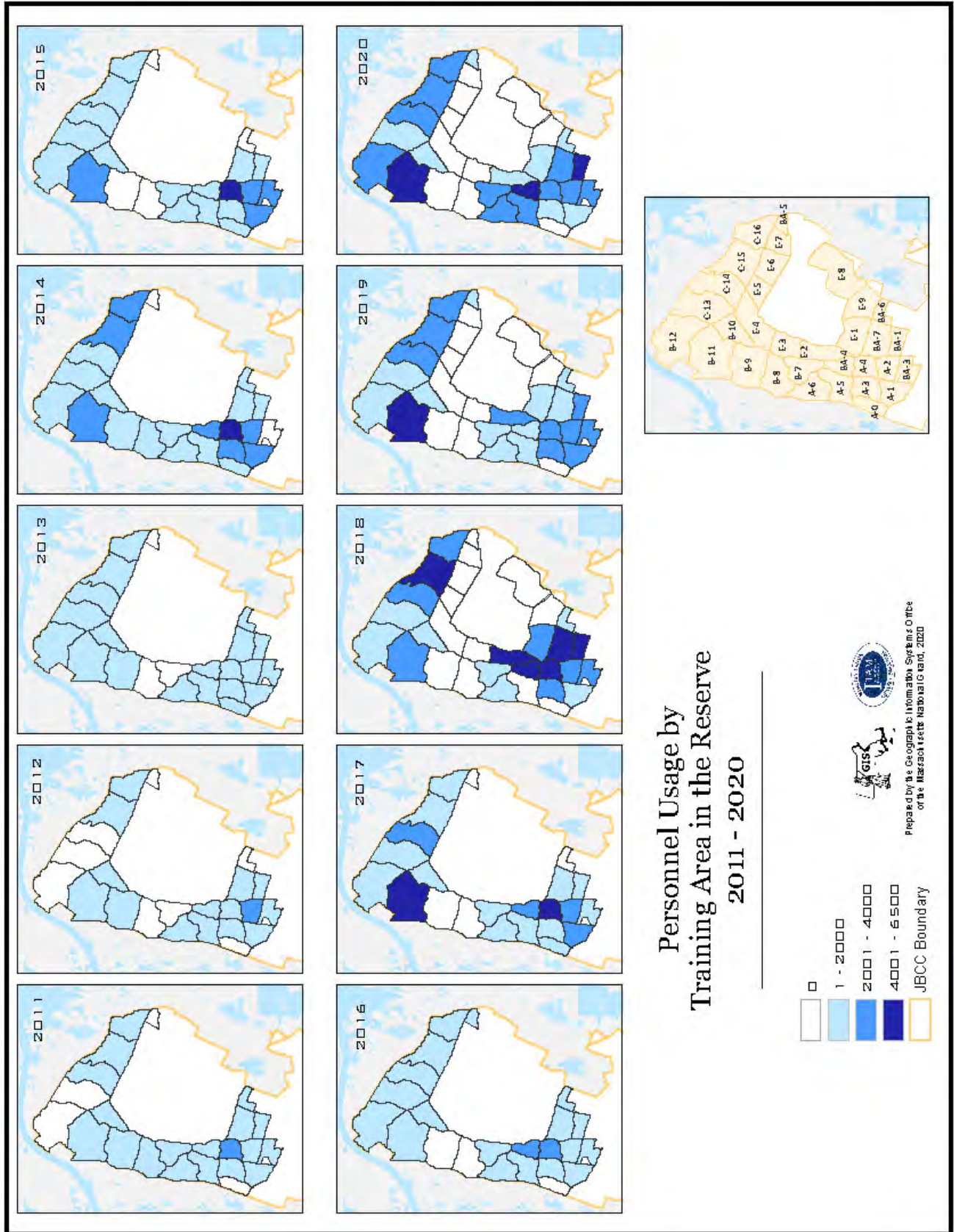


Figure 2-3 Personnel Usage by Training Area in the Training Area/Reserve, TY 2011 – TY 2020



Low=263-6,550 personnel; Medium=6,551-16,342 personnel; High=16,343-34,542

Figure 2-4 Ten Year Personnel Use by Training Area in the Training Area/Reserve, TY 2011 – TY 2020



Note: Prior to 2018, the E training areas were not available for use and are not delineated in the 2011 to 2017 graphics.

Figure 2-5 Daily Usage per Training Area in the Training Area/Reserve, TY 2020

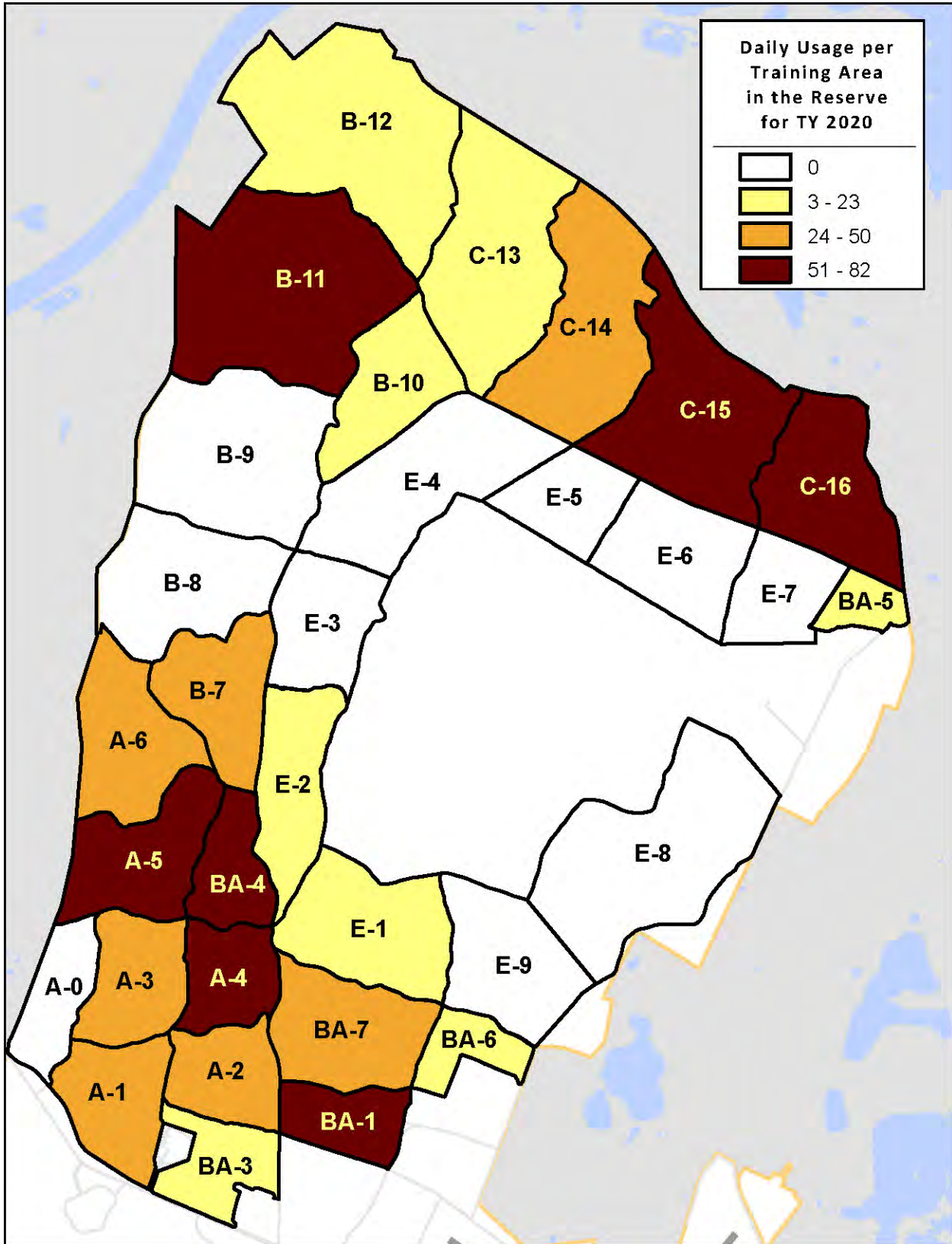
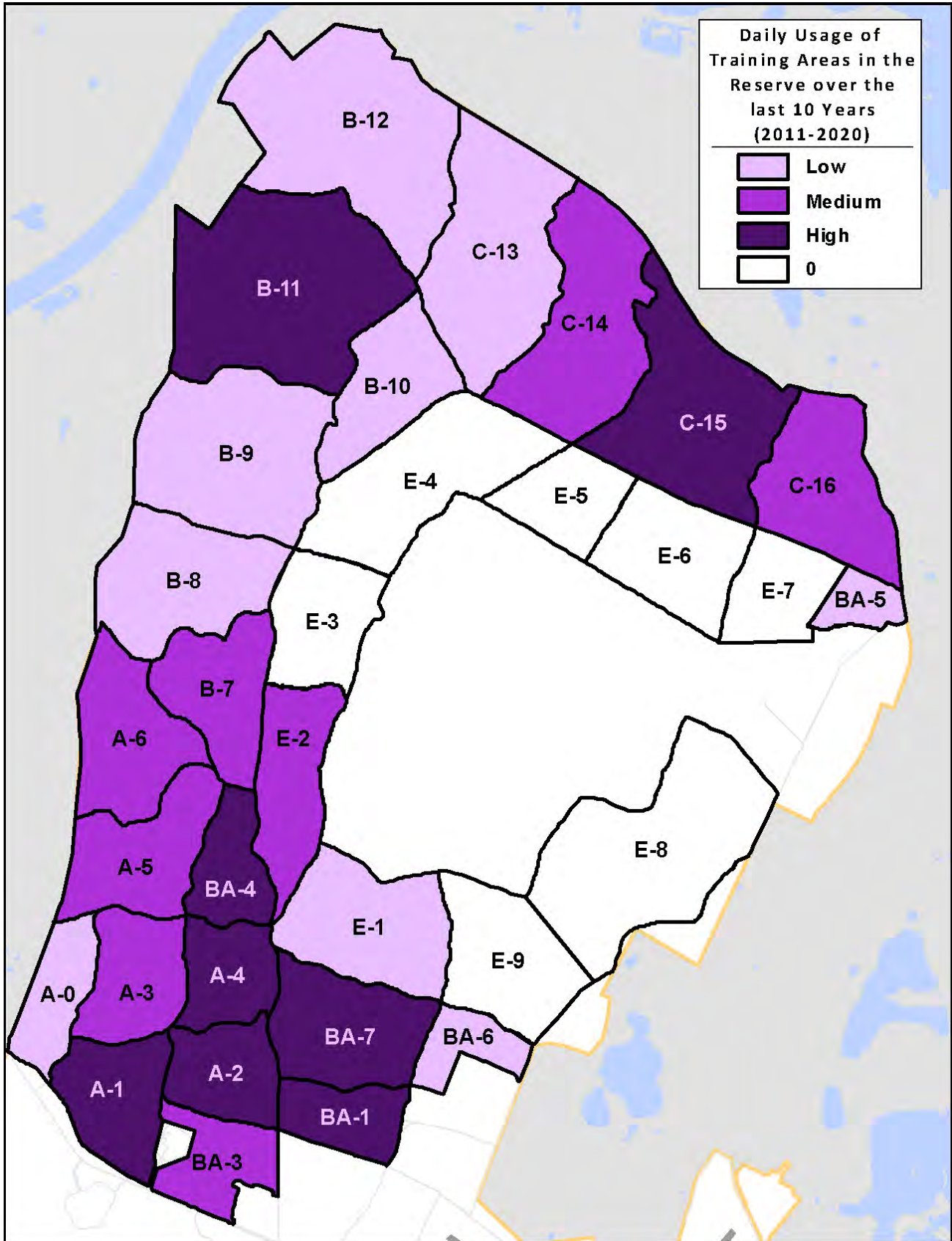
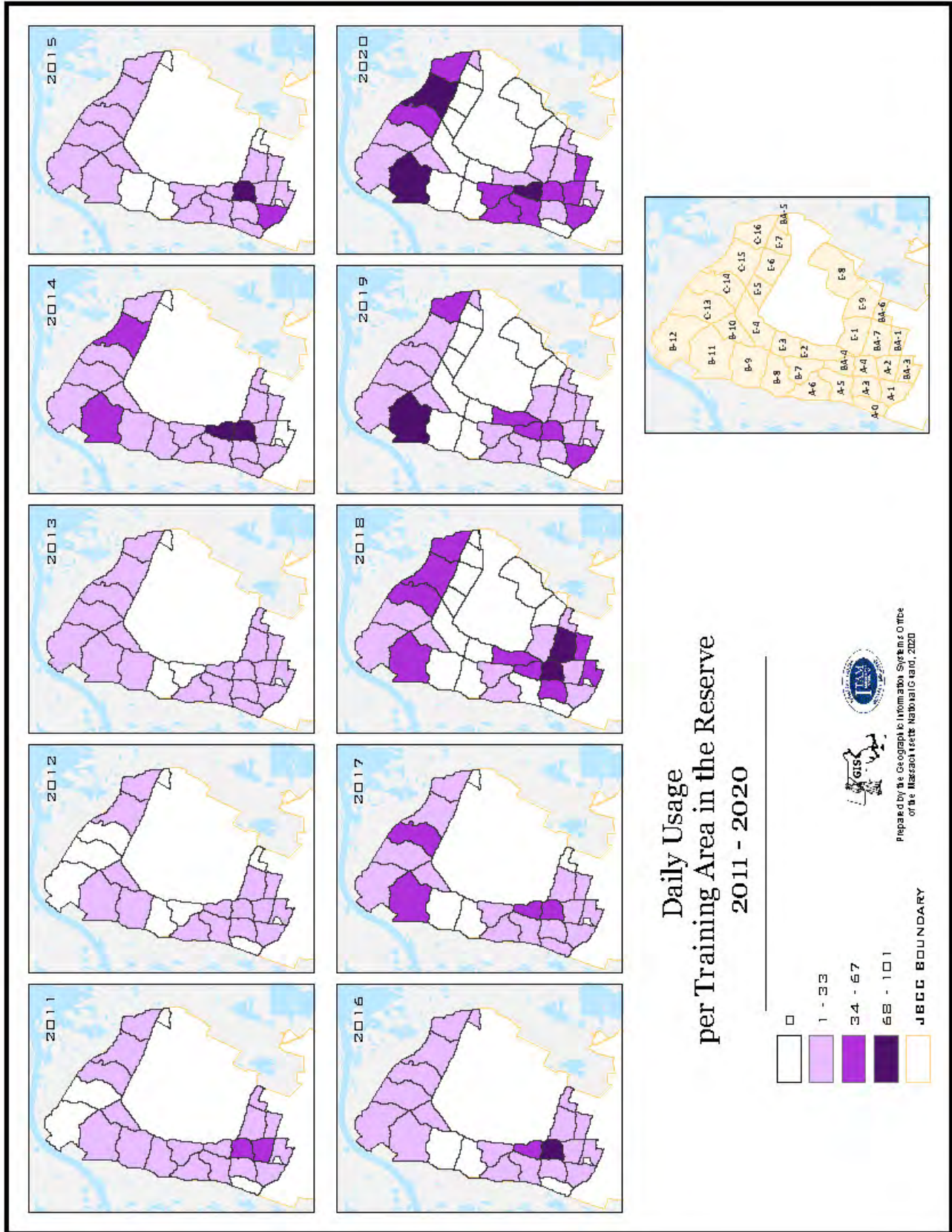


Figure 2-6 Daily Usage per Training Area in the Training Area/Reserve, TY 2011 – TY 2020



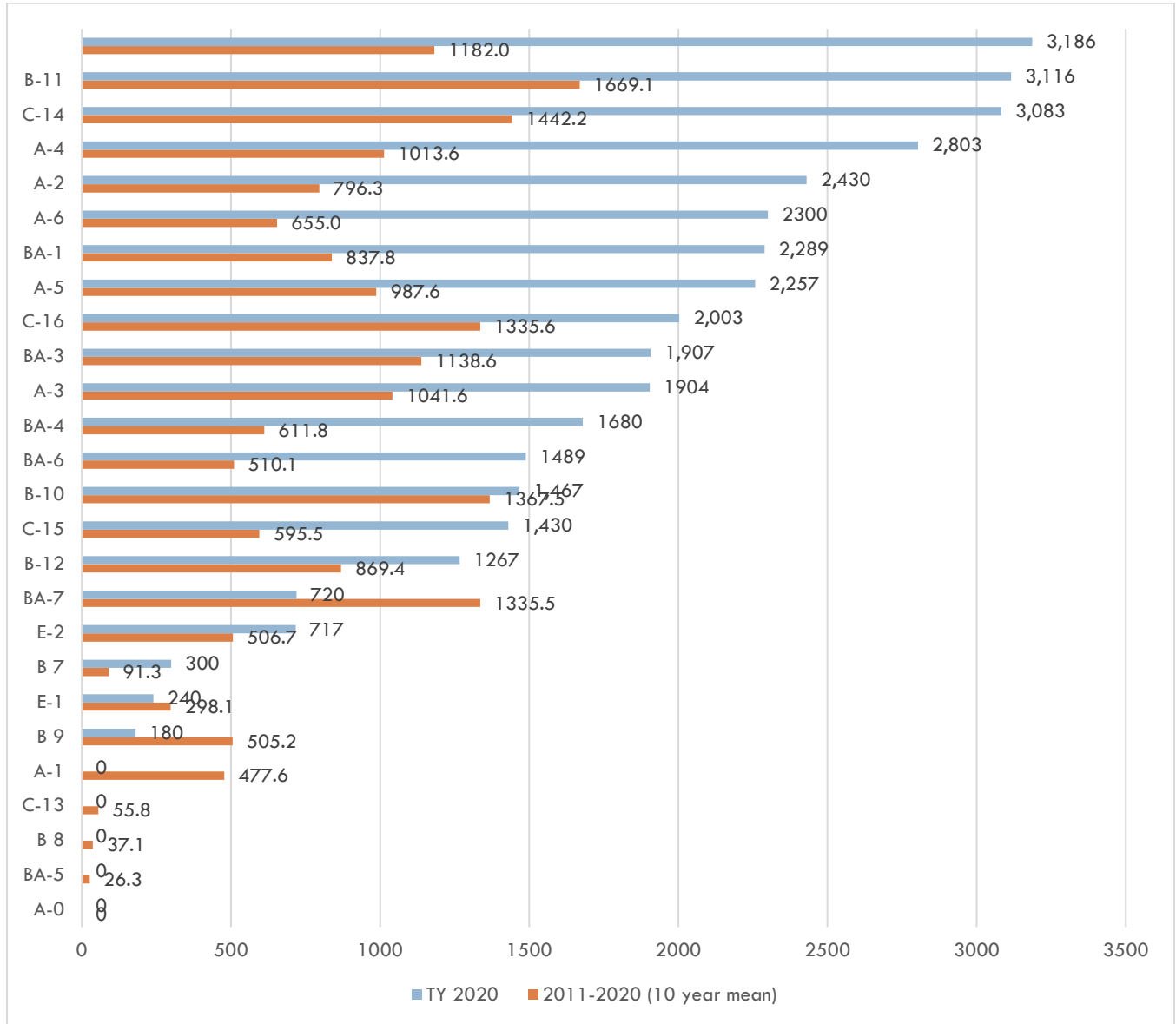
Low=5-80 days; Medium=81-239 days; High=240-543 days

Figure 2-7 Ten Year Daily Usage by Training Area in the Training Area/Reserve, TY 2011 – TY 2020



Note: Prior to 2018, the E training areas were not available for use and are not delineated in the 2011 to 2017 graphics.

Graph 2-1 Personnel Use by Training Area



Graph 2-2 Days Used by Training Area

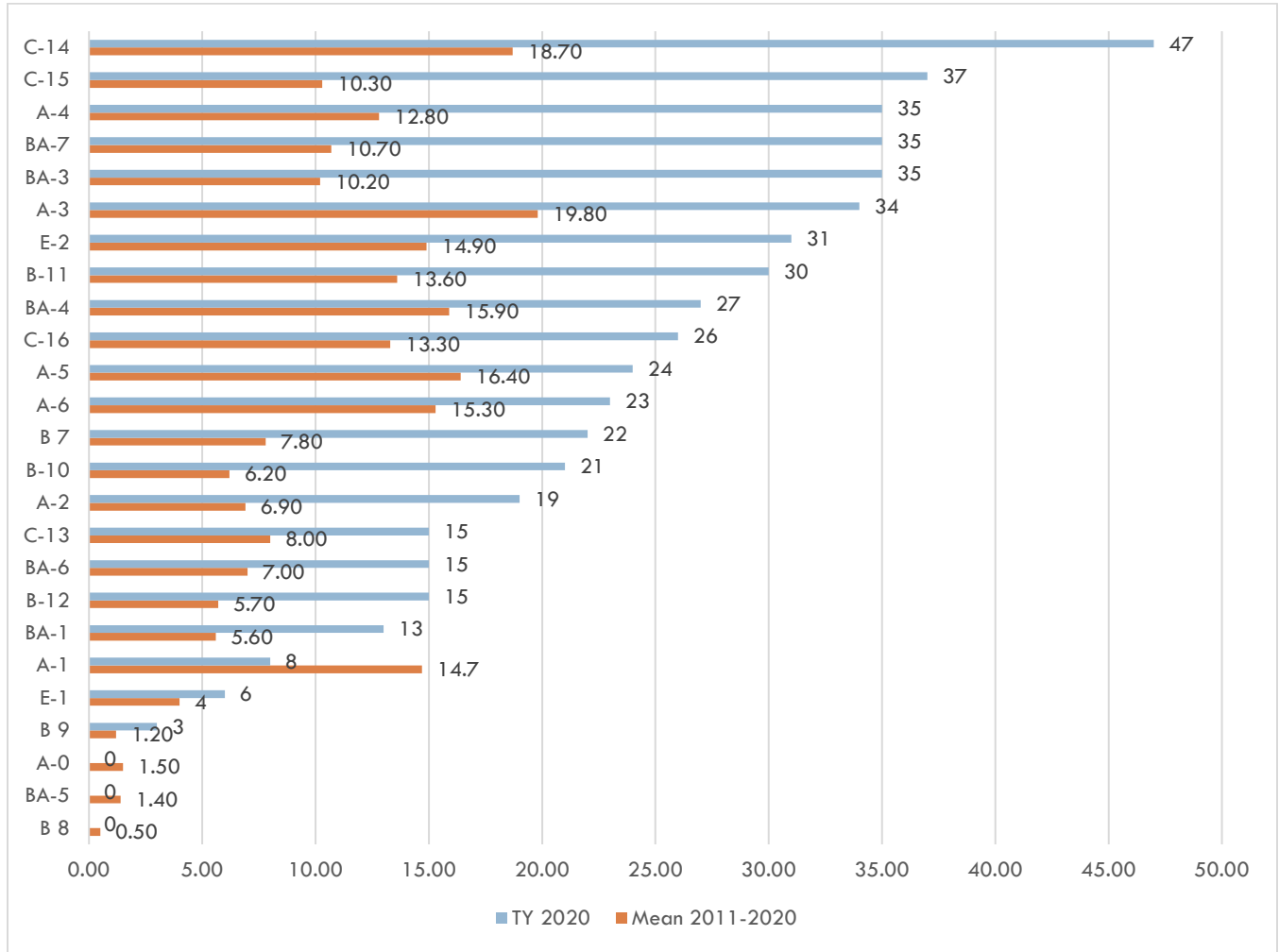




TABLE 2-2 TRAINING USE HISTORY

Training Year	Training Days/Events	Military Personnel	Civilian Personnel
TY 2020	3,041	138,474	6,828
TY 2019	2,481	94,974	12,424
TY 2018	2,118	103,864	1,673
TY 2017	2,268	144,671	3,450
TY 2016	2,065	92,083	2,271
TY 2015	2,105	122,645	2,691
TY 2014	1,845	121,740	2,050
TY 2013	1,052	46,361	1,650
TY 2012	1,117	78,745	866
TY 2011	1,232	71,707	819
<b>TOTAL</b>	<b>19,324</b>	<b>1,015,264</b>	<b>34,722</b>

In the table above, civilian usage numbers in TY 2019 and TY 2020 are higher than in past training years; this is due in part to the Cape Cod Police Academy's use of Camp Edwards facilities over the past two years as well as a Federal Emergency Management Agency training that took place in TY 2019.

## 2.2 RANGE UPDATE

The current active small arms ranges on Camp Edwards are Sierra, India, Lima, and Echo ranges. Juliet and Kilo ranges are currently inactive as their STAPP™ systems have been dismantled (see Section 2.4.2). The ISBC, KD and Tango ranges are undergoing rehabilitation. The locations of these ranges are shown in Figure 2-1.

## 2.3 SCIENCE ADVISORY AD HOC COMMITTEE

On November 2, 2017, the EMC formed an Ad Hoc Committee to the SAC to review the current small arms range environmental monitoring process and aide in developing the most appropriate monitoring processes for those ranges. Committee members are SAC members Phil Gschwend and Jack Duggan, both geochemists, SAC member Denis LeBlanc, US Geological Survey, and Jay Clausen from the US Army Corps of Engineers Cold Regions Research and Engineering Laboratory (CRREL), who is a metals mobility expert. The committee had a sunset clause of two years, however based on the effectiveness of the body and emerging issues, such as pyrotechnics, the EMC voted to allow the Ad Hoc committee to continue.

The committee met on August 19, 2020 and discussed the continuing work to research the movement of antimony in soil, which is being conducted by CRREL. The work, when complete, will help determine the type, or species, of antimony present in the soil, which can then lead to what the source of antimony may be on the ranges and if any management actions are needed. At the time of the SAC ad hoc meeting, the California lab that was to do the speciation was closed due to the ongoing Covid pandemic.

During the TY 2019 SAC Ad Hoc meeting, it was recommended that the MAARNG conduct two seasonal baseline samplings at the Small Arms Ranges and after the baseline is established, move to sampling every three years. Those baseline samples were collected in October 2019 and April 2020. See section 2.4 for further sampling information and Appendix C for sampling results. The samples were for metals and those constituents that may make metals mobile in soil. The Ad Hoc committee discussed the baseline sampling data and how they may impact antimony. The Ad Hoc committee determined that it required more time to digest the information presented before determining whether to change range sampling frequency to every three years.

## 2.4 TANGO, JULIET AND KILO RANGES

Live fire with lead ammunition resumed at Tango Range in August 2007, Kilo Range in March 2009, and Juliet Range in August 2009. STAPP™ systems were installed on these ranges to capture and contain lead ammunition. The system is a multi-layer rubber sandwich framed by synthetic lumber, which consists of a bottom rubber membrane, a matrix of rubber granules, and a cover that permits bullets to pass through but minimizes precipitation getting into the system.

The Tango Range STAPP™ system was dismantled in November 2017 and is currently being reconfigured for use as a copper ammunition only zeroing range in support of weapons qualification at Sierra Range. The Juliet Range and Kilo Range STAPP™ systems were dismantled in Fall 2020 (see Section 2.4.2). The Department of Defense has been moving away from lead ammunition for approximately 10 years. As such, lead rifle ammunition is no longer authorized for most MAARNG Units and it is not authorized for use at Camp Edwards. For this reason, Juliet and Kilo Ranges with their associated STAPP™ systems were no longer required. The ranges' STAPP™ systems were subsequently dismantled.

These ranges are currently in inactive status.

### 2.4.1 Range Maintenance and Sampling

Camp Edwards personnel conducted inspections of Juliet and Kilo ranges during TY 2020 in accordance with the provisions of the Operations, Maintenance and Monitoring Plan (OMMP).

Maintenance activities conducted at Juliet and Kilo ranges during TY 2020 included: securing the tarp cover over the STAPP™ system after severe weather, disposing of water from the internal reservoir, and repairing the top cover.

A list of Range Control's inspection and maintenance activities at these ranges in TY 2020 is included in Appendix C.

In October 2019 and again in April 2020, surface soil, porewater, and groundwater samples were collected from the ranges per the OMMP and guidance from the SAC Ad Hoc Committee. The samples were analyzed for antimony, copper, lead, chloride, sulfate, calcium, magnesium, phosphate, potassium, sodium, pH, alkalinity, specific conductance, dissolved organic carbon and oxygen where appropriate for the media being sampled. Results (see Appendix C) of the surface soil and groundwater analyses continue to show no trends or significant concentrations when compared to the Action Levels specified in the OMMPs and as compared to background levels. Porewater results indicate an exceedance of the action level (6 parts per billion [ppb]) for antimony in several lysimeters on these ranges. Figures showing lysimeter locations, data and graphs are in Appendix C. Antimony is in lead alloy bullets and in bullet primers.

There are two likely causes of increased antimony in porewater:

- legacy range soils, where lead-antimony bullets were fired, were used for berm and range construction at Juliet, Kilo, and Tango ranges;
- phosphates added to range soils (1998-1999) to immobilize lead in legacy soils

To address the issue of antimony and other metals movements through soils, the MAARNG, along with members of the SAC Ad Hoc Committee (see Section 2.3) added the sampling of substances that can cause metals to be mobile in soil (see above paragraph). The first round of this amended sampling was completed in October 2019 and the second round is scheduled for April 2020.

Another finding of the Ad Hoc Committee through lab studies at CRREL in New Hampshire is that antimony is not threatening the groundwater. It has been determined that antimony mobility is influenced by pH and soil

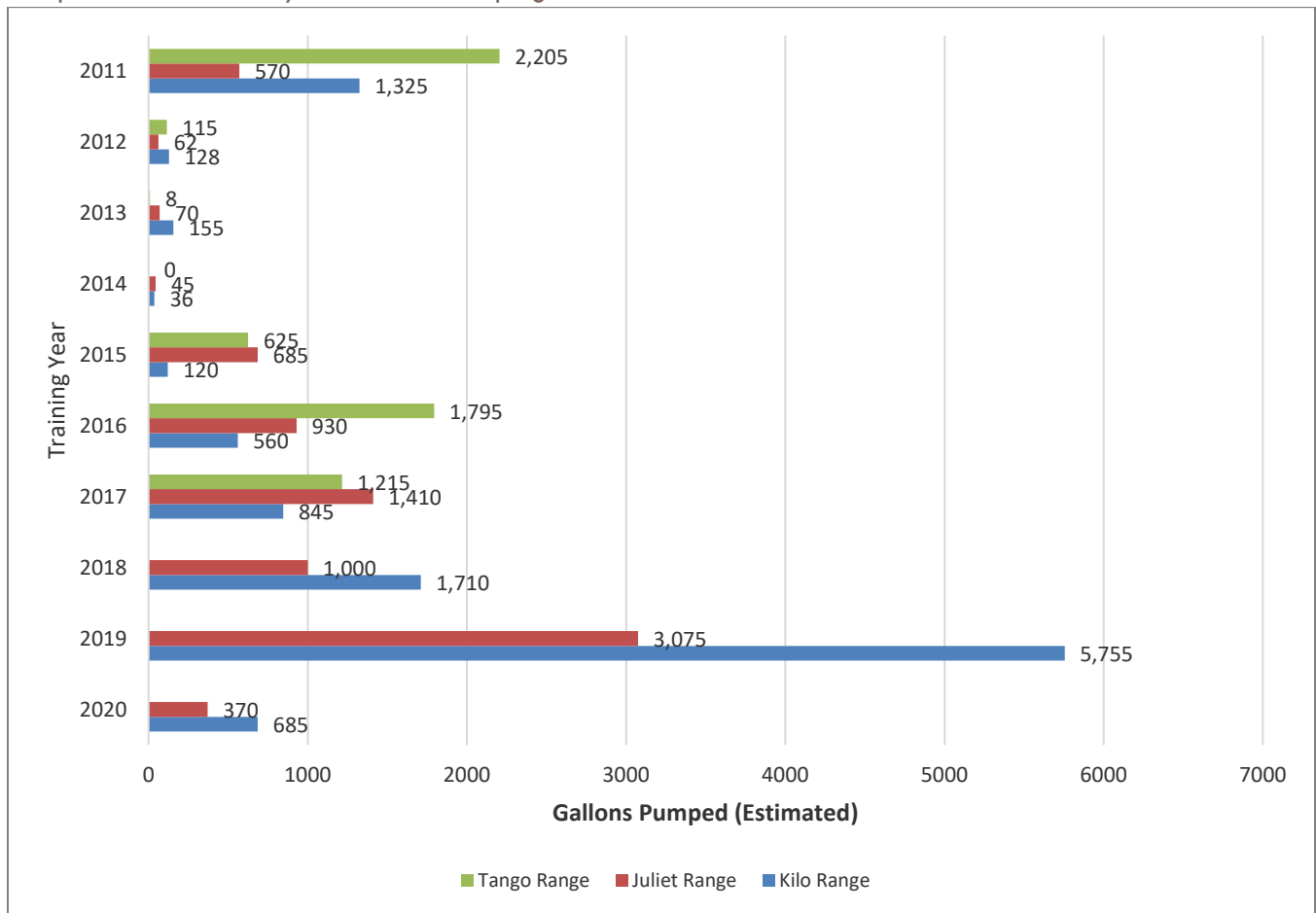
amendments. Soil amendments were halted several years ago at the direction of the SAC Ad Hoc committee until such time it could be determined what the effects of these amendments had on antimony mobility. It has also been determined through soil sampling that antimony mobility is limited to surface soils where amendments were applied. The Tango, Juliet and Kilo Ranges sampling results for TY 2020 are available in Appendix C.

As of October 2020, the STAPP™ systems on Juliet and Kilo Ranges have been removed from the ranges with the ranges now placed in inactive status.

An estimated 1,055 gallons of water were pumped from the STAPP™ systems on Juliet and Kilo ranges during TY 2020: 370 gallons at Juliet and 685 gallons at Kilo. The water pumped is the result of incidental seepage of rainwater, as well as condensation within the systems. This water has been tested at various times since the systems were installed for constituents that would reasonably be expected to be found on active ranges, particularly antimony, copper, and lead. Water collected from the STAPP™ collection system never enters the environment and is managed as a non-hazardous wastewater and disposed of accordingly.

Graph 2-3 reflects the amount of water pumped from the STAPP™ systems from TY 2011 to TY 2020. Gallons pumped are estimated figures based on measurements of water in containment areas by dip stick as water pumped from multiple systems can be accumulated in the same disposal drum. The graph below shows an increase in water pumped from the systems in TY 2019, which was due to large-scale rain events where the tarps covering the STAPP™ systems were blown off by wind, allowing more rainwater to enter the systems.

Graph 2-3 STAPP™ System Water Pumping



## 2.4.2 Tango, Juliet and Kilo Ranges Dismantling

Camp Edwards decommissioned and removed the STAPP™ system from Tango Range in November 2017. The range will be converted to a 32-lane zeroing range for copper ammunition. Soldiers will be able to zero their weapons at Tango Range and then move to the adjacent Sierra Range to conduct weapons qualification. To safely use Tango Range, the target and firing lines will be moved 25 meters north to move them out of the SDZ of the adjoining Sierra Range, such that both ranges can be used simultaneously. Construction began on Tango Range in Fall 2020 and is planned to be complete in March 2021.

Work to dismantle the STAPP™ systems on Juliet and Kilo ranges began on October 13, 2020 and was completed by November 3, 2020. Photographs 2-1 to 2-5 below show the cleanout and removal of the regrind material from the Juliet Range STAPP™ system prior to it being dismantled. Approximately 4,192 lbs. of lead were removed from the Juliet and Kilo STAPP™ systems during the cleanout.



Photograph 2-1 The Juliet Range STAPP™ system.



Photograph 2-2 The Juliet Range STAPP™ system showing the regrind material.



Photograph 2-3 The Juliet STAPP™ system showing the projectile layer.



Photograph 2-4 The Juliet Range STAPP™ system cleaned out. The bottom liner is visible.



Photograph 2-5 Shows the vacuum and tight tanks for regrind removal.

## 2.5 SIERRA AND INDIA RANGES

Sierra Range is an automated 300-meter pop-up modified record of fire range using copper ammunition only and is used to qualify soldiers in marksmanship proficiency. The firing line is 200 meters long with 10 firing positions. There are nine stationary, pop-up targets in each firing lane. The targets are located at 50, 100, 150, 200, 250, and 300 meters, with two targets at the 50-meter distance and one each at the other distances. Sierra Range returned to live fire with copper ammunition in June 2012. The following weapons are authorized for use on Sierra and India Ranges: the M16 and M4 rifles, the M249 machine gun with 5.56mm ammunition, and the M240 machine guns (India Range only) using 7.62mm ammunition.

India Range is a 25-meter small arms range using copper ammunition to train soldiers on the skills necessary to align the sights on their weapons and practice basic marksmanship techniques against stationary targets. It has 20 firing positions with one target in each firing lane. The range is also used for short-range marksmanship training and qualification. India Range returned to live fire with copper ammunition in September 2013.

### 2.5.1 Range Maintenance and Sampling

In TY 2020, the MAARNG found that an experiment that began in TY 2019 using an alternative bullet-pocket management practice was not successful. The Camp Edwards Range Control staff utilized multiple bullet capturing blocks (Dura-Bloc™) to fill two bullet pockets on India Range. One pocket had the blocks placed in a stepped fashion and the other had the blocks placed in a flush fashion. The experiment did not prove successful as there would be increased maintenance and potential hazardous waste.

Maintenance activities during TY 2020 at Sierra Range included filling bullet pockets with screened loam. At India Range, maintenance activities included flattening the firing line and repairing and filling bullet pockets.

A list of Range Control's inspection and maintenance activities at Sierra and India ranges in TY 2020 is included in Appendix C.

In October 2019 and again in April 2020, groundwater, porewater, and surface soil samples were collected from Sierra Range and India Range as prescribed in the OMMP. The samples were analyzed for antimony, copper, lead, chloride, sulfate, calcium, magnesium, phosphate, potassium, sodium, pH, alkalinity, specific conductance, dissolved organic carbon and oxygen where appropriate for the media being sampled. Results of the soil and

groundwater analyses continue to show no exceedance of the Action Levels specified in the OMMP. The Sierra and India Range sampling results for TY 2020 are available in Appendix C.

## 2.6 LIMA RANGE

In 2012, the Environmental Protection Agency (EPA) Region 1 and the EMC approved returning to live firing on Lima Range using the M781 40mm Training Round.

The M781 is a practice grenade that is fired as a projectile composed of a hollow plastic “windshield” filled with Day-Glo-Orange marking powder. The Day-Glo-Orange marking powder is considered to be non-toxic. The initial firing of the M781 40mm Training Round occurred in 2013.

Lima Range is used to train and test individual soldiers on the skills necessary to engage and defeat stationary target emplacements with the 40mm grenade launcher. The range has four self-contained stations and is 30-meters wide by 400-meters long. The stations consist of firing positions and targets of various types and distances, ranging from 100 to 350 meters.

### 2.6.1 Range Maintenance and Sampling

In October 2019 and again in April 2020, porewater and surface soil samples were collected from Lima Range and analyzed for antimony, copper, lead, chloride, sulfate, calcium, magnesium, phosphate, potassium, sodium, pH, alkalinity, specific conductance, dissolved organic carbon and oxygen, where appropriate for the media being sampled. There were no Action Level exceedances. The Lima Range sampling results for TY 2020 are in Appendix C.

Maintenance activities included making repairs to the netting at the back of the range.

A list of Range Control’s inspection and maintenance activities Lima Range in TY 2020 is included in Appendix C.

## 2.7 ECHO RANGE

Echo Range, a dual-purpose range, is a Combat Pistol/Military Police Qualification Course, consisting of 15 firing lanes with seven pop-up targets per lane offset along the firing lanes at varying distances with one fixed Military Police target at the end of the lane. Shooters shift their pistol firing position to engage the targets at the varying distances. 9 mm pistol ammunition is fired at pop-up targets, passes through, and strikes the backstop berm. The two courses of fire, on the same range, are referred to as an automated combat pistol/military police firearms qualification course.

The backstop berm is utilized as the primary projectile capture area. Single Individual Target frontal berms are the capture location for extreme low shot projectiles. The backstop berm was constructed on core material (native), landscape fabric as a demarcation line, a projectile capture medium that is 1/8th minus (road sand) and capped with topsoil that slows projectiles and allows for vegetation and slope stabilization.

Echo Range became operational in September 2019.

### 2.7.1 Range Maintenance and Sampling

In October 2019 and again in April 2020, groundwater and surface soil samples were collected from Echo Range and analyzed for antimony, copper, lead, chloride, sulfate, calcium, magnesium, phosphate, potassium, sodium, pH, alkalinity, specific conductance, dissolved organic carbon and oxygen, where appropriate for the media being sampled. There were no Action Level exceedances when samples were analyzed from Echo Range during the sampling efforts.

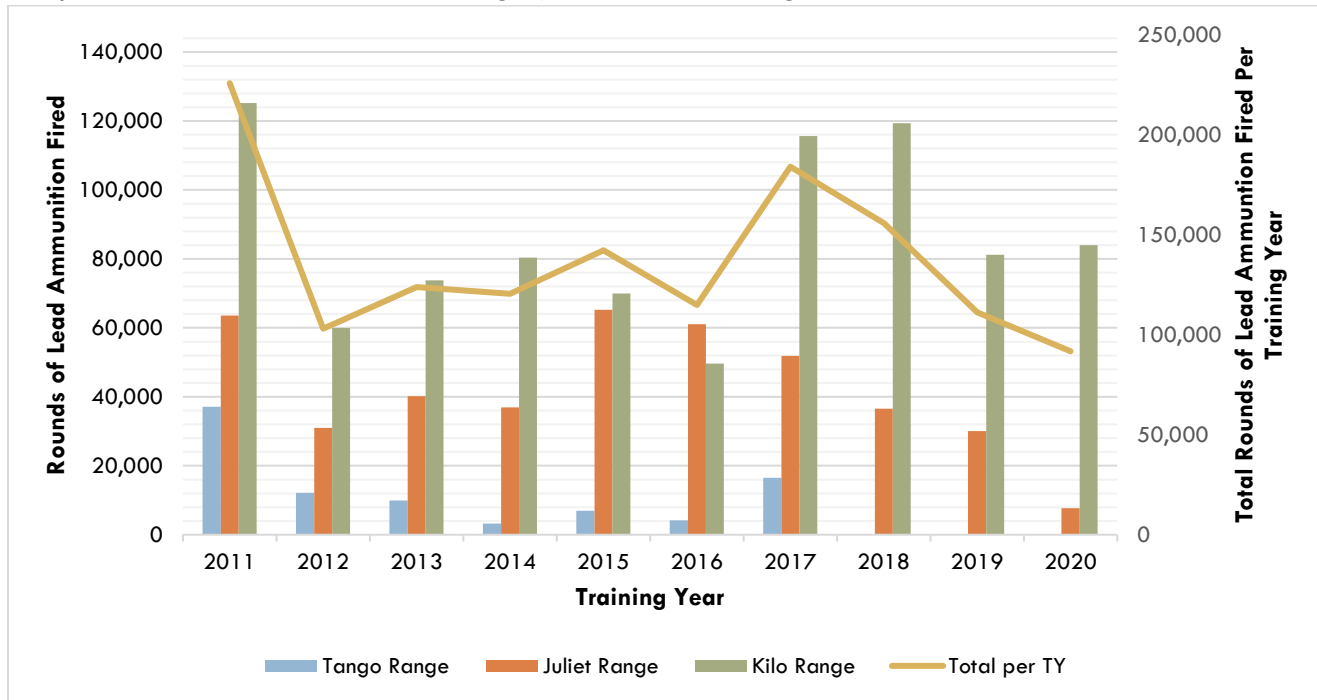
Maintenance activities included excavating a firing lane for electrical work and then backfilling it when the electrical work was complete.

A list of Range Control’s inspection and maintenance activities at Echo Range in TY 2020 is included in Appendix C.

## 2.8 RANGE USAGE DATA

A total of 1,768,071 rounds of lead ammunition have been fired at Tango, Juliet and Kilo ranges since STAPP™ systems were installed (at Tango Range in 2006; and Juliet and Kilo ranges in 2008) and their use approved: 474,910 at Juliet Range and 949,135 at Kilo Range. As of November 2017, the Tango Range STAPP™ system was dismantled; there is currently no firing on Tango Range. Graph 2-4 provides a summary of lead ammunition rounds fired at Tango, Juliet and Kilo from TY 2011 to TY 2020. The graph shows a declining trend in usage of lead ammunition; lead is being phased out of the Department of Defense inventory. Information on lead ammunition fired from TY 2007 through TY 2020, including amounts and types, is provided in Appendix C.

Graph 2-4 Lead Ammunition Use – Tango\*, Juliet and Kilo Ranges

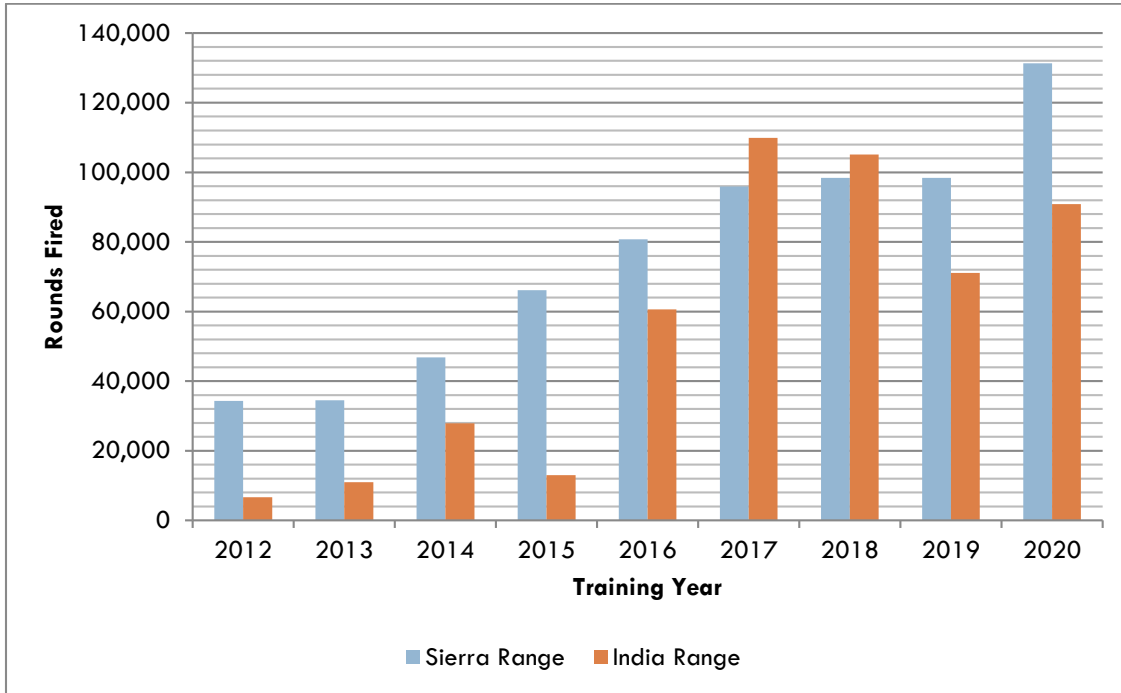


\*The Tango Range STAPP system was dismantled in November 2017. There is currently no firing on Tango Range.

A total of 1,182,378 rounds of copper ammunition have been fired at Sierra and India ranges since its use was approved: 686,487 at Sierra Range and 491,098 at India Range. Graph 2-5 provides a summary of copper ammunition fired at Sierra and India ranges since use of copper ammunition was approved at them. The graph shows an upward trend in copper ammunition use. During TY 2020, the MAARNG has transitioned to all copper-based rifle ammunition. Information on the number of copper ammunition fired on Sierra and India ranges each training year from 2012 through 2020 is provided in Appendix C.

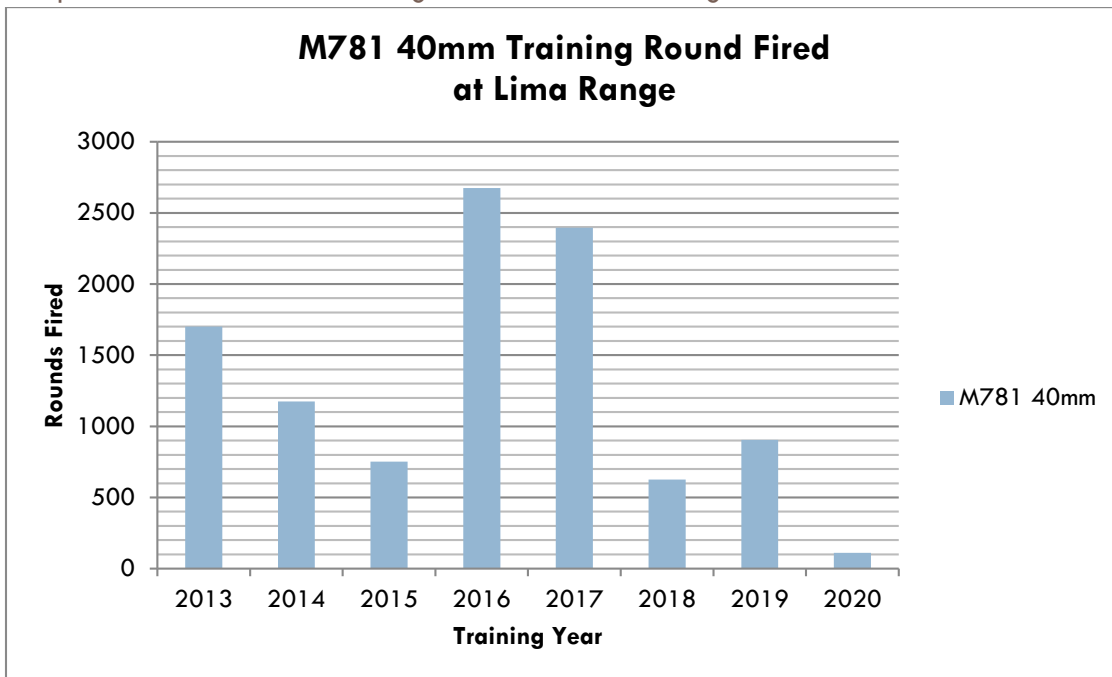


Graph 2-5 Copper Ammunition Use – Sierra and India Ranges



A total of 10,337 M781 40mm Training Rounds have been fired at Lima Range since its use was approved. In TY 2020, 14 M576 40mm rounds were fired by the US Coast Guard through a non-standard training request approved by the EMC’s Environmental Officer. The M576 40mm is an all-steel buckshot round. Graph 2-6 provides information on the number of M781 40mm Training Rounds fired at Lima Range. The graph reflects the cyclic requirement for qualification for grenadiers. Units that have grenadiers only have one to two soldiers with that requirement in the unit; not every soldier uses this weapon.

Graph 2-6 M781 40MM Training Round Use – Lima Range



A total of 19,105 rounds of 9mm lead ammunition has been fired at Echo Range since it became operational during TY 2019. Information on lead ammunition fired from TY 2007 through TY 2020, including amounts and types, is provided in Appendix C.

The only civilian use of the small arms ranges during TY 2020 was by the Massachusetts State Police and the Cape Cod Police Academy. The Massachusetts State Police fired 1,500 .45 cal. rounds on Kilo Range. The Cape Cod Police Academy fired 48,400 9mm rounds of ammunition and 10,300 5.56mm rounds of ammunition on Kilo Range.

During TY 2020, some type of weapons firing was conducted on at least one of the ranges on 71 calendar days.

In accordance with the OMMP for each range, the MANG is required to capture, contain, and recover bullets/projectiles to the greatest extent practical. Recovery of projectiles is based on usage, time, and projectile density. The OMMPs define when this is required for each range.

### 2.8.1 Training Areas

Camp Edwards has numerous areas that support military training: training areas, battle positions, observation posts, training roads, etc. The training areas also support a variety of training activities including land navigation, bivouacs, Soldier Validation Lanes, meteorological data collection, engineer/infantry/artillery skills training, drivers (day and night) training, and Reserve Officer Training Corps (ROTC) training.

Information on utilization of the training areas and major locations within them during TY 2020 is provided in Table 2-3. The total overall utilization of the training areas for the past 10 training years is included in Table 2-4. The variations over the years in training days and personnel numbers is a result of differing unit training requirements, combined training needs, and deployment cycles. During TY 2020, some type of training was conducted in at least one of the training areas on 207 calendar days. The numbers in Tables 2-3 and 2-4 do not include employees and vehicles from the remediation programs and private contracting firms. Also, hunters using the Training Area/Reserve during the deer and turkey seasons are not tracked as they move through the various training areas. During TY 2020, hunter days in the Training Area/Reserve accounted for around 1.14 percent of the usage, and around 75% of the Training Area/Reserve was available to hunters during the deer hunting season. Please see Sections 3.5.4 and 3.5.5 for information about the deer and turkey hunting seasons.

Other military users of the training areas during TY 2020 included the US Army, the US Army Reserve, the US Coast Guard, the US Coast Guard Reserve, the US Navy, the Massachusetts Air National Guard, the Vermont ARNG, New Hampshire ARNG, Rhode Island ARNG, and the New York ARNG, and the Princess Louise Fusiliers (Canadian Armed Forces).

Civilian organizations using the training areas during TY 2020 included the Cape Cod Police Academy, the Massachusetts Environmental Police, the Massachusetts State Police, the Massachusetts Institute of Technology-Lincoln Lab, Systems & Technology Research, the Department of Defense’s Defense Innovation Unit, and environmental remediation and restoration contractors.

TABLE 2-3 TRAINING AREA USE - TY 2020					
Location	Training Days	Personnel		Vehicles (Wheeled) #	Vehicles (Tracked) #
		Military	Civilian		
SVL-OBJ 1	32	1,481	20	0	0
SVL-OBJ 2	26	1,539	20	0	0
SVL-OBJ 3	9	974	0	0	0

TABLE 2-3 TRAINING AREA USE - TY 2020, cont'd

Location	Training Days	Personnel Military	Personnel Civilian	Vehicles (Wheeled) #	Vehicles (Tracked) #
SVL-OBJ 4	2	188	0	0	0
BP 2	24	455	15	22	0
BP 7	3	180	0	0	0
BP 14	20	225	0	0	0
BP 16	23	255	0	0	0
BP 24	3	180	0	0	0
BP 27	6	240	0	0	0
BP 28	8	720	0	0	0
NBC 1	4	106	0	0	0
Training Roads	52	4,812	0	0	0
A 1	13	717	0	0	0
A 2	22	1,267	0	0	0
A 3	31	1,907	0	0	0
A 4	24	1,467	0	0	0
A 5	35	2,289	62	0	0
A 6	37	2,430	0	0	0
B 7	35	2,690	62	0	0
B 10	15	1,680	0	0	0
B 11	30	3,186	0	0	0
B 12	21	2,300	0	0	0
BA 1	15	1,430	0	0	0
BA 3	23	2,003	0	0	0
BA 4	26	2,257	0	0	0
BA 5	3	300	0	0	0
BA 6	19	1,489	0	0	0
BA 7	27	1,904	0	0	0
C 13	15	1,680	0	0	0
C 14	34	3,116	0	0	0
C 15	47	3,083	0	0	0
C 16	35	2,803	0	0	0
Wheelock Hill	6	322	0	8	0
Land Nav 1	28	937	0	8	0
Land Nav 2	15	591	0	0	0
Land Nav 3	22	1,077	0	0	0
Land Nav 4 Alpha	11	263	0	0	0
Land Nav 4 Bravo	10	374	0	0	0
Land Nav 4 Charlie	19	580	0	0	0
Dig Site 3	43	4,381	0	72	0
Landing Zones	25	116	115	0	0
<b>Total</b>	<b>898</b>	<b>59,994</b>	<b>294</b>	<b>110</b>	<b>0</b>

TABLE 2-4 TRAINING AREA USE HISTORY

Training Year	Training Days/Events	Personnel		Vehicles (Wheeled)	Vehicles (Tracked)
		Military	Civilian		
TY 2020	898	59,994	294	110	0
TY 2019	702	49,716	1,920	618	0
TY 2018	893	69,652	238	530	12
TY 2017	688	42,478	1,344	1,244	12
TY 2016	551	24,344	1,858	2,805	0
TY 2015	681	33,219	1,909	2,198	0
TY 2014	642	39,137	370	4,129	0
TY 2013	247	11,164	181	1,484	7
TY 2012	232	13,532	122	2,037	5
TY 2011	298	16,591	132	2,232	2
<b>TOTAL</b>	<b>5,832</b>	<b>359,827</b>	<b>8,368</b>	<b>17,387</b>	<b>38</b>

### 2.8.2 Vehicle Use, Fueling and Maintenance

Vehicle use in the training areas during TY 2020 was 110 wheeled vehicles. No tracked vehicles were used. These numbers do not include vehicles from the Impact Area Groundwater Study Program (IAGWSP) program and contractors. Pumping fuel in the Training Area/Reserve has been prohibited by the EPSs since 2002, however the MAARNG has proposed to modify the EPSs to allow refueling in the Training Area/Reserve under certain conditions. Please see Section 2.14 for further discussion. Currently, the fuel point and the secondary containment pads in the Tactical Training Base (TTB) area represent the designated location for units to refuel and park and store tanker trucks at Camp Edwards.

The military does not conduct scheduled vehicle maintenance in the training areas. Personnel in the field are authorized only to check fluid levels, add small amounts, and repair flat tires or track sections that separate during training. Major repairs and other maintenance activities and training occur at the Unit Training Equipment Site (UTES) facility located in the Cantonment Area of Camp Edwards. The UTES facility is a vehicle and motor pool area; the Massachusetts National Guard has also designated the area as a Satellite Accumulation Point to store hazardous waste.

### 2.8.3 Training Support Areas (Simulators, Cantonment Area)

There are separate facilities and equipment that can simulate live military training; these are grouped under the Training Support Area (TSA). The majority of the training activities associated with these facilities are conducted in the Cantonment Area of Camp Edwards.

Table 2-5 presents the total number of training days/events and personnel that used each TSA during TY 2020. Overall historical use of the TSA for the past 10 training years is included in Table 2-6. Figure 2-8 shows TSA locations in the Cantonment Area. Because unit commanders maximize training time by rotating personnel through several different events or exercises in a given training cycle, this again presents an inflated figure for training days compared to calendar days. For example, the Cape Cod Police Academy Cadets and Cadre are counted as using the facility and areas on a daily basis.

Civilian organizations using the TSA in the Cantonment Area of Camp Edwards during TY 2020 included Allied Universal Security, Barnstable County Sheriff's Department, the Boy Scouts of America, Cape Cod Healthcare, Cape Cod Police Academy, Falmouth Police Department, FBI Boston, the Massachusetts Environmental Police, Massachusetts Maritime Academy, the Massachusetts State Police, the Massachusetts Bay Transit Authority

Police, the Massachusetts Emergency Management Agency-Region 2, the Sea Cadets, the United States Geological Survey and the Massachusetts National Guard Family Support Group.

TABLE 2-5 TRAINING SUPPORT AREA USE - TY 2020

Training Support Area	Training Days/Events	Personnel	
		Military	Civilian
1100 Training Area (Drivers Training)	16	870	0
1300 Training Area	5	380	0
APFT Running Track	35	4,082	0
Asymmetric Threat Classroom	6	172	0
Battle Simulation Ctr - Bldg 1206	91	9,595	650
Battle Simulation Ctr - Rear Offices	158	4,428	0
Battle Simulation - Bldg 1213, 1st Floor	45	3,064	450
Battle Simulation - Bldg 1213, 2nd Floor	53	4,487	450
Battle Simulation - TOC Pads	19	5,135	0
Call for Fire Trainer	55	2,571	192
VBS3 Classroom - Bldg 3494	28	1,600	140
Connery Field	30	4,407	0
Counter IED Visual Indicator Lane	1	23	0
Engagement Skill Trainer 2000 - A	96	1,118	0
Engagement Skill Trainer 2000 - B	120	4,082	0
Engagement Skill Trainer 2000 - C	90	2,432	192
HEAT 1123	16	490	0
HEAT 1132	12	330	0
HEAT 1215	33	1,340	0
1243-High Risk Entry Facility-Control	22	345	335
1244-High Risk Entry Facility	22	345	335
Lee Field	23	3,450	120
MRAP	57	2,707	0
ODS - Operator Driving System	1	2	0
Shaw Field	36	5,855	0
Unstabilized Gunnery	42	1,751	0
Vault 1 - TSC	202	566	69
Vault 2 - TSC	256	846	0
Vault 3 - TSC	168	572	0
Virtual Convoy Opns Trainer #43 (VCOT - TSC)	9	30	0
Virtual Convoy Opns Trainer #98 (VCOT - TSC)	39	1,435	0
Weapons Cleaning - Bldg 3498	20	866	0
Welcome Center	116	1,850	2700
YD Memorial Park	9	360	200
<b>TY 2020 Total</b>	<b>1,931</b>	<b>71,586</b>	<b>5,833</b>

TABLE 2-6 TRAINING SUPPORT AREA USE HISTORY

Training Year	Training Days/Events	Personnel		
		Military	Civilian	Total
TY 2020	1,931	71,586	5,833	77,419
TY 2019	1,554	39,888	10,223	51,665
TY 2018	1,061	39,619	4,285	43,904
TY 2017	1,299	96,783	1,150	97,933
TY 2016	1,224	50,463	282	50,745
TY 2015	1,313	73,678	627	75,618
TY 2014	1,132	77,516	1,541	79,057
TY 2013	742	42,654	1,404	44,058
TY 2012	824	63,210	691	63,901
TY 2011	852	52,225	574	52,799
<b>TOTAL</b>	<b>11,932</b>	<b>607,622</b>	<b>26,610</b>	<b>637,099</b>

## 2.9 OFF-SITE TRAINING

During TY 2020, the MAARNG had 89 units conduct their annual two-week training cycle. Of these, 81 units trained in Massachusetts, 55 of which trained solely at Camp Edwards (approximately 2,246 soldiers). Eight units trained in four different states; one in New Hampshire, one in Iowa, two in Washington and four in New York. Four units were mobilized and deployed in support of contingency operations; one unit deployed overseas, and three units deployed to the continental United States.

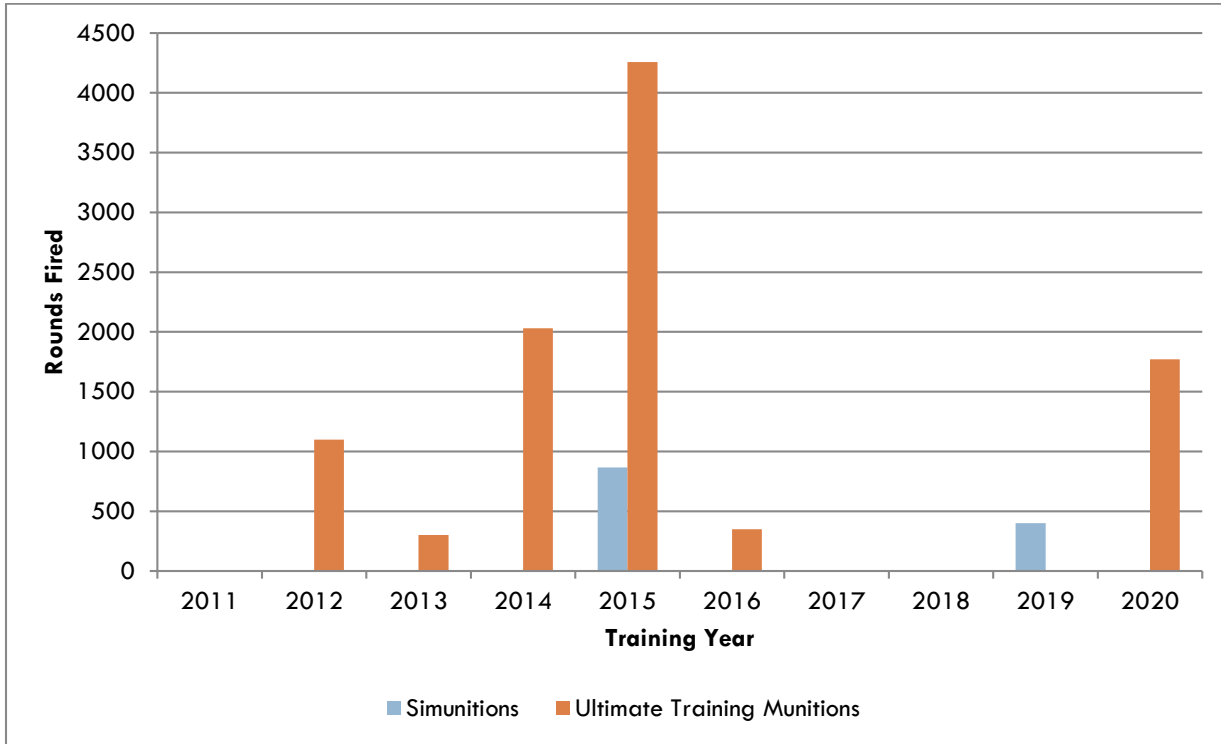
The total number of Massachusetts Soldiers trained during annual training for TY 2020 was 3,683 out of 5,621. Eighteen units conducted year-round annual training consisting of 580 soldiers, while 863 served on Title 32 orders for the Covid-19 response in lieu of annual training. The number of MAARNG soldiers that completed a two-week annual training cycle by general geographical locations is: 3,026 in Massachusetts and 657 in other states.

## 2.10 SIMULATED MUNITIONS

The MAARNG uses two types of simulated munitions at Camp Edwards: an Ultimate Training Munitions (UTM) Man Marker Round and a Simunitions FX Marking Round. The EMC required that the Annual Report include steps taken by the National Guard and progress associated with converting to the use of lead-free primer in simulated munitions. The Massachusetts National Guard monitors the activities of the U.S. Army Environmental Command in its efforts working with private industry development of alternate munitions; currently no new information has been provided. Simulated munitions are best used in concert with other simulators to be effective for most units; therefore, their effective training use is currently limited. Graph 2-7 provides the number of UTM and Simunitions FX Marking Rounds fired in the Training Area/Reserve since 2011.



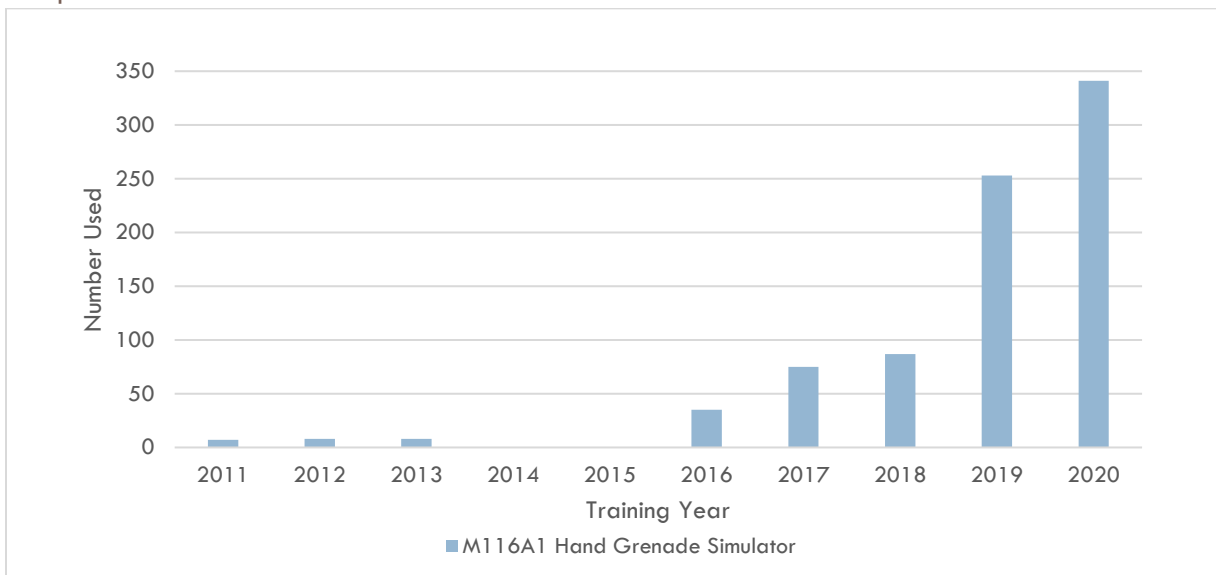
Graph 2-7 Simulated Munitions Use



## 2.11 PYROTECHNICS

The M116A1 Hand Grenade Simulator was approved for use at Camp Edwards in March 2010. Three hundred-forty-one were used in the Training Area/Reserve during TY 2020. Graph 2-8 shows the number used each training year since TY 2011. M116A1 hand grenade simulator use increased because the MAARNG has been conducting more collective training versus individual unit training. The M116A1 is used primarily during collective unit training and is used to simulate battlefield conditions during training events. A result of the Covid-19 pandemic was the cancellation of out-of-state training that was redirected to Camp Edwards, which contributed to the increase in usage of pyrotechnics at Camp Edwards during TY 2020.

Graph 2-8 M116A1 Hand Grenade Simulator Use





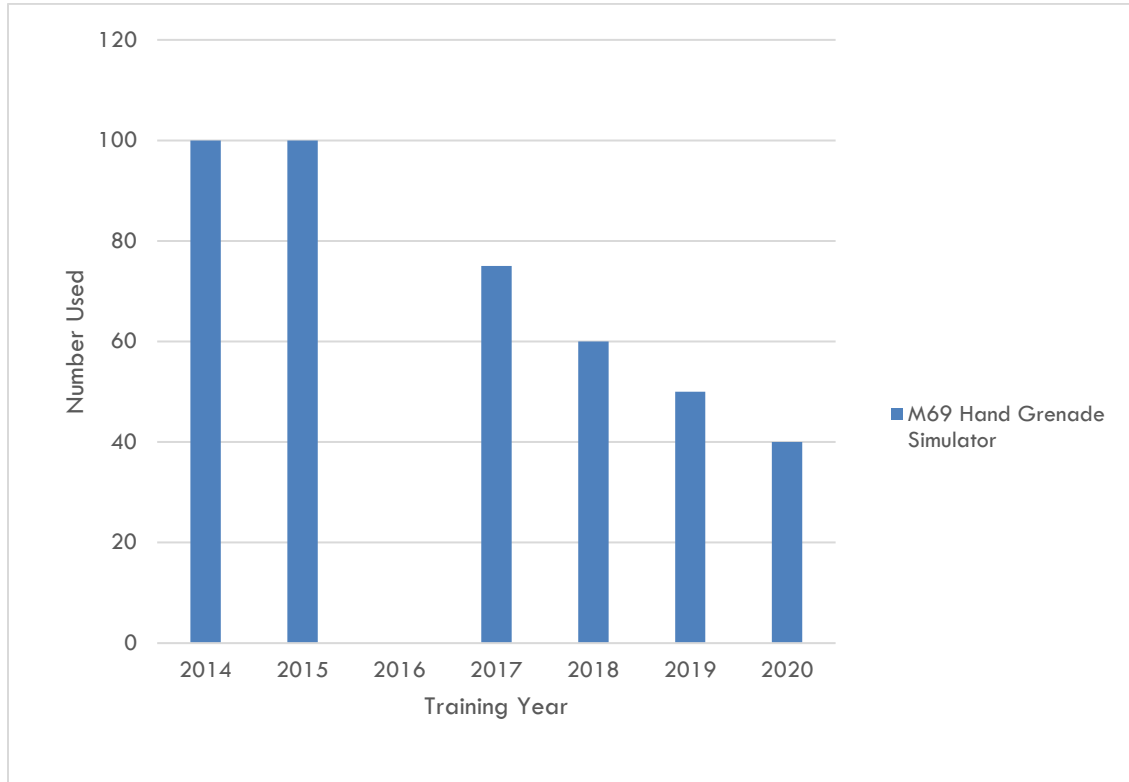
## 2.12 M69 HAND GRENADE SIMULATOR

In 2013, EPA Region 1 and the EMC approved the use of the M69 Hand Grenade Simulator on Camp Edwards.

The M69 provides realistic training and familiarizes soldiers with the functioning of a fragmentation hand grenade. The average Soldier can throw the M69 approximately 40 meters (131 feet). After a delay of four to five seconds, the M69 emits a small puff of white smoke and makes a popping noise. The grenade bodies are reused repeatedly by replacing the fuse assembly.

Camp Edwards developed a Standard Operating Procedure and Course Management Plan for the M69 Hand Grenade Simulator, approved by the EMC in 2014. The plan allows for maximum effective use of the M69 Hand Grenade Simulator with the M288 Fuse in the Camp Edwards training areas and on the Hand Grenade Qualification Course while abiding by training and environmental guidelines. Use of the M69 Hand Grenade Simulator began in September 2014. Forty were used in the Training Area/Reserve in TY 2020. Graph 2-9 shows the number of M69 Hand Grenade Simulators used since TY 2014. M69 Hand Grenade Simulator use shows a declining trend because the MAARNG has been conducting more collective training versus individual unit training. The M69 is used primarily during individual unit training for hand grenade use and familiarization.

Graph 2-9 M69 Hand Grenade Simulator Use



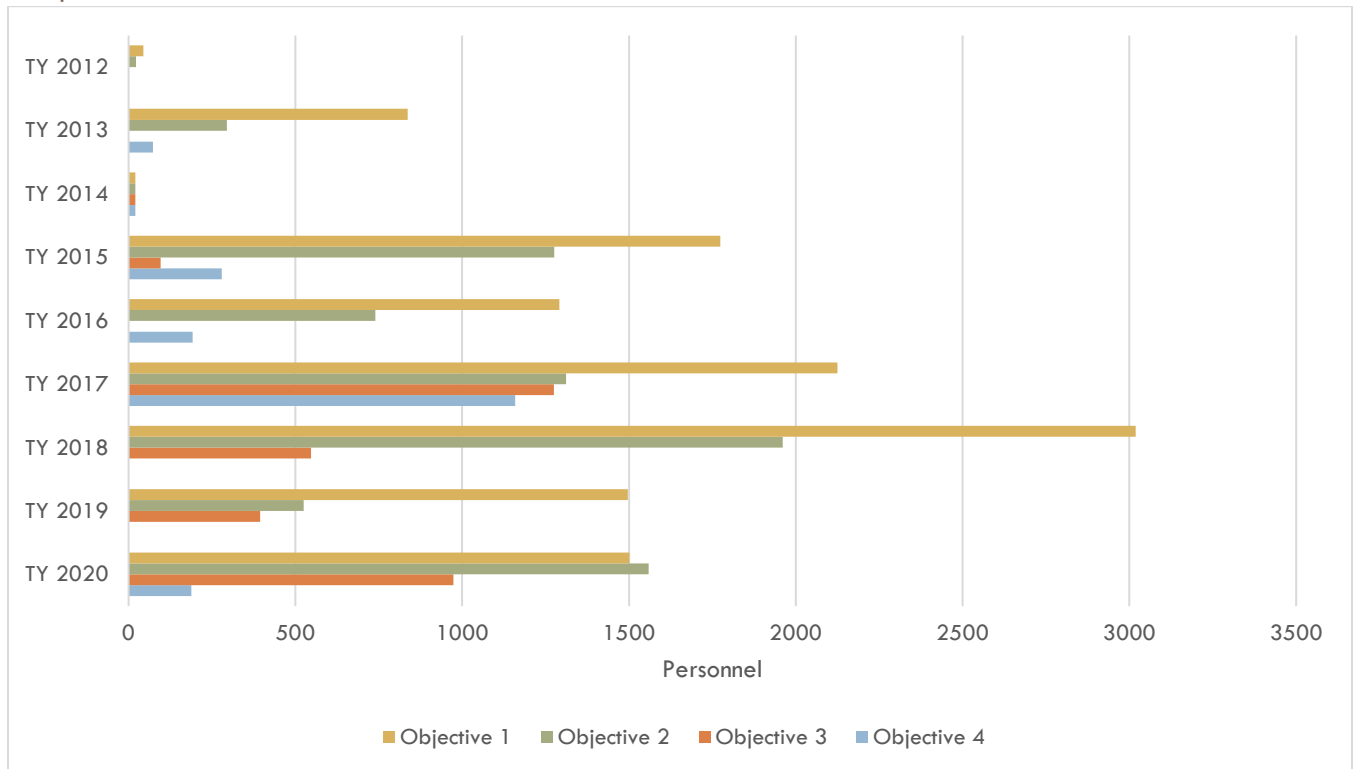
## 2.13 SOLDIER VALIDATION LANE

The SVL uses conex-like shipping containers as training aids, which can be reconfigured to mimic small villages and used for Improvised Explosive Device (IED) training. The containers are located in open or previously cleared, historically used training areas including training and bivouac sites within the Training Area. The ability to periodically reconfigure the portable training aids within the Training Area will critically enhance the ability to adapt scenarios to the most current combat situations, ultimately helping to save the lives of soldiers on the battlefield.

Four SVL locations (called objectives) were used during TY 2020 to meet military training needs: Objective 1 in Training Area A-4; Objective 2 in Training Area BA 4; Objective 3 in Training Area B 11, and Objective 4 in Training Area C-14. Graph 2-10 shows the use of all four SVL Objectives since TY 2012. The locations of the SVL Objectives are shown in Figure 2-9.

The Natural Heritage and Endangered Species Program (NHESP) requires a yearly monitoring report be submitted documenting the locations and numbers of containers and the approximate dates of placement within these locations, as well as documenting any cutting of trees or leveling of sites that were required for container placement. The Soldier Validation Lane Annual Monitoring Report for TY 2020 is available in Appendix C.

Graph 2-10 Soldier Validation Lane Use

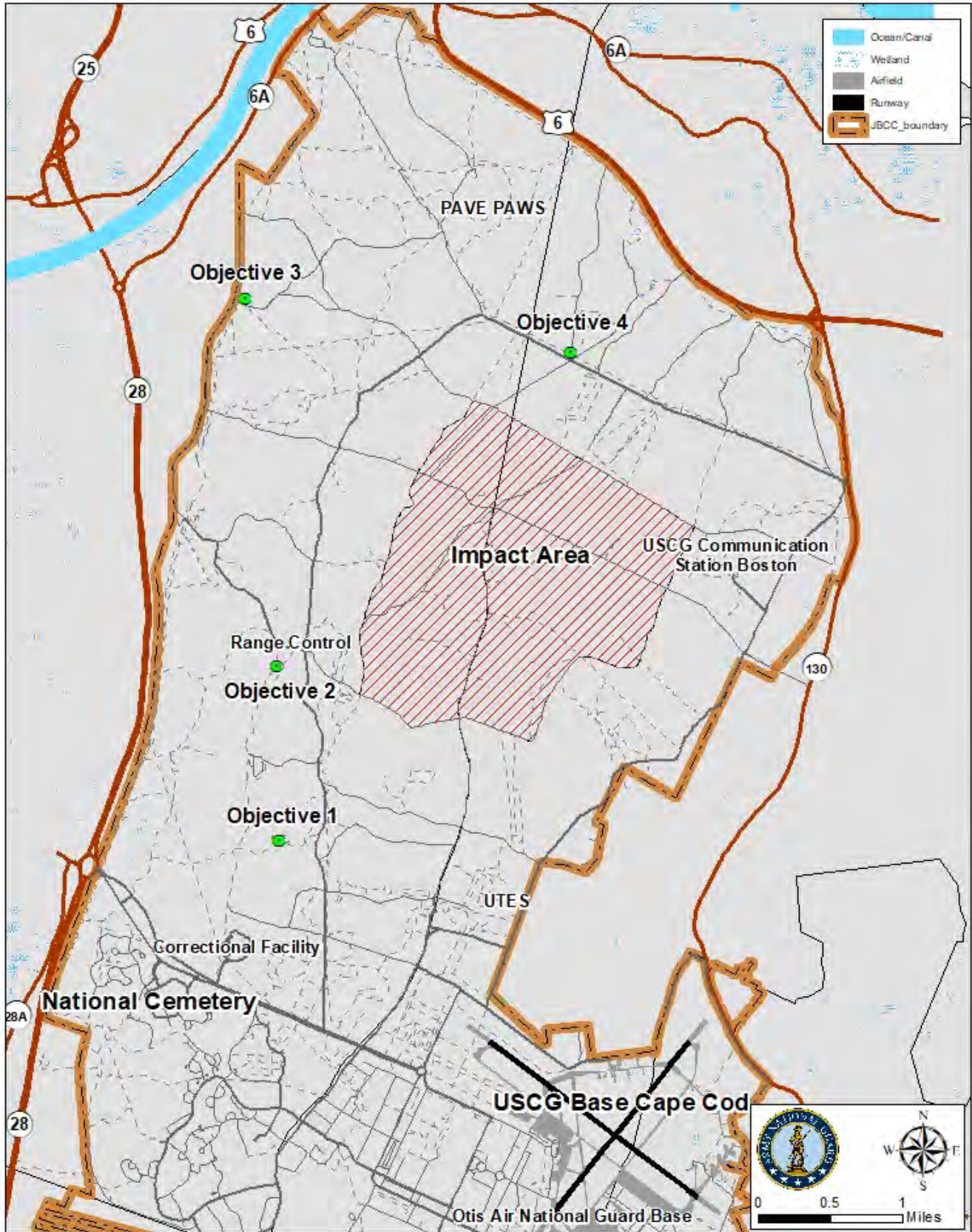


### 2.14 EPS 15.3.3 FIELD REFUELING

The MAARNG is proposing to modify EPS 15.3.3, Fuel Management, which states: “No storage or movement of fuels for supporting field activities, other than in vehicle fuel tanks, will be permitted except in approved containers no greater than five gallons in capacity.” The MAARNG is making a request of the EMC that vehicle refueling in the Training Area/Reserve be allowed under certain conditions. Currently, exceptions to the standard are granted so that the MAARNG can complete critical remediation, construction and training area and habitat management in the most cost effective and efficient manner. In addition to the MAARNG’s need to refuel vehicles for remediation, range construction and training area and habitat management, there is a required need for MAARNG soldiers to be able to train effectively with refueling in a tactical, field training environment. The proposed adjustment is reflective of the many years of EPS implementation and continual improvement of training and environmental practices that allow for compatible military training at Camp Edwards.

In TY 2017, the MAARNG conducted its first Proof of Concept outside of the Training Area/Reserve, within TTB Kelley, to illustrate that field refueling can be conducted in a safe and environmentally protective manner. During the Proof of Concept, MAARNG soldiers refueled a Blackhawk helicopter in a tactical environment, demonstrating their standard Best Management Practices (BMPs), which are protective of the environment.

Figure 2-9 SVL Objective Locations



BMPs included large-capacity secondary containment under the fueler and secondary containment at connections in the fuel line. A second Proof of Concept was conducted during TY 2018 at Battle Position 2 that consisted of refueling HUMVEEs. BMPs include secondary containment under the fueler and a drip pan on the ground under the nozzle.

In addition to the proofs of concept, several exceptions to the standard have been granted to the MAARNG by the EMC Environmental Officer to include the Combined Arms Exercise in TY 2019. Refueling in the Training Area/Reserve during that exercise was executed successfully. During TY 2020, exemptions to the standard were granted by the EMC Environmental Officer in TY 2020 in support of the Tango Range reconstruction and removal of the STAPP™ systems on Juliet and Kilo ranges.

As requested by the EMC through guidance of the SAC and CAC, the MAARNG has drafted a Standard Operating Procedure for fueling in the Training Area/Reserve along with a map that denotes areas for fueling vehicles and off-limits areas. The Standard Operating Procedure covers topics ranging from how Soldiers fuel to criteria for closing and opening a newly requested fueling site. The MAARNG has also developed language for the proposed EPS change. At the September 2019 SAC meeting, it was determined that more information would be needed to review and provide input to the EMC to decide if this standard needs to be adjusted. Information requested included site descriptions, distance to sensitive receptors, depth to groundwater, site screening criteria, etc. The MAARNG plans to return to the both the SAC and CAC with the additional information prior to requesting the EPS change from the EMC during TY 2021.

## 2.15 MULTI-PURPOSE MACHINE GUN RANGE

During TY 2015, the MAARNG's MILCON (Military Construction) project submission to construct a Multi-Purpose Machine Gun Range (MPMG) in 2020 on Camp Edwards at the current KD Range was approved by Congress. An MPMG is where soldiers train and qualify with automatic weapons. KD Range is a 600-yard Known Distance Range that is currently divided into two subparts with two distinct firing line/target configurations and training uses.

The approximately \$11.5 million project consists of \$9.7 for range construction and \$1.8 million for targetry. Environmental contracting and review of the project began in May 2018 and includes review under both the National Environmental Policy Act (NEPA) and the Massachusetts Environmental Policy Act (MEPA).

As part of the preliminary planning process, Camp Edwards conducted a test fire at KD Range on August 14, 2015, to simulate noise from the proposed MPMG range. The results of the test fire showed noise levels did not exceed MassDEP levels for nuisance noise and met the Army's criteria for considering a range in this area. Other surveys included an Archeological Survey in 2016 (no "finds" reported); Flora/Fauna Planning/Impact Assessment Surveys; Federal species: Bats surveyed in 2015 and 2016 (project area); Frosted elfin surveyed in 2017, and the Rusty-patched bumble bee, which was surveyed in 2017; State species: Eastern Whip-poor-will surveyed annually, including adjacent to project area; updated base-wide Moth survey, and then under the Migratory Bird Treaty Act, base-wide annual bird monitoring including in and near the project area.

Over the past five years, the MAARNG has coordinated with multiple state and Federal agencies including DFW's NHESP to ensure that adverse impacts to natural resources (including state-listed rare species) were avoided or mitigated (see Section 3.19).

For the MEPA process, a Notice of Project Change was filed in February 2020 with a 30-day public comment period. The Secretary of the Executive Office of Energy and Environmental Affairs determined that a Supplemental Environmental Impact Report (SEIR) should be completed. The MAARNG submitted the SEIR on June 11, 2020, with a 30-day comment period. The MAARNG received a certificate signed by the Secretary on

July 17, 2020, which determined the SEIR submitted for the project adequately and properly complies with MEPA and its implementing regulations.

For the NEPA process, the Environmental Assessment was completed in August 2020 and a 30-day public comment period was held from August 8, 2020 to September 7, 2020. Approximately 367 comment letters were received from state and local agencies, environmental groups, and members of the public. As of December 2020, the MAARNG is completing the responses to comments. Once that is complete, the public comments and responses will be placed on the E&RC's website. National Guard Bureau will determine whether the Environmental Assessment meets the "Finding of No Significant Impact" or if the project requires further environmental consideration.

In addition to environmental review under MEPA and NEPA, the MAARNG must receive the EMC's approval for both the MPMG range design and its OMMP.

# SECTION 3

## ENVIRONMENTAL PROGRAM MANAGEMENT

### 3.0 INTRODUCTION

Chapter 47 of the Acts of 2002 requires the Annual Report to contain information describing the range of resource management activities conducted by the MAARNG in the Training Area/Reserve and to report on activities associated with the EPSs for the Training Area/Reserve. Sections 3.1 through 3.16 include information for each EPS where there were associated activities. Section 3.17 provides similar information for the generic Cultural Resources EPS that also applies to MAARNG activities in the Training Area/Reserve. In addition to meeting this requirement, Section 3 provides information on required mitigation measures undertaken by the MAARNG and information on any noncompliance with the EPSs or other laws and/or regulations.

Chapter 47 of the Acts of 2002 also requires the Annual Report to describe long-term trends in the major areas of resource management and activities. Data is provided in this report back through TY 2011, when available, or longer when appropriate to illustrate long-term trends. Additional information on environmental management activities performed in the Training Area/Reserve can be found on the Publications page of the E&RC web site at: <https://www.massnationalguard.org/ERC/>.

During TY 2020, six Records of Environmental Consideration (RECs) were reviewed for natural and cultural resources for proposed actions in the Training Area/Reserve. RECs are an internal environmental review document based on NEPA. The RECs reviewed were for the paving of Turpentine Road, renovations completed at the former Otis Road and Gun Club, small road repair, repaving Pocasset-Forestdale Road, and removal of the firing position culverts at B and C ranges.

Appendix D identifies the relevant federal, state, DoD, and U.S. Army environmental regulations governing MAARNG activities in the Training Area/Reserve.

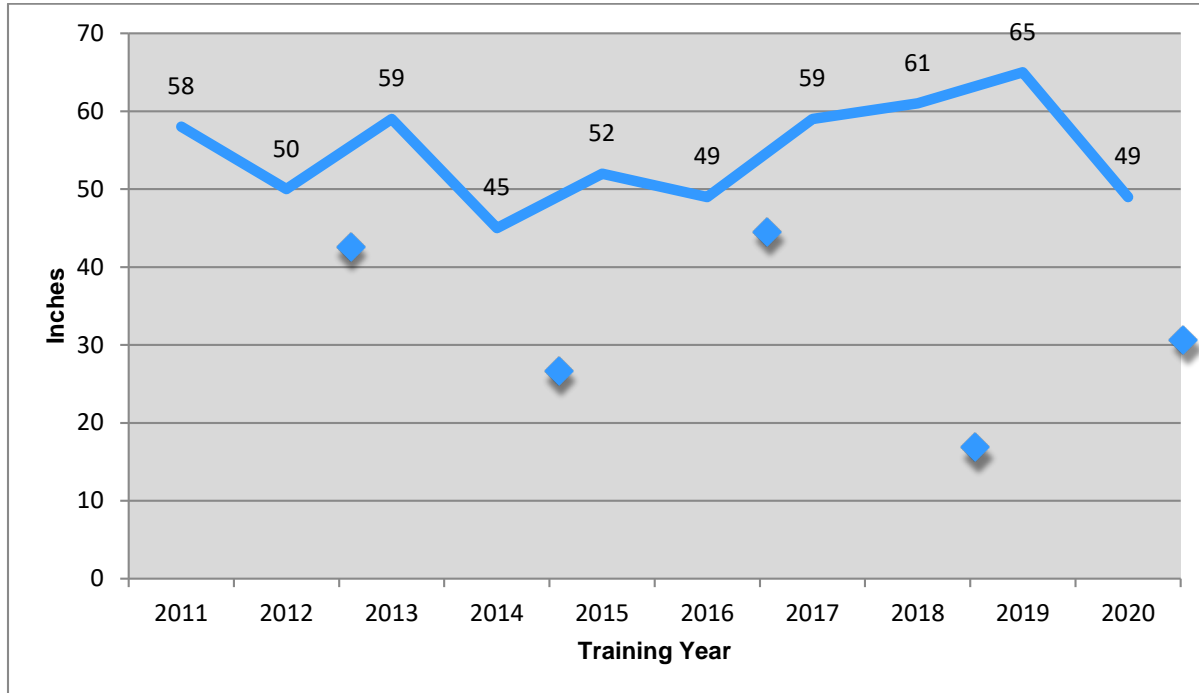
### 3.1 GROUNDWATER RESOURCES MANAGEMENT

The MAARNG complied with the Groundwater Environmental Performance Standard during TY 2020. Travel in Zone 1 Wellhead Protection Areas was limited to foot travel or to vehicles required for construction, operation, or maintenance of wells. The Upper Cape Water Supply Cooperative continues to have fencing around its three water supply wells and appropriate signage around the wells' 400-foot radius in the Training Area/Reserve. Both the Upper Cape Water Supply Cooperative and the 102<sup>nd</sup> Intelligence Wing operated within the water withdrawal limits of their respective MassDEP issued permit or registration. The Bourne Water District has a well in the Training Area/Reserve that became operational in TY 2014 as part of its overall water supply system. The JBCC Groundwater Protection Policy is available on the Publications page of the E&RC website at: <https://www.massnationalguard.org/ERC/>.

#### 3.1.1 Precipitation

Precipitation information included in the Annual Report is obtained from the Northeast Regional Climate Center at Cornell University in Ithaca, New York, based on recordings from a station in East Sandwich, Massachusetts. That station reported a total of 49.23 inches of precipitation for TY 2020 (Graph 3-1). Barnstable County experienced drought conditions in 2020.

Graph 3-1 Precipitation Recorded



### 3.1.2 Groundwater Level

In TY 2005, the U.S. Geological Survey (USGS) installed a monitoring well (USGS number MA-SDW 537-0107) on Camp Edwards to record the altitude of the water table in the Cape Cod aquifer. The well became operational in January 2005. The well is located west of Greenway Road on the J-1 Range of the Training Area/Reserve and is about 107 feet deep. A recording device in the well electronically transmits a continuous record of the water level near the top of the water-table mound that forms the Sagamore groundwater-flow system on western Cape Cod. The well's location is shown in Figure 3-1.

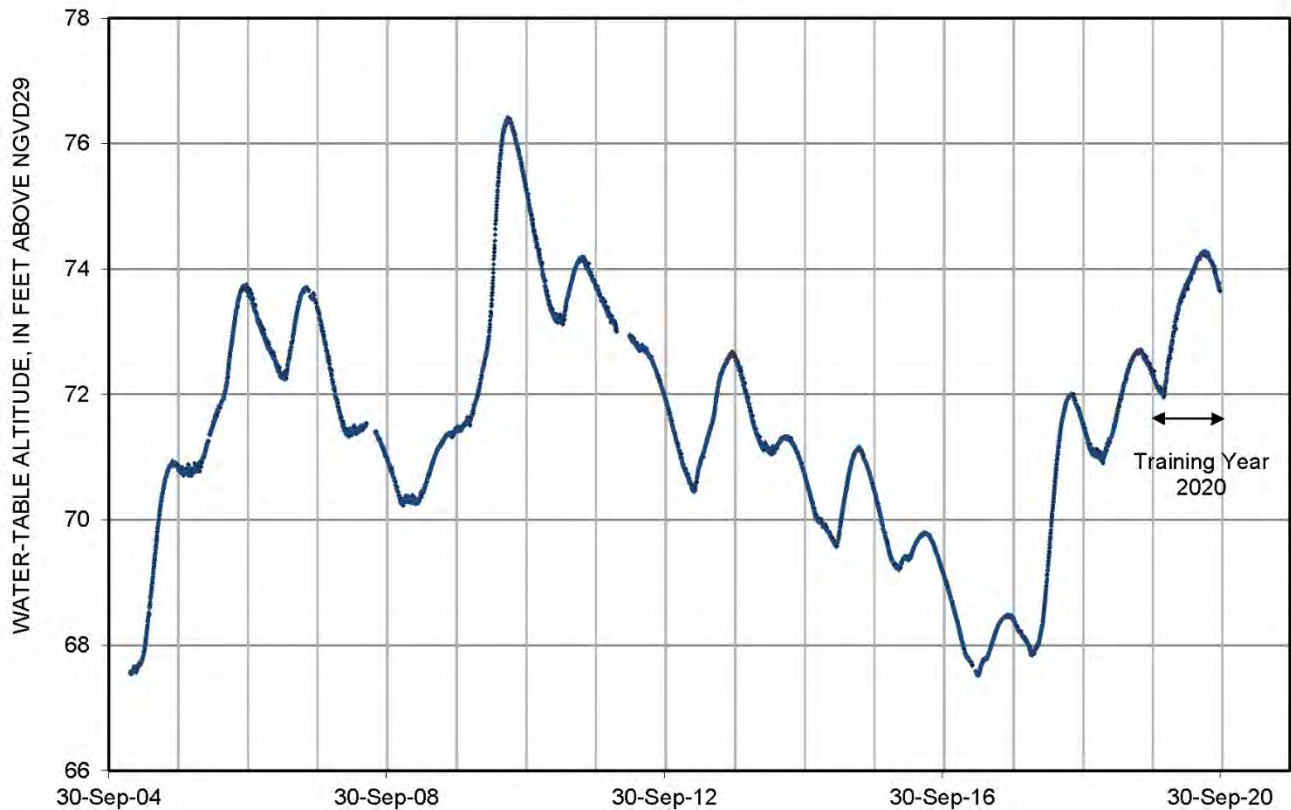
The pattern of water-level changes observed at the monitoring well is caused by natural seasonal and year-to-year variations in recharge from precipitation. Graph 3-2 shows the trend in the water-table altitude at the USGS monitoring well for the 2005-2020 training years. During TY 2020 the water-table altitude declined about 0.5 feet during October to early December, rose about 2.3 feet during the next 7 months, and then declined about 0.6 feet, ending the training year about 2.2 feet higher than the average water-table altitude for TY 2005-2020.

The IAGWSP of the Army National Guard provides part of the funding for the operation of the monitoring well because the water-level data are used in that program. Information about the well and the observed groundwater levels is publicly available on the following USGS website:

<http://groundwaterwatch.usgs.gov/AWLSites.asp?S=414159070310501&ncd=>

Graph 3-2 U.S. Geological Survey Monitoring Well

U.S. GEOLOGICAL SURVEY MONITORING WELL  
MA-SDW 537-0107



### 3.1.3 Water Supply Systems

#### Upper Cape Regional Water Supply Cooperative

The Upper Cape Regional Water Supply Cooperative provided 370,647,000 gallons of water (a daily average of 1,015,471) from its three wells to the six public water supply systems it services during TY 2020: Bourne Water District, Mashpee Water District, Sandwich Water District, the Town of Falmouth water system, the Barnstable County Correctional Facility, and the Otis ANGB water supply system. The Cooperative is authorized to withdraw up to 3.0 million gallons per day. Graph 3-3 shows the daily average pumping rate of the Cooperative since TY 2011. The locations of the Cooperative’s three water supply wells (WS-1, WS-2, WS-3) and its seven sentry monitoring wells (C-1 through C-7) are shown in Figure 1 in Appendix E. No samples were taken for the Cooperative’s long-term monitoring well last year. The Cooperative’s 2020 Consumer Confidence Report is available in Appendix E.

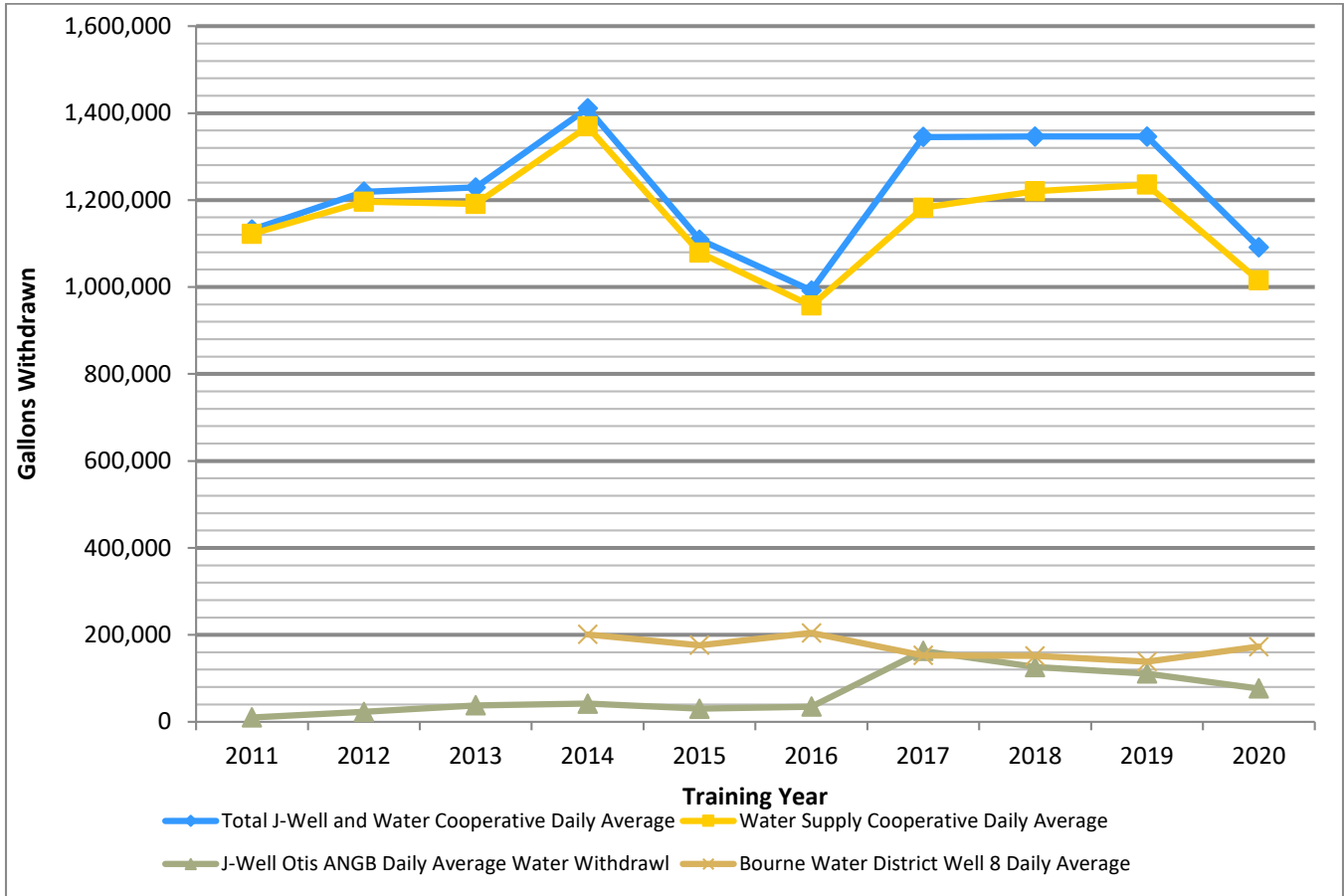
#### Otis ANGB Public Water Supply System

The Otis ANGB system pumped an average of 76,460 gallons of water per day and a total of 27,908,000 gallons of water from its well, known as J-Well (located in the Cantonment Area), during TY 2020. It also received 40,188,000 gallons from the Cooperative during TY 2020; a daily average of 110,104 gallons. Graph 3-3 shows the daily average pumping rate of the Otis system since TY 2011.

A copy of the calendar year 2019 Consumer Confidence Report published by the 102nd Intelligence Wing in May 2020 is provided in Appendix E.



Graph 3-3 Daily Water Withdrawal, J-Well and Water Cooperative



Note: Bourne Water District Well 8 began production on May 30, 2014.

### Bourne Water District Water Supply Well

Bourne Water District Well 8 became operational in May 2014. During TY 2020 a total of 63,054,700 gallons were pumped, with a daily average of 172,752 gallons pumped. Graph 3-3 shows the daily average pumping rate of Well 8 for TY 2014 through TY 2020. The well’s location is shown in Figure 3-1. A copy of the calendar year 2019 Bourne Water District’s Water Quality Report is provided in Appendix E.

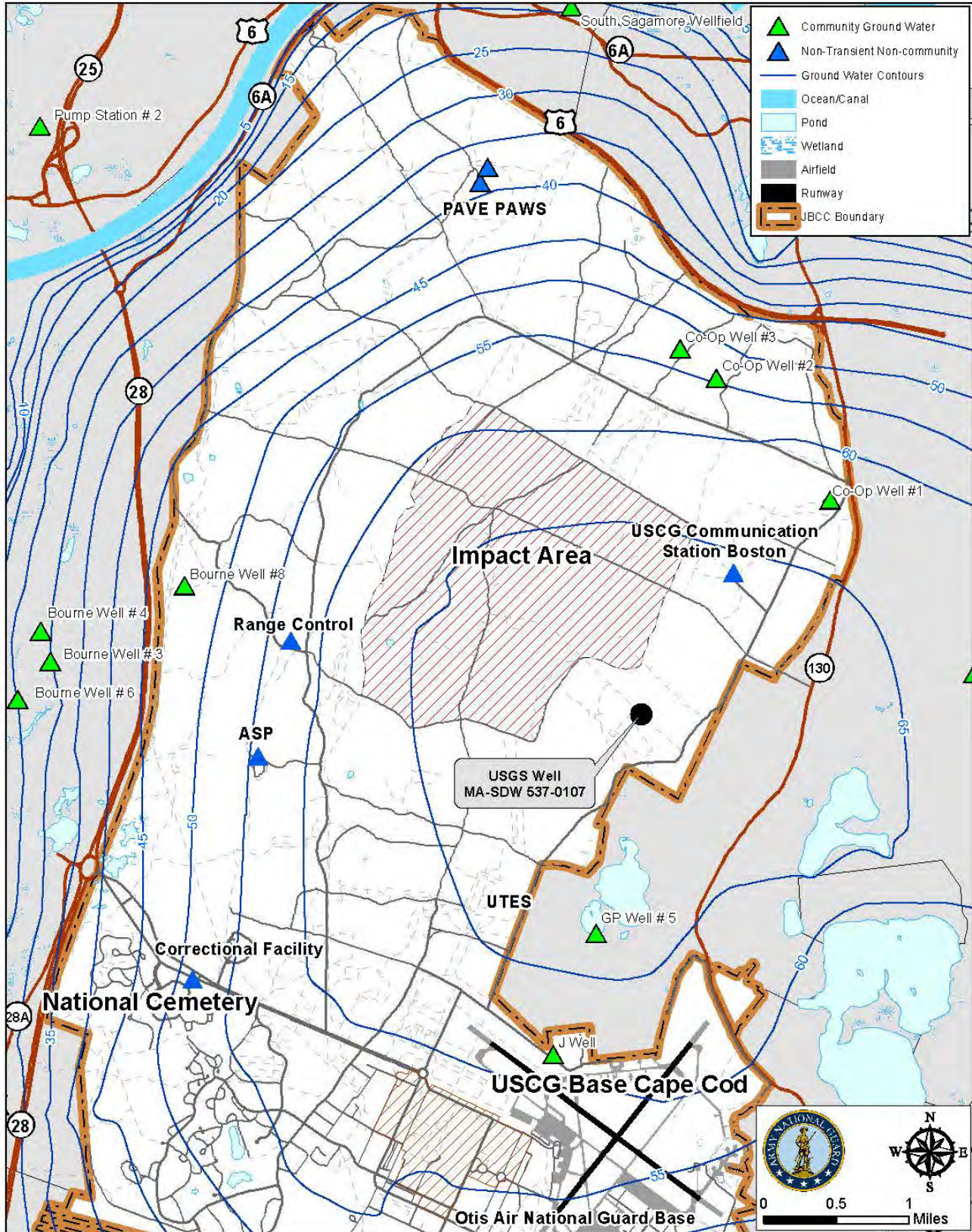
### Other Water Wells

There are two water supply wells located within the boundary of the Training Area/Reserve, which are not subject to Chapter 47 of the Acts of 2002 and the EPSs. These are located at Cape Cod AFS (PWS# 4036008) and the USCG Communications Station. Further information on water supply wells is available on MassDEP’s website: <https://www.mass.gov/service-details/well-database>.

## 3.2 WETLANDS AND SURFACE WATER MANAGEMENT

The MAARNG did not take any actions during TY 2020 that resulted in the loss of any wetland resources or their 100-foot buffer areas. No new bivouac areas were created in the Training Area/Reserve during the year within 500 feet of any wetland and no land alteration activities were conducted by the MAARNG within 100 feet of a certified vernal pool during the year. Representatives of the E&RC routinely attended numerous coordination meetings held by various parties (e.g., Camp Edwards, IAGWSP) to stay abreast of the activities in the Training Area/Reserve and to ensure appropriate coordination occurred and impacts were avoided or permitted. No wetland associated projects were implemented or reviewed within the Training Area/Reserve during TY 2020.

Figure 3-1 Well Locations



In TY 2020, work was completed to comply with the Conservation and Management Plan (CMP) for Agassiz's Clam Shrimp (*Eulimnadia agassizii*), a state listed endangered species, occurring in roadway puddles. Details on this mitigation and monitoring are in Section 3.3.4. In TY 2018, the Bourne Conservation Commission reviewed this project and made a negative determination, as reported in the TY 2018 annual report.

In TY 2020, two significant efforts were made to help further wetlands priorities on base. First, Conservation Agents from the towns of Bourne and Sandwich both participated in a Stakeholder Task Force meeting for the development of the Integrated Natural Resource Management Plan (INRMP) Update. This allowed for input from the town's wetland specialists on priorities for conservation projects on the base going forward. The INRMP was sent out for signatures in December 2020. The document is now final, with the final signature received on February 8, 2021. In addition, in TY 2020, the Natural Resources Office hired a Conservation Biologist to focus on wetlands and vegetation priorities.

### 3.2.1 Vernal Pools

In TY 2020, the Natural Resources Office only monitored vernal pools and puddles for the existence of clam shrimp. No vernal pools or puddles were monitored specifically for amphibian activity. Monitoring of puddles followed the guidance agreed upon in the Conservation and Management Permit (CMP) for Agassiz's Clam Shrimp. The clam shrimp monitoring results are presented in Section 3.3.4.

## 3.3 RARE SPECIES MANAGEMENT

The Natural Resources Office and their contractors observed and reported on floral and faunal species listed under the Massachusetts Endangered Species Act (MESA) on Camp Edwards in TY 2020. The office observed 16 species and is reporting the sightings to NHESP in early TY 2021 (Table 3-1). One field technician hired for TY 2020 was primarily involved in observing and reporting these rare floral and faunal species in the Training Area/Reserve with supplementary observations from others. The Natural Resources Office is also reporting observations of "Tracking List" species to NHESP as a standard condition of scientific collection permits for reptiles and amphibians.

The Natural Resources Office formally and informally reviewed proposed military and civilian activities in the Training Area/Reserve to ensure that adverse impacts to natural resources (including state-listed endangered species) were avoided or mitigated. Multiple state and federal coordination processes were initiated or completed during TY 2020 for rare species. MESA coordination continued, culminating in a CMP, for future development of a MPMG range (Project #18-37434) and establishment of a "master planning" mitigation bank at JBCC for state-listed species potentially impacted by other projects within the Training Area/Reserve and Priority Habitat. The final CMP was signed on September 30, 2020. Informal consultation was also conducted with the US Fish and Wildlife Service (USFWS) New England Field Office for the MPMG Range project, evaluating the potential for impacting federally listed species including the Northern Long-eared Bat and two plants not currently known to occur at JBCC (sandplain gerardia [*Agalinis acuta*] and American chaffseed [*Schwalbea americana*]). The USFWS concurred with the MAARNG determination that the MPMG construction, maintenance, use, and mitigation actions may affect, but are unlikely to negatively affect, the Northern Long-eared Bat and American chaffseed on July 7, 2020. Additional review, coordination, survey, and permitting under this project and CMP included the Tango Range redevelopment and Eversource switching station soil stockpile with MESA approval and turtle protection for both projects. Additional details on these projects and associated actions is described in the Mitigation Section (3.19).

Multiple contracts were developed or continued in TY 2020 for surveying and managing rare species. Tetra Tech, a contractor for the MAARNG, manually vetted bat acoustic data from TY 2018 and TY 2019. Tetra Tech also completed a report interpreting MAARNG bat call vetting results from 2016 and 2017. Tetra Tech is currently

working to manually vet bat acoustic data from TY 2020, upload past data into the MAARNG bat acoustic database, and create a scope of work to analyze trends in bat data on base over the last 7 years.

See Section 3.3.6 for information on TY 2020 contracts and other in-house work regarding Eastern Box Turtles.

See Section 3.3.1 for details on a contract regarding the state-listed plant *Triosteum perfoliatum*.

In Training Year 2020, MAARNG Natural Resources continued opportunistic coverboard surveys aimed at studying snake species distributions in the Training Area/Reserve. Surveys were less frequent than in past years due to Covid-19 pandemic-related issues. In TY 2020 Natural Resources and ITAM staff worked with Camp Edwards Headquarters and Facilities Engineering to remove and fill the old, unused concrete firing positions at Ranges B and C. Past discoveries of snakes in these pits identified them as potential sources of mortality for snake species. Regular checks by Natural Resources technicians attempted to prevent/minimize any mortality events while coordination and work occurred to fill and or remove the pits.

### 3.3.1 Rare Species Reporting

Table 3-1 identifies the rare species sightings reported to NHESP for the past five years (See Appendix F for sightings reported for the past 10 years). The fluctuation in numbers reported is attributed to a variety of factors, including but not limited to: the time and length of surveys, locations where surveys are conducted (the same locations are not necessarily visited each year), intensity of the surveys, the number and experience of summer field crew personnel, weather conditions during the times available for surveys, locations where soldiers may train during the training year, familiarity of individual soldiers and others utilizing the various training areas and training support areas on Camp Edwards with rare species, etc. With these limitations and the varied associated counting procedures and efforts, the numbers contained in Table 3-1 do not reflect changes or trends in populations. These are raw number counts that are reported to NHESP based on sightings.

Efforts are ongoing to collect rare species and management data in a way that allows for trends analysis that will better inform management decisions and meet the intent of Chapter 47 of the Acts of 2002. The data currently reported in the table are gross observations only and not interpretable for trends. State-listed species such as the Whip-poor-will lend themselves to data collection for trends analysis (annual point-count transects) and cooperation with statewide or national efforts (Section 3.3.8). Likewise, grassland bird monitoring standardization will allow for long-term trends analysis and better integration with broader conservation initiatives. The Natural Resources Program staff are working with statewide and regional efforts to coordinate monitoring, including participating in the annual Northeastern Nightjar Survey.

In TY 2020, three species that occur on Camp Edwards were added to the Massachusetts Endangered Species list. The Eastern Hog-nosed Snake (*Heterodon platirhinos*), a species frequently found on base, was added as a Species of Special Concern. Habitat management activities that occur on base, including prescribed fire, forestry, and vegetation management, are thought to benefit the species. The Eastern Meadowlark (*Sturnella magna*) was



Photograph 3-1 The caterpillar of the Slender Clearwing Sphinx (*Hemaris gracilis*), one of the species reported to NHESP during TY 2020.

TABLE 3-1 LIST OF RARE SPECIES REPORTED TO NHESP

Quantities shown are not resulting of standardized surveys and should not be interpreted as population trends

Common/Scientific Names	Individuals Reported						
	Fed Status <sup>14</sup>	State Status	TY 2016	TY 2017	TY 2018	TY 2019	TY 2020
<b>BIRDS</b>							
Grasshopper Sparrow <sup>13</sup> ( <i>Ammodramus savannarum</i> )	-	T	16	15	16	20	34
Northern Harrier <sup>1</sup> ( <i>Circus cyaneus</i> )	-	T	Wintering	Wintering	Wintering	Wintering	Wintering
Upland Sandpiper <sup>13</sup> ( <i>Bartramia longicauda</i> )	-	E	9	8	7	12	6
Eastern Meadowlark <sup>13,16</sup> ( <i>Sturnella magna</i> )	-	SC	8	3	2	7	14
Whip-poor-will <sup>2</sup> ( <i>Antrostomus vociferous</i> )	-	SC	87	52	110	53	99
<b>REPTILES and AMPHIBIANS</b>							
Eastern Box Turtle ( <i>Terrapene carolina carolina</i> )	-	SC	38	42	43	58	45
Eastern Hog-nosed Snake <sup>16</sup> ( <i>Heterodon platirhinos</i> )	-	SC	2	3	8	9	1
<b>PLANTS</b>							
Adder's Tongue Fern <sup>4,6</sup> ( <i>Ophioglossum pusillum</i> )	-	T	98	247	0	25	646
Broad Tinker's Weed <sup>5,6</sup> ( <i>Triosteum perfoliatum</i> )	-	E	113	127	0	200	TBD
American Arborvitae <sup>9</sup> ( <i>Thuja occidentalis</i> )	-	E	4	N/A	N/A	N/A	N/A
<b>BEEES</b>							
Walsh's Anthophora <sup>15,16</sup> ( <i>Anthophora walshii</i> )	-	E	0	5 (1)	0	32 (9)	4
<b>BUTTERFLIES and MOTHS<sup>11</sup></b>							
Buck Moth ( <i>Hemileuca maia</i> )	-	SC	90	95	0	4	2
Pine Barrens Speranza ( <i>Speranza exonerata</i> )	-	SC	44	13	0	0	0
Sandplain Euchlaena ( <i>Euchlaena madusaria</i> )	-	SC	3	7	0	0	1
Heath Metarranthis ( <i>Metarranthis pilosaria</i> )	-	SC	1	1	0	0	0

TABLE 3-1 LIST OF RARE SPECIES REPORTED TO NHESP, cont'd

Quantities shown are not resulting of standardized surveys and should not be interpreted as population trends

Common/Scientific Names	Individuals Reported						
	Fed Status <sup>14</sup>	State Status	TY 2016	TY 2017	TY 2018	TY 2019	TY 2020
Melsheimer's Sack Bearer ( <i>Cicinnus melsheimeri</i> )	-	T	2	0	0	0	7
Gerhard's Underwing ( <i>Catocala herodias</i> )	-	SC	33	10	0	0	2
Pine Barrens Zale ( <i>Zale lunifera</i> )	-	SC	13	8	0	0	0
Barrens Dagger Moth ( <i>Acronicta albarufa</i> )	-	T	1	0	0	0	0
Chain-dotted Geometer ( <i>Cingilia catenaria</i> )	-	SC	0	0	0	1	0
Drunk Apamea ( <i>Apamea inebriata</i> )	-	SC	1	0	0	0	0
Pink Sallow ( <i>Psectraglaea carnosae</i> )	-	SC	9	5	0	0	0
Pink Streak ( <i>Dargida rubripennis</i> )	-	T	25	0	0	0	3
Collared Cycnia ( <i>Cycnia collaris</i> )	-	T	0	1	0	11	33
Coastal Heathland Cutworm ( <i>Abagrotis benjamini</i> )	-	SC	0	1	0	0	0
Woolly Gray ( <i>Lycia ypsilon</i> )	-	T	0	2	0	0	0
Water-willow Stem Borer ( <i>Papaipema sulphurata</i> )	-	T	0	1	0	0	0
Waxed Sallow Moth ( <i>Chaetoglaea cerata</i> )	-	SC	0	2	0	0	0
Frosted Elfin <sup>12</sup> ( <i>Callophrys irus</i> )	-	SC	5	5	5	TBD	25
Slender Clearwing Sphinx ( <i>Hemaris gracilis</i> )	-	SC	0	0	0	0	5

TABLE 3-1 LIST OF RARE SPECIES REPORTED TO NHESP, cont'd

Quantities shown are not resulting of standardized surveys and should not be interpreted as population trends

Common/Scientific Names	Individuals Reported						
	Fed Status <sup>14</sup>	State Status	TY 2016	TY 2017	TY 2018	TY 2019	TY 2020
<b>CRUSTACEANS</b>							
Agassiz's Clam Shrimp <sup>10</sup> ( <i>Eulimnadia agassizii</i> )	-	E	0	6	38	9	3
<b>MAMMALS</b>							
Northern Long-Eared Bat <sup>7,8</sup> ( <i>Myotis septentrionalis</i> )	T	E	15 (1)	2	1	3	TBD
Little Brown Bat <sup>7</sup> ( <i>Myotis lucifugus</i> )	UR	E	22	4	2	6	TBD
Tricolored Bat <sup>7</sup> ( <i>Perimyotis subflavus</i> )	UR	E	7	3	2	3	TBD
Eastern Small-Footed Bat <sup>7</sup> ( <i>Myotis leibii</i> )	UR	E	0	0	0	1	TBD

<sup>1</sup> NHESP is only accepting reports of nesting raptors, rather than opportunistic observations of individuals. Reports are provided as relevant, but common wintering birds or migrants are not individually tracked or reported (e.g., Northern Harrier).

<sup>2</sup> As of TY 2016, quantities only reflect the results of annual survey routes during May, after totaling the minimum number (between two observers) heard at each site. In prior years, the number shown reflects the quantity reported to NHESP, which may include multiple survey windows and repeated counts. Due to Covid-19 concerns, 2020 routes were not run in duplicate, and the number represents the total number of individual birds heard calling throughout the routes.

<sup>3</sup> Comet and Spatterdock Darner are no longer on NHESP's rare species list. Also, Odonate surveys were suspended after TY 2015.

<sup>4</sup> Several known *Ophioglossum* sites could not be surveyed in TY 2016 due to a lack of cease-fire agreement with the off-base Monument Beach Shooting Club. 2019 numbers are likely under representative, as surveys occurred late in the season. In 2020 *Ophioglossum* was surveyed earlier in the year in order to get an accurate count.

<sup>5</sup> Actual 2019 numbers may be as few as 82, MAARNG staff is now studying the genetics of *Triosteum perfoliatum* and *T. aurantiacum* due to difficulty in accurately differentiating the two species. Once the genetics project is completed, 2020 numbers will be reported.

<sup>6</sup> In 2018, only sites with historic records and no recent records were surveyed, and this should not be interpreted as a loss of rare plants between 2017 and 2018.

<sup>7</sup> Acoustic monitoring collects "call sequence" data and the true number of individuals is unknown. Numbers in the table reflect the number of survey sites with acoustic detections confirmed through manual call vetting. Numbers are reported to NHESP, but not tracked by them due to current uncertainty in using acoustic identifications. TY 2020 data is still being processed, these numbers are to be determined at a later date (TBD).

<sup>8</sup> Number in parentheses is captured individuals trackable by NHESP due to species identification confirmation versus acoustic data.

<sup>9</sup> NHESP is not interested in tracking this population, as it is likely of anthropogenic origin (pers. comm. with State Botanist, Bob Wernerehl).

<sup>10</sup> Numbers represent only locations where species was found and ID confirmed by either NHESP Aquatic Ecologist or trained MAARNG staff.

<sup>11</sup> Moths were extensively surveyed under contract with the Lloyd Center for the Environment between 2016 and 2017. There were no surveys in 2018, and MAARNG staff is not recording flight records of Barrens Buckmoth, as they are ubiquitous around the Training Area/Reserve. 2019 quantities represent individuals or groups of individuals (a group of Barrens Buckmoth caterpillars on a single leaf is counted as one, as are a pair of Unexpected Cynia caterpillars sharing the same butterflyweed plant).

<sup>12</sup> MAARNG staff did not perform surveys for *Callophrys irus* in 2019, but facilitated USFWS surveys. Results are pending, but USFWS staff found Frosted Elfins across a wider area than was previously known.

<sup>13</sup> Grassland bird numbers represent individual territories observed in a given year rather than the total number of birds observed throughout repeated surveys as was reported in past years (prior to the TY 2019 SOTRR). Upland Sandpiper counts exclude known females, but include unknown birds. Also, the numbers reported in annual reports TY 2015 and earlier included birds found on the Coast Guard airfield, which is not reported by MAARNG Natural Resources. Numbers in this version of Table 3-1 are accurate.

<sup>14</sup> "UR" indicates a species is currently under review for listing on the federal Endangered Species Act.

<sup>15</sup> MAARNG contracted a targeted survey for *Anthophora walshii* in 2019 after an exploratory bee survey in 2017. The first number represents the number of flying/foraging records, and in parentheses the records of nesting activity. Unconfirmed nests were not counted.

<sup>16</sup> Species added to MA Endangered Species List in TY 2020. Observation quantities included for prior years, but would not have been officially reported to NHESP.

also listed as a Species of Special Concern. This species utilizes the grasslands on base as summer nesting habitat and regularly overwinters in lower abundance. The protective measures and habitat management in place already in the grassland management area is consistent with activities to protect and promote this species. Walsh's Anthophora (*Anthophora walshii*) was added to the list as Endangered. Walsh's Anthophora has primarily been observed in the Cantonment Area grasslands in areas experiencing frequent management activities. The species has also been observed on powerline right of ways and one range area on base. From surveys conducted, the species was found to be more abundant in heavily managed areas (mowing, fire, and herbicide use). Hence, this species will not change management activities occurring in the grasslands or other early successional areas. All of these species are expected to benefit from the mitigation actions outlined in the CMP.

Based on recommendations from the State Botanist in 2016, a subset of rare plant sites are surveyed annually, and each site monitored every three years. Hence, the numbers presented in the tables cannot be evaluated as trends in the species. State-listed plants were surveyed at seven sites for *Ophioglossum pusillum* and *Triosteum perfoliatum* in TY 2020, including all sites where *Ophioglossum* is known to be or has recently been extant. *Ophioglossum pusillum* was found in low to moderate quantities at three sites. Surveys were performed earlier this year, as in past years the *Ophioglossum* had senesced by late summer (this happened even earlier in TY 2020 due to drought). In TY 2020, one site had *Triosteum perfoliatum* present. This species is difficult to tell from its congener, *Triosteum aurantiacum*, particularly when plants are in smaller growth stages or less than ideal conditions. In the Training Area/Reserve, it appears that the two species grow in the same areas, adjacent to each other. This makes accurate counts difficult and prompted the Natural Resources Office to contract a genetic and hybridization study, which started in TY 2020. Results are expected in TY 2021, and will guide future monitoring, and possibly restoration efforts. The Natural Resources Office also surveyed the lone population of the Watch List plant *Lupinus perennis*, located in the Training Area. A subset of seed was collected for year two of a five-year translocation project aimed at creating satellite populations for the long-term stability of the species in the area. Seed collected in 2019 was translocated to a site in the Cantonment grasslands, and germination was successful, but the length of the drought made it unlikely that any plants will survive into 2021.

In TY 2020, acoustic monitoring for bats continued. Tetra Tech was contracted to perform manual vetting and database upload, and results will be received in TY 2021. Confirmed detections will be reported to NHESP. All vetted bat data from 2014-2020 was entered by Natural Resources staff into the federal database, NABat, to inform the ongoing USFWS status assessment of *Myotis lucifugus*, *M. septentrionalis*, and *Perimyotis subflavus*. In TY 2020, Tetra Tech vetted data from 2018 and 2019 and produced reports on 2017 and late 2016 data. TY 2019 vetting results detailed the presence of a new bat species for Camp Edwards, the state-listed *Myotis leibii*, at a single site in the southeastern corner of the Training Area.

Starting in TY 2019, grassland bird numbers represent individuals (not double counting the same bird) observed in a given year rather than the total number of birds observed throughout repeated surveys as was reported in past years. This will better represent the number of active territories in a given year. In 2020, there were 34 active Grasshopper Sparrow territories, 7 active Upland Sandpiper territories, and 14 active Eastern Meadowlark territories. There were no Vesper Sparrows observed in TY 2020. Due to the way surveys were run in TY 2020, it's possible that Grasshopper Sparrow territory numbers may include some overlap between sites (inflated numbers).



Harrier sightings were not counted as the species is constant and conspicuous throughout the non-breeding season with much uncertainty to individuals, and NHESP no longer accepts non-nesting reports of this and other raptor species.

### 3.3.2 State and Federally Listed Bats

The Northern Long-eared Bat (NLEB) was federally listed as threatened in May 2015. The listing is primarily due to the severe population crashes (estimated greater than 95%) caused by white-nose syndrome. The extent of population loss drives concerns for impacts on individuals and maternal roost sites throughout the eastern United States. Recent survey efforts have suggested that NLEB are persisting better in coastal areas of the Northeast than any of the rest of their range. Because of this, there is a strong focus on surveys and conservation on Cape Cod and the Islands, Long Island, and coastal New Jersey. A NLEB was discovered on Martha's Vineyard in February 2016 with successively more found hibernating. Acoustic hits for NLEB on base in March and November suggest bats may be overwintering on Cape Cod, as well. If they are utilizing a different type of hibernacula than the caves utilized inland, it could have huge implications for the recovery of the species. Caves allow the spread and growth of white-nose, but a different type of hibernacula or less densely inhabited hibernacula may be allowing coastal bats to avoid white-nose syndrome leading to the greater numbers of bats in coastal areas.

In TY 2020, four sites in the Training Area were acoustically monitored for bats using programs targeting the foraging and echolocation characteristics of NLEB and *Perimyotis subflavus*. Two of these are considered long-term monitoring sites, having been recording at some of our highest-activity NLEB sites year-round since 2015. In TY 2019-2020 program staff aimed to acoustically monitor the state-listed species *Perimyotis subflavus* (also being considered for federal listing), as it is a high-flying species that may require different methods than those used to monitor NLEB. Two of the acoustic sites were set up above the forest canopy to survey specifically for them. These sites will also be monitored through the winter of 2020-2021. *P. subflavus* and NLEB were each recorded at 3 of the 19 acoustic sites monitored in TY 2019, including one site where they were both found, site 15\_35, along the southeastern boundary of the Training Area. *P. subflavus* was recorded at one of the two sites targeting the species in TY 2019, though equipment and insect noise issues were prevalent.

In TY 2020, Tetra Tech, a contractor for the MAARNG, manually vetted bat acoustic data from TY 2018 and TY 2019. Tetra Tech also completed a report interpreting MAARNG bat call vetting results from 2016 and 2017. Tetra Tech is currently working to manually vet bat acoustic data from TY 2020, upload past data into the MAARNG bat acoustic database, and create a scope of work to analyze trends in bat data on base over the last seven years.

The Army National Guard completed a programmatic informal consultation for NLEB addressing small projects implemented by MAARNG at all managed locations to include actions less than 5 acres and incorporating conservation measures. The USFWS concurred with the Army National Guard determination on October 8, 2015 and small projects are kept within the scope of that agreement. Larger projects are scoped to avoid impacts to bats to the extent possible while utilizing the 4(d) rule exemption under the Endangered Species Act as appropriate for habitat management actions. Investment in equipment, personnel training, and collaboration continued in TY 2020 to address concerns both over avoiding impacts to bats and minimizing bat impacts on ongoing actions such as pine barrens habitat management.

The Air Force Civil Engineer Center (AFCEC) manages two 1.5 megawatt (MW) wind turbines in the Training Area/Reserve. Turbine operation is curtailed for the NLEB from July 15 to October 15, 30 minutes before sunset to 30 minutes after sunrise for wind speeds less than 4.5 meters per second. There were no reported bat or bird strikes during TY 2020. However, there is not an active mortality survey effort and any reportable observations would be associated with equipment maintenance activities. Acoustic surveys conducted at Air Force Station Cape Cod, including turbine sites, found relatively low levels of activity dominated by Big Brown Bat.

### 3.3.3 New England Cottontail Rabbit Study

The Natural Resources Office began a study in TY 2010 on the New England cottontail rabbit (*Sylvilagus transitionalis*), at the time a candidate species for federal listing. Original study objectives were to determine the home range and habitat preferences of the species. This information can be used regionally to influence effective management efforts for this species. Current and future efforts are transitioning more from research into population monitoring, though with a strong emphasis on evaluating the effects of habitat management on cottontails. New England cottontails occur throughout suitable scrub oak habitat across Camp Edwards.

In 2015, the USFWS removed New England cottontail from the federal candidate list. The finding was based upon the conservation implementation enacted and future commitments by the large regional partnership, including MAARNG and Camp Edwards. Continued habitat management and monitoring are critical to New England cottontail success and keeping the species from being federally listed.

In TY 2016, contracted wildlife detection dogs readily found pellets at off-base locations and at two on-base sites located along powerlines. At several sites on base that had previously had rabbits, the dogs did not find rabbit sign or not in all repeated surveys at the site. This data could suggest a lower density of rabbits or a higher extinction rate at more interior sites. More interior sites tend to have more native habitat. To further explore the factors driving this, the Natural Resources Office sent fecal samples for diet analysis in TY 2017 and 2018. The low diversity of food resources at interior base sites with more native vegetation may be limiting the density of rabbits on base. In TY 2019, the Natural Resources Office assisted a Harvard graduate student correlating our diet analysis data with availability of vegetative resources through stem density counts. In TY 2020, the graduate student completed his thesis (available here: <https://dash.harvard.edu/handle/1/37365622>). His findings on preferred forage species and management techniques to encourage diverse forage species will be examined in TY 2021 and used in planning management activities for the species.

The Natural Resources Office continued active participation on the Technical Committee, working with partners to prioritize and develop actions and efforts to implement the conservation strategy for the species. Due to a technician leaving the position in the early winter, pellet search efforts in regional plots were suspended in TY 2020. The Natural Resources Office plans to resume pellet searches in TY 2021. In Fiscal Year 2021, the Natural Resources Office plans to contract statistical analysis and reporting for the New England cottontail data compiled thus far. This synthesis of New England cottontail research was approved for funding in TY 2019, but was an unfunded request until late in the year. The timing of funding did not provide sufficient time for preparation and contracting. In TY 2020, the project was again an unfunded request. In TY 2019, the funds that arrived late in the year were used for a habitat restoration project in Training Areas BA-6 and BA-7 to benefit the species. In TY 2020, several habitat management projects totaling 207 acres completed on Camp Edwards this year have benefits for expanding or maintaining New England cottontail habitat. In addition, the establishment of an on-site mitigation bank will continue to manage pine barrens on Camp Edwards to benefit the New England cottontail as well as many state-listed species.

### 3.3.4 Agassiz's Clam Shrimp

Clam shrimp were discovered in roadway puddles on base in TY 2015. Initial attempts at identification indicated the clam shrimp could be two state listed species, *Eulimnadia agassizii* and *Limnadia lenticularis*. In TY 2018, the NHESP Aquatic Ecologist confirmed *E. agassizii* in multiple roadway puddles along with the non-listed *Cyzicus gynecea*. *Limnadia lenticularis* has not been identified on base. In TY 2018, NHESP visited Camp Edwards, viewed some of the known clam shrimp locations, and trained MAARNG staff in proper identification of the species likely to be encountered in the Training Area/Reserve. The Natural Resources Office also received a collection permit to sample clam shrimp on MAARNG lands or any lawfully entered lands in Massachusetts.

*E. agassizii* occurs in roadway puddles on base. These sites are most often heavily trafficked, unvegetated puddles created by roadway compaction. Several puddles along Herbert and Cat Roads had become large enough to impede use for training. In TY 2018, the Natural Resources Office worked with NHESP and Oxbow Associates to create a Conservation and Management Plan (CMP) to address the necessary road repairs and provide net benefit for the species. The plan includes several components: habitat creation, experimental treatments, and monitoring. As part of the mitigation actions in TY 2019, a new puddle was created along the Tank Trail and an existing puddle was modified to create better habitat on Canal View Road. In TY 2020, two sites along Cat Road were repaired as *in situ* sites. One puddle had the egg-bearing sediment scraped, rock and sand laid down and compacted, and the egg-bearing sediment spread on top. The other puddle on Cat Road had a drainage ditch cut in the side to control the water level. The bottom of the puddle was hardened, and this solution allowed the bottom, egg-bearing sediment to be undisturbed. This completed the mitigation actions outlined in the CMP.

The third of three years of monitoring required in the CMP was completed in TY 2020. The methodology used was coordinated with NHESP as part of the CMP process. Natural Resources staff conducted repeated surveys (biweekly or monthly depending on season) at 11 puddles (10 puddles required by the CMP), some known to have had clam shrimp. Pools were measured for area, depth, temperature and pH, and all aquatic life was recorded. *Eulimnadia agassizii* were found in three of these puddles, including two where presence was expected but unconfirmed based on past survey results. Surveys in TY 2020 also documented for the first time the coexistence of *E. agassizii* and *C. gynecia* concurrently in the same pool. Given the dry conditions in TY 2020, few puddles had water during most of the survey period. Given the lack of favorable conditions in TY 2020 and the desire for additional surveys on the newly created and *in situ* puddles, clam shrimp surveys are planned for TY 2021.

### 3.3.5 Walsh's Anthophora

In 2017, the Natural Resources Office contracted bee specialist Michael Veit to perform bumblebee surveys at Camp Edwards. During his work, he discovered a breeding population of *Anthophora walshii*, Walsh's Anthophora, or Walsh's Digger Bee, in the Cantonment grasslands. This species' range is in the central US with Massachusetts having the only extant population east of Ohio. The species has only been documented in two Massachusetts locations in the last 35 years, Martha's Vineyard and Camp Edwards. According to Michael Veit, Camp Edwards seems to have the largest breeding population yet discovered in the Northeastern United States. At the time of this discovery, NHESP had *Anthophora walshii* listed as a Species of Greatest Conservation Need, but in TY 2020 the species was listed as Special Concern under MESA.

In 2019 Michael Veit completed ten days of surveying for *Anthophora walshii* at Camp Edwards. For this survey, sites with large populations of *Baptisia tinctoria*, the primary food plant for the species, were surveyed including sites in the Cantonment Area and the powerline right-of-way on Gibbs Road. *Anthophora walshii* was documented at three grassland parcels owned by MAARNG, one parcel owned by the Coast Guard on Shelton Road, and on the powerline on Gibbs Road near Sierra Range. Both foraging and nesting activity was documented at all sites, except the on the powerline where no nesting activity was documented.

In early July 2020, Natural Resources staff documented foraging of *Anthophora walshii* on *Asclepias* (milkweed) species in two separate parts of the Training Area, 6 km apart, and each roughly 4 km from the nearest known *Anthophora walshii* site. The sites consisted of a small powerline right-of-way with a small population of *Asclepias amplexicaulis* and an unmowed area behind a small arms range with a large, dense population of *Asclepias syriaca*. Through correspondence with Michael Veit it was determined that these were likely males foraging in advance of the emergence of females.

All the sightings of *Anthophora walshii* have been in areas that have been managed with either mowing, prescribed fire, herbicide use or a combination of those treatments. Given the regular management of the grassland parcels, the planned increase in management from the CMP mitigation projects, and the continued management by the utility companies of the rights-of-way, this species is expected to benefit from planned management activities and not impact current operations.

### 3.3.6 Eastern Box Turtle

In support of the MPMG proposed project, AECOM was contracted to create an Eastern Box Turtle Construction Period Monitoring and Protection Plan (CPMPP) and to complete initial canine-assisted surveys around the MPMG range in the fall of 2019. Once NHESP approved the plan, the plan implementation was contracted to AECOM to provide canine-assisted pre-construction turtle surveys and construction period monitoring, including tracking turtles around the project area using radiotelemetry. The CPMPP included silt fence installation followed by the required hours of turtle surveys inside the wildlife barrier completed before October 31. The construction contract was not awarded in TY 2020, which meant the silt fence could not be installed. The agreed upon survey hours and turtle tracking was still completed. A report on all efforts will be submitted to NHESP in TY 2021 and a new timeline for silt fence installation and turtle clearance will be discussed.

In September and October 2020, AECOM completed a similar project for Tango Range including creating an approved CPMPP, completing surveys inside a wildlife barrier, obtaining approval from NHESP for construction to proceed, and completing construction monitoring during the turtle active season. The MAARNG contracted LEC Environmental Consultants, Inc. to do a similar effort for the gym expansion project in the spring of TY 2021. Natural Resources Office biologists have also been coordinating with utility projects on their efforts to protect Eastern Box Turtles and plan around rare species.

In-house turtle searching and telemetry efforts focused on tracking turtles from C-14 and around the MPMG. The majority of these turtles were equipped with transmitters in Fall 2019. Other turtles found in the area and in the areas surrounding Tango and Sierra Range (areas with future construction projects) were also outfitted with transmitters and tracked. At Juliet and Kilo ranges, the tarps covering the STAPP™ system form puddles, where turtles have been found in the past. These puddles were monitored for turtles, with several being found here. The Natural Resources Office also attempted to replicate this on the MPMG Range using black plastic and water filled from fire equipment. No turtles were captured using this method. Given knowledge of turtle use of the tarps at Juliet and Kilo ranges, a technician searched the work area daily during for the turtle active season during the STAPP™ system removal project.

As turtles were monitored, an increasing number of Dipteran larval infestations were observed and monitored. Two turtles were found dead and taken for necropsy at Tufts Wildlife Clinic. Six turtles with radio transmitters were taken to Tufts due to significant fly larvae infestations and concerns for their survival. Two of those will overwinter at Tufts while the rest were healthy enough to be released shortly after treatment. Natural Resources Office staff are coordinating with the State Herpetologist and the veterinarian at Tufts on this recently discovered threat to turtles on base.

During the summer, a turtle mortality was discovered on Echo Range in one of the firing lanes. It is assumed that the turtle fell in the firing lane and was unable to escape. Given the heat in the summer and lack of shade, Range Control conducted twice daily checks of the lanes to prevent another mortality event. During monitoring, one turtle was discovered on the range and relocated to the east. Range Control, with input from the Natural Resources Office, is creating ramps to install in each lane to provide a means of egress for turtles and preclude the need for monitoring during the turtle active season.



Photograph 3-2 A firing lane on Echo Range. Range Control, with input from the Natural Resources Office, will install ramps in the firing lanes as a means of turtle egress.

### 3.3.7 Lepidoptera

The creation of the MPMG, the associated fire control measures, and the required pine barrens management will increase the amount of fire on the landscape. Many of the Lepidoptera species on base are expected to greatly benefit from the reintroduction and increased frequency of fire. The monitoring component of the CMP requires long-term Lepidoptera surveys. The monitoring component needs to evaluate effects of the overall range development, the fire hazard reduction actions, and mitigation actions (short and long term) on the Lepidoptera community. Monitoring of moth and butterfly species will guide adaptive management for the use of fire (e.g., seasonality, intensity, return interval). The Natural Resources Office has contracted Western EcoSystems Technology Inc. to provide a robust analysis of sampling designs to make the most use of the monitoring data. The Natural Resources Office plans to implement the sampling design in TY 2021.

In TY 2019 and 2020 the Natural Resources Office collaborated with a PhD student from the UMass Boston Stevenson Lab in monitoring Lepidopteran diversity at Camp Edwards. The focus of the student's research is Lepidopteran diversity across urban/rural gradients, and the Training Area fits the rural category. While a general moth expert, the student also specializes in the Sphingidae, a declining group. Her studies have expanded our knowledge of Sphingid moths at Camp Edwards and has added to our list of moth species found at Camp Edwards. She introduced survey methods to the Natural Resources Office that directly resulted in the TY 2020 documentation of a state-listed species not previously found at Camp Edwards but



Photograph 3-3 A frosted elfin (*Callophrys irus*)

assumed to be present (*Hemaris gracilis*) and the rediscovery of a northern Training Area population of frosted elfin (*Callophrys irus*) thought to have been extirpated since last seen in 1994 (Photograph 3-3). Her work at Camp Edwards will continue in TY 2021.

### 3.3.8 Eastern Whip-poor-will

Prior to TY 2016, Whip-poor-will numbers shown in the table have included multiple surveys, and likely repeated counts. From TY 2016 onward, the number reported reflects the lowest number (between two observers) heard per site during a single round of surveys to remain conservative in reporting, while keeping detections over negative site records (sites are only considered negative records if surveyors mark paired zeroes).

Due to issues regarding the Covid-19 pandemic, surveys in TY 2020 were not paired, but performed by a single observer. The numbers reported in the table for TY 2020 are the sum of individuals heard by each observer, removing any results from points that were duplicated. Weather and conditions prevented TY 2020 surveys from adhering to Northeastern Nightjar Survey guidelines, and in most cases it took several nights to complete routes that are typically completed in a single night. Between May 13-15 and on May 20, 99 individual Whip-poor-wills were detected at 26 out of 32 sites.

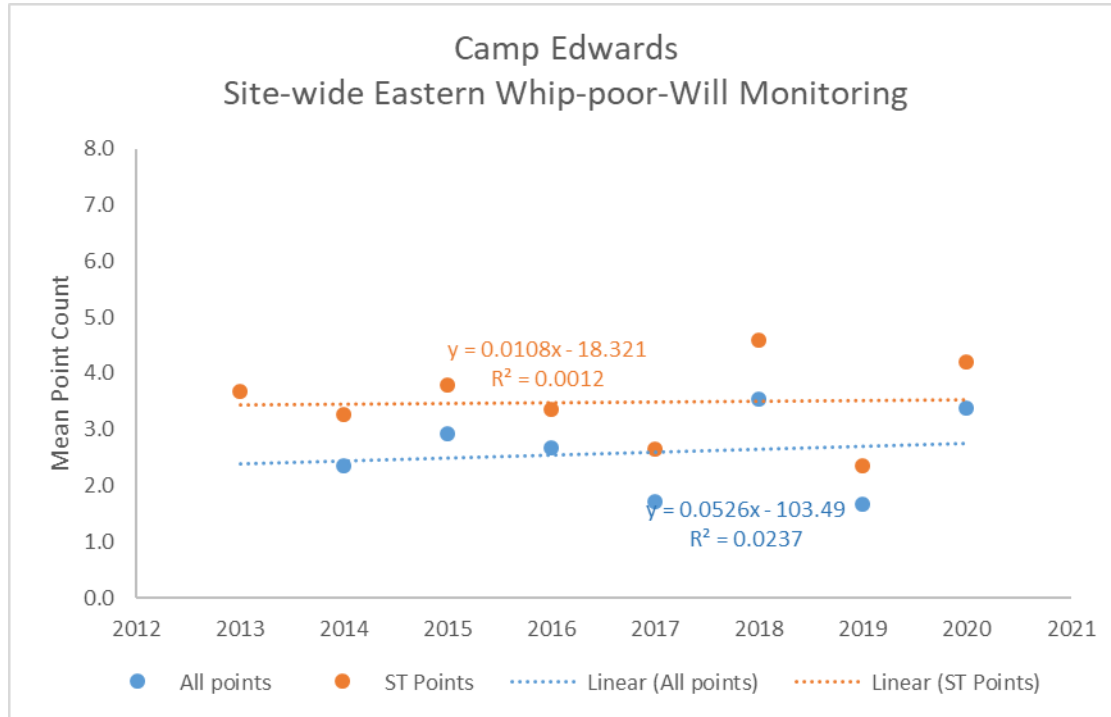
For the fourth year, Natural Resources staff assisted a joint research project led by Marja Bakermans (Worcester Polytechnic Institute) and Andrew Vitz (MassWildlife) on active netting of Whip-poor-wills at Camp Edwards for a migration study. No new GPS tags were deployed at Camp Edwards this year, but there was high recapture success collecting previously deployed dataloggers. Results will be reported separately by the researchers and referenced here when publicly available. MAARNG personnel support was significantly reduced this year due to pandemic concerns with a maximum of two staff assisting primary personnel. However, close coordination allowed for flexible collaboration and reaction to the pandemic challenges.

Annual implementation of the Northeastern Nightjar Survey, as mentioned above, facilitates the evaluation of population trends throughout Camp Edwards and the Training Area/Reserve using a standardized protocol implemented throughout the eastern United States. A subset of 10 points originally set by MassWildlife has been surveyed annually since 2013 and an average of over 34 sites has been surveyed along three routes starting in 2014 providing a site-wide assessment. The Eastern Whip-poor-will is likely a strong indicator of pine barrens habitat health and management condition given its sensitivity and decline throughout the region and close association with dense, but open woodland and shrubland habitat condition that is important to the vast majority of species of conservation concern in southeastern Massachusetts.

Given that the state assigned points target higher quality habitat than the more randomly assigned site-wide points, the state (ST) points have consistently higher mean count of birds per point. A mean count of Whip-poor-wills detected at each point is calculated for a year, throwing out survey nights that have inordinately low detections due to weather, lunar illumination, or other conditions. For population trend analysis the mean for all points within a year is compared across years. The 2014-2020 site-wide mean count of Whip-poor-wills is 2.6 with an insignificantly positive trend slope of 0.05. Likewise, the ST point set from 2013-2020 has a mean count of 3.5 Whip-poor-will per point and no significant trend (0.01 birds per point per year). Graph 3-4 presents the summary annual mean counts and trend lines.

The primary notable trend is the increasing interannual variation first seen with the very low counts in 2017, followed by new high totals in 2018, and continuing to alternate dramatically in 2019 and 2020. This is likely due to the very narrow definition of survey nights for the nightjar survey and calling behavior of whip-poor-wills being quite sensitive to conditions. For example, they reliably call quite actively during the dusk period and just after dark somewhat regardless of conditions, but then will only reliably continue calling with high levels of lunar illumination, relative warm temperatures, and overall calm and dry weather. Some years, like 2017 and 2019,

Graph 3-4 Camp Edwards Site-wide Eastern Whip-poor-will Monitoring



Graph 3-4: Annual results of Camp Edwards Whip-poor-will monitoring using the Northeastern Nightjar Survey protocol. The orange (ST) points are a subset of 10 points originally set by MassWildlife based on habitat associations and the blue points are the overall site-wide monitoring points (mean 34 per year).

have competing priorities including prescribed fire and supporting the whip-poor-will research project that limited available nights and led to attempting surveys under somewhat less favorable conditions. Other potential explanations include a response to management (e.g., prescribed burns) shifting birds around as they are temporarily displaced and/or recolonize areas previously less suitable – with either leading to lower counts at surveyed points – or stochastic dynamics related to regional declines starting to impact local populations. The observation that the restrictions and challenges presented by the ongoing pandemic in 2020 required added flexibility to be able to complete surveys is of particular interest for future surveys. Single observers (as opposed to paired) surveyed fewer points on a survey night taking advantage of the dusk activity period and ending when whip-poor-will activity ended. This more opportunistic structure will make the surveys more achievable and more standardized for survey window by avoiding nights with high early activity and little to no late activity.

However, focal research efforts and longer-term trends suggest that the overall population is healthy and response to management is positive or neutral.

### 3.4 SOIL CONSERVATION MANAGEMENT

All military and civilian uses and activities in the Training Area/Reserve during the year were reviewed by the Natural Resources Office to ensure that they were compatible with the limitations of the underlying soils. All users were instructed to report evidence of soil erosion to Range Control so that potential repairs to roads, bivouac areas and well pads could be identified in a timely manner. None of the existing unimproved roads in the Training Area/Reserve were made into improved roads as a result of IAGWSP remediation activities during the year. Additionally, any maintenance on unimproved roads during the year did not involve paving the roads. Repairs were made by the IAGWSP, coordinated with the EMC's Environmental Officer, on Wood Road, Barlow Road, and Turpentine Road consisting of graveling significantly degraded sections. IAGWSP coordinated closely with Natural Resources to avoid impacting Agassiz's clam shrimp and the programs are working together to

develop a road maintenance plan within the INRMP, coordinated with the towns and NHESP, to ensure provision of abundant clam shrimp habitat while maintaining an effective road network that supports training, remediation, natural resources management, and emergency response.

Three repaving and/or pavement repair projects were completed to stabilize degrading roads and remediate conditions leading to road widening or potential road failure. The IAGWSP, coordinating with the EMC’s Environmental Officer, repaved Turpentine Road from Herbert Road to Pocasset-Forestdale Road. An Army Engineer paving unit repaved Pocasset-Forestdale Road from Frank Perkins Road west to the Ammunition Supply Point and completed major pothole repair on Pocasset-Forestdale Road extending east to Greenway Road.

### 3.4.1 Erosion

The Integrated Training Area Management Program (ITAM) worked with Camp Edwards Facilities Engineering to conduct erosion management on established maneuver trails. No significant projects were conducted.

## 3.5 VEGETATION, HABITAT AND WILDLIFE MANAGEMENT

The Natural Resources Office manages for a diversity of natural communities, plants, and animals. This supports a sustainable military training site and high-quality habitat for rare species (Table 3-1) as well as common ones. Particular emphasis is on maintenance or expansion of earlier successional habitats (e.g., grasslands, shrublands, and young forests) due to the conservation value of these habitats and rapidity at which they are lost to trees or other influences. Mechanical restoration, prescribed fire, resource monitoring, invasive plant management and others are important tools used here. During TY 2020, two larger restoration projects were implemented along with several smaller, focal projects – all of which are discussed in much greater detail in Section 3.5.6. Table 3-2 provides an overview list of the projects. A whole-tree timber harvest restored the area surrounding BP-20 to historically shrub savannah conditions. One hardwood coppice management project recommended by MassWildlife was completed to support rare species mitigation goals as a phase 2 management at Wheelock Overlook. Four battle positions received basic vegetation management, and invasive plant management was continued after emphasis on planning and personnel training and licensing. No prescribed burn operations were conducted due to poor weather conditions and the onset of the Covid-19 pandemic. Additionally, six permits were maintained to continue wildlife and fire operations.

Table 3-2 Training Area Management Projects

Training Area	Acres Treated	Primary Objective	Treatment Method
Battle Position 24	1.3	Training site rehabilitation	Extracted and removed dense immature pitch pine monoculture
Battle Position 20	41	Training site rehabilitation	Whole tree harvest
Wheelock Overlook	40	Habitat management	Targeted herbicide application
BA-6 and BA-7	107	Fuel reduction	Targeted mastication of standing dead trees
Bivouacs and BPs	12	Training site maintenance	Rotary deck and forestry cutting head mowing

Efforts to collect habitat management information for trends analysis were initiated in 2013 and will be continued. Additionally, overall bird surveys were revised in 2013 to use static point-counts and transects through the Training Area to specifically provide long-term trend data over time and intentionally cover specific categories of training areas and habitats for evaluation of site use and impacts. As sufficient data has been collected and additional efforts are begun, those trends will be reported. With eight years of bird monitoring data utilizing the



standardized point counts, Natural Resources Office staff had initiated evaluating trends for focal species. However, much work is left before reporting results. Eastern Whip-poor-will data showing sitewide trends, including extensive habitat restoration efforts since 2013, are reported above. Completing bird survey trend analysis will be carried forward as a priority as it was included in the Conservation and Management Permit to evaluate impacts of large scale mitigation efforts (positive and/or negative) in the Cantonment area and the Training Area.

A significant administrative commitment to ecosystem management was realized in TY 2020 as the Natural Resources and ITAM Program was able to complete a long-term effort to hire two new full-time positions. The addition of a dedicated Wildland Fire Program Coordinator (August 2020) and Vegetation and Wetlands Conservation Biologist (July 2020) will significantly increase our ability to plan, implement, and monitor conservation actions within the Training Area/Reserve including active habitat management.

### 3.5.1 Vegetation Surveys

Limited vegetation survey efforts were conducted beyond targeted state-listed and Watch List plant surveys. However, an initial survey was developed and implemented to assess short- and long-term tree and habitat response to forest management activities (e.g., harvests). At this time there is not sufficient variation between harvest prescriptions as to provide an overview, but details will be added in future years. Typical vegetation surveys for New England cottontails are based on radiotelemetry locations. This year no rabbit trapping was performed, so vegetation surveys were not needed. Fire monitoring plots were not completed this year. Land navigation surveys are performed on an as needed basis and were completed in TY 2017.

### 3.5.2 Invasive and Nuisance Vegetation Management

Invasive plants are non-native species that have spread into natural, minimally managed, or disturbed plant systems in Massachusetts. They can cause economic or environmental harm by developing self-sustaining populations and becoming dominant and/or disruptive to those systems. As defined here, “species” includes all synonyms, subspecies, varieties, forms, and cultivars of that species unless proven otherwise by a process of scientific evaluation. Invasive species are primarily from the Massachusetts Invasive Plants Advisory Group (MIPAG) lists, but also include emerging invasive species as coordinated with partner agencies.

Nuisance species are more selectively or situationally defined and may include native plants under certain conditions. Several native species have displayed such aggressive establishment and regeneration that they require targeted management in order to preserve the training and preferred habitat value of some training venues. Although not exotic, these species, under certain conditions, can display the same dominant and disruptive characteristics normally associated with invasive species. Pitch pine in particular has historically taken advantage of neglected training sites to create impenetrably dense, overstocked pitch pine monocultures that provide little habitat value, produce unhealthy trees, present significant fire hazard, prevent training, and suppress all other vegetation. Other native, desirable species that may situationally present a nuisance condition from a habitat perspective include bayberry and sweetfern due to tendencies towards monoculture through chemical defenses. Exotic invasive plants are a management concern both in the Training Area and within the Cantonment area. Effective management of these species, primarily autumn olive (*Elaeagnus umbellata*), Oriental bittersweet (*Celastrus orbiculatus*), and shrub honeysuckles (*Lonicera spp.*), is both labor and cost intensive. Natural Resources-ITAM has two trained and licensed Massachusetts core pesticide applicators on staff. With this capability, Natural Resources-ITAM representatives carried out targeted, high-impact herbicide applications at several sites, in the Training Area/Reserve as well as the Cantonment area. These actions have likely prevented several new species from becoming established on base. ITAM also conducted hand pulling to remove spotted knapweed (*Centaureia stoebe*) from restored training sites on BP-1, Demo-2, and Wheelock Overlook, covering 7 acres.

The Natural Resources-ITAM Program field technician actively surveyed the Training and Cantonment areas for invasive species, expanding the invasive plant geodatabase. This is an ongoing project that is used to prioritize and record invasive plant control operations and will inform ongoing updates to our integrated pest management plan. Field crews maintained updated knowledge of, and monitored for MIPAG Early Detection Priority species, including mile-a-minute vine (*Persicaria perfoliata*), as there are several populations at nearby Crane Wildlife Management Area. Field personnel also continued mapping, monitoring, and treating populations of *Calamagrostis epigejos* (bushgrass), an invasive grass identified on base in 2016.

In TY 2020 the Natural Resources Office contracted a targeted invasives control project in the northern Training Area, totaling roughly 5 acres of spot-spraying and cut-paint methods. The areas chosen were some of the most impacted by invasives, as well as adjacent to future disturbance sites where the invasive plants would spread rapidly.

The Natural Resources Office is involved in a multi-year effort to stop the spread of black swallow-wort (*Cynanchum louiseae*) from a single one-acre location in the training area. This would have been the fifth year of treatment, but in-house herbicide treatment was not performed in TY 2020 due to Covid-19-related issues. This species is highly invasive in grasslands as well as forest, and can interrupt the life cycle of monarch butterflies, so keeping it from spreading in the Training Area/Reserve is a high priority. Spot-treatment will continue in TY 2021 in order to prevent re-establishment. Elsewhere in the training area, other roadside invasive species were treated with cut-and-paint methods in areas deemed high-risk for off-road spread.

Grassy or disturbed sites with exposed sand, particularly in groundwater treatment areas, bivouac areas, dig sites, or along roadsides, are often rapidly colonized by pitch pine. This can often lead to the exclusion of other species and a monoculture condition that degrades habitat value and training while increasing fire hazard. ITAM contracted mechanical removal of regenerating pitch pine in one battle position with implementation in early TY 2020, followed up by reseeding with a native grass mix.

Many rare plant sites are being encroached by invasive species or overshadowed by native species. In TY 2017, the Natural Resources Office contracted Wilkinson Ecological Design to complete a Vegetation Management Plan for invasive species treatment in rare plant sites and complete the associated MESA permitting. In 2017, Wilkinson completed the site visits and prepared a Vegetation Management Plan, which has since been approved by NHESP. In TY 2018, Wilkinson performed chemical treatment of all invasive plants found at rare plant sites. Natural Resources Office staff performed follow-up treatments where necessary and monitored the sites in 2019 and 2020. No major invasive species problems remain at sites where rare plants still exist, but several of the bowls where rare species have disappeared over the years still have high numbers of invasive shrubs and small trees. The Natural Resources-ITAM Office plans to remedy this through targeted tree removal in order to return frost bottom effects to these bowls.

### 3.5.3 Bird Surveys

This is the eighth year that point counts were conducted along a bird survey route through the Training Area to determine differences in bird activity in a variety of military training areas and habitat types. The routes consisted of 65 sites that were each visited three times to reduce the likelihood of species being undetected. The calculation of detection probabilities for species of survey concern were not calculated in TY 2020 due to other priorities. Additionally, with the completion of eight years, we will start evaluating trend data as able, prioritizing species of significant conservation interest.

Whip-poor-wills (*Antrostomus vociferus*) and other nightjars were surveyed May 13-15 and May 20 at 32 sites (three routes). In TY 2020, Whip-poor-wills were detected at 26 out of 32 sites. Conditions were less than desirable for nightjar surveys, but Natural Resources Office staff documented 99 Whip-poor-wills. No other

nightjars were heard in TY 2020 other than a single flyover Common Nighthawk in May. Trend data and more detailed survey and research discussion for Eastern Whip-poor-wills is included above in Section 3.3.8.

For the sixth year, a point-count methodology was implemented in continuation of a state-wide survey of grassland birds coordinated with the DFW and Mass Audubon. This method is intended to be continued to evaluate trends in grassland bird populations and response to management. State-listed species were reported to NHESP (Table 3-1), including Grasshopper Sparrows (*Ammodramus savannarum*) and Upland Sandpipers (*Bartramia longicauda*). The Eastern Meadowlark (*Sturnella magna*) was also listed as a Species of Special Concern in TY 2020, and will now be reported in Table 3-1.

In TY 2019 and 2020, several points were added to the bird survey routes in order to survey the future site of the MPMG and the Impact Area, along with other points scattered throughout the training area increasing the total number of annual survey points from 39 to 79. This allowed the Natural Resources Office to assess whether any species of concern used areas of interest, but also will facilitate more holistic long-term species trend analysis. The Natural Resources Office will evaluate trends along with the other data to investigate effects of mitigation efforts surrounding range expansion and development areas.

Perhaps the most notable TY 2020 avian observation was Blue-winged Warblers at four locations. This is a new species for the Camp Edwards surveys as showed abundant breeding activity, though no nest searches were performed. Twenty-three Species of Greatest Conservation Need (SGCN), as categorized by the State Wildlife Action Plan, were observed during breeding bird point counts (See Table 3-3). Three species were not included due to the birds being flyovers not using habitat (Black-backed Gull, Common Loon, Herring Gull). Additionally, the Blackpoll Warbler, Nashville Warbler, and Olive-sided Flycatcher are migrants not typically detected despite TY 2020 observations. Additional SGCN are frequently observed at Camp Edwards, but are not readily detected through diurnal point counts, including American Woodcock (occasional focal surveys conducted) and Eastern Whip-poor-will (discussed above). Many of the SGCN reported below are notable in their degree of occupancy (survey sites with detection) at Camp Edwards and several show significantly positive response to habitat management, especially including Brown Thrasher and Field Sparrow, but somewhat surprisingly also species such as Scarlet Tanager. The overall proportion of occupied survey sites is shown in Table 3-3, but some species are more distinctly associated with either the Training Area (TA) or Cantonment grasslands (GLU) and are reported separately. A total of 65 training sites and 14 grassland sites were surveyed in TY 2020.

Species	TY20 Survey Points with Detections	Proportion of Sites (total n=79)	Proportion of Subset (GLU or TA)
American Kestrel	4	0.051	0.286 (GLU)
Black-and-white Warbler	39	0.494	0.569 (TA)
Black-billed Cuckoo	15	0.190	
Blackpoll Warbler*	3	0.038	
Blue-winged Warbler	4	0.051	
Brown Thrasher	56	0.709	
Chimney Swift	3	0.038	
Eastern Meadowlark	11	0.139	0.786 (GLU)
Eastern Towhee	78	0.987	
Field Sparrow	38	0.481	
Grasshopper Sparrow	12	0.152	0.857 (GLU)

TABLE 3-3 BREEDING BIRD POINT COUNTS, cont'd

Species	TY20 Survey Points with Detections	Proportion of Sites (total n=79)	Proportion of Subset (GLU or TA)
Horned Lark	1	0.013	0.071 (GLU)
Nashville Warbler*	4	0.051	
Olive-sided Flycatcher*	1	0.013	
Prairie Warbler	46	0.582	
Purple Finch	15	0.190	
Ruffed Grouse	65	0.823	0.984 (TA)
Scarlet Tanager	62	0.785	0.908 (TA)
Upland Sandpiper	9	0.114	0.571 (GLU)

\*migrant, non-breeder

### 3.5.4 Deer Hunt

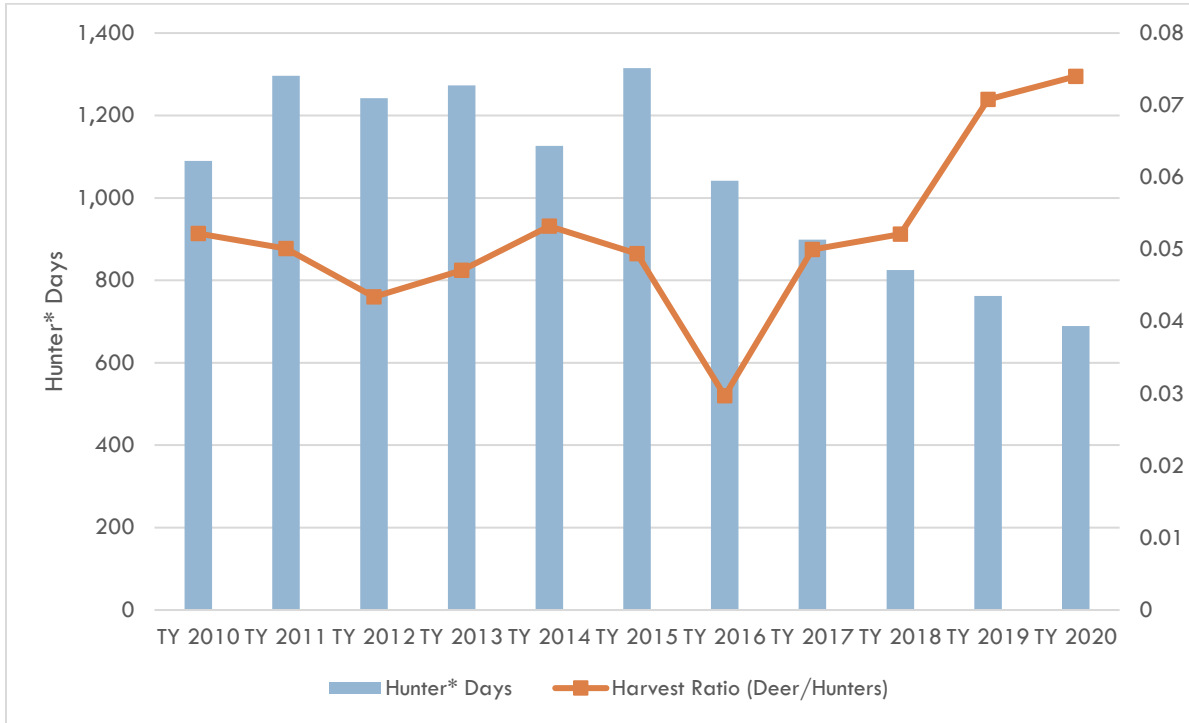
There was a deer hunting season in the Training Area/Reserve during TY 2020 in which 51 deer were taken during 689 hunter days. The Natural Resources Program supports a hunt sufficient to maintain a harvest level that is compatible with a healthy deer herd and healthy ecosystem. MAARNG and DFW generally feel that the recent average of 60 deer per year meets the overall objective.

The Natural Resources Program continues to provide a variety of hunting opportunities to best engage the hunting community and encourage new hunters through events such as the youth day, archery, and military sportsmen hunt. Hunting during TY 2020 included a three-day hunt for paraplegic sportsmen (October 31-November 2, 2019), a one-day youth hunt (September 28, 2019), a two-day opening for archery scouting (November 18-19, 2019), a three-day archery season (November 21-23, 2019), a two-day hunt for military sportsmen (December 2-3, 2019), a six-day shotgun season (December 9-14, 2019), and a two-day primitive (muzzleloader) season (December 19-20, 2019). Graph 3-5 shows the hunter days and deer harvest ratio since TY 2011.

During TY 2020, the Natural Resources Office and the Division of Fisheries and Wildlife conducted hunter surveys to determine hunter preferences, to better respond to queries and requests from hunters, and to determine the success of our advertising efforts. Of the 61 respondents, thirteen (21%) were new hunters to the site and 5 (8%) were hunters that had recently come back to hunt the site. Of the new hunters, more than half had found out about the hunt from other hunters, 31% had found out from hunt clubs, and two (16%) had found out from the DFW website. Roughly 27 percent of hunters use the no deer driving areas. For context, the no deer driving area constitutes roughly 10-15 percent of available hunting area each year. Of the hunters that participate during the shotgun season, 39% conduct deer drives with more than 5 people, and 16% conduct deer drives with less than 5 people. There was some overlap with these two groups with a resulting 45% of respondents participating in deer driving. This means the majority of the shotgun hunters that participated in the survey do not participate in deer drives. The hunter surveys will not be conducted in TY 2021 due to safety protocols to prevent the spread of coronavirus.

In the spring and summer, the core planning team for the hunt met several times to determine appropriate safety protocols to implement at check in and triggers for canceling the hunt. The team decided that an appropriate guide would be the state's phases corresponding to the risk level of the coronavirus pandemic. The team decided that the hunt best fit as a Phase 3 activity given the state classification system. The hunt will proceed if the state is in Phase 3, but not in lower phases. This information as well as detailed safety procedures were advertised on the Division of Fish and Wildlife website. The Southeast District Manager also distributed information to hunters as well.

Graph 3-5 Camp Edwards Deer Harvest



Note: Hunter Days is the sum of the number of hunters each day for each day of the annual hunt.

In TY 2020, the advertising efforts made for the hunt drew comments from the public on social media about the safety of deer meat consumption due to past contamination on the base. The Natural Resources Office quickly coordinated with IAGWSP, the EMC’s Environmental Officer, the Southeast District Manager, and scientists at MassDEP. Several past risk assessments were consulted and IAGWSP provided a message for potential hunters: “The risk of deer being exposed to explosives is extremely low. Explosives have not been detected in surface water on Camp Edwards. Areas with contaminated soil historically were a very small percentage of the overall base acreage. Subsequently, all contaminated soil in these areas has been cleaned up to meet Massachusetts’ strictest standards. Therefore, uptake of significant levels of explosives into plants is unlikely.”

To further formalize a response to such concerns, the Natural Resources Office met with the EMC’s Environmental Officer, the IAGWSP, and a scientist from MassDEP about the creation of a white paper response. The Natural Resources Office has reached out to the two groundwater cleanup offices on base to garner their expertise for a brief overview of the knowledge given past sampling of risk assessments relevant to this issue.

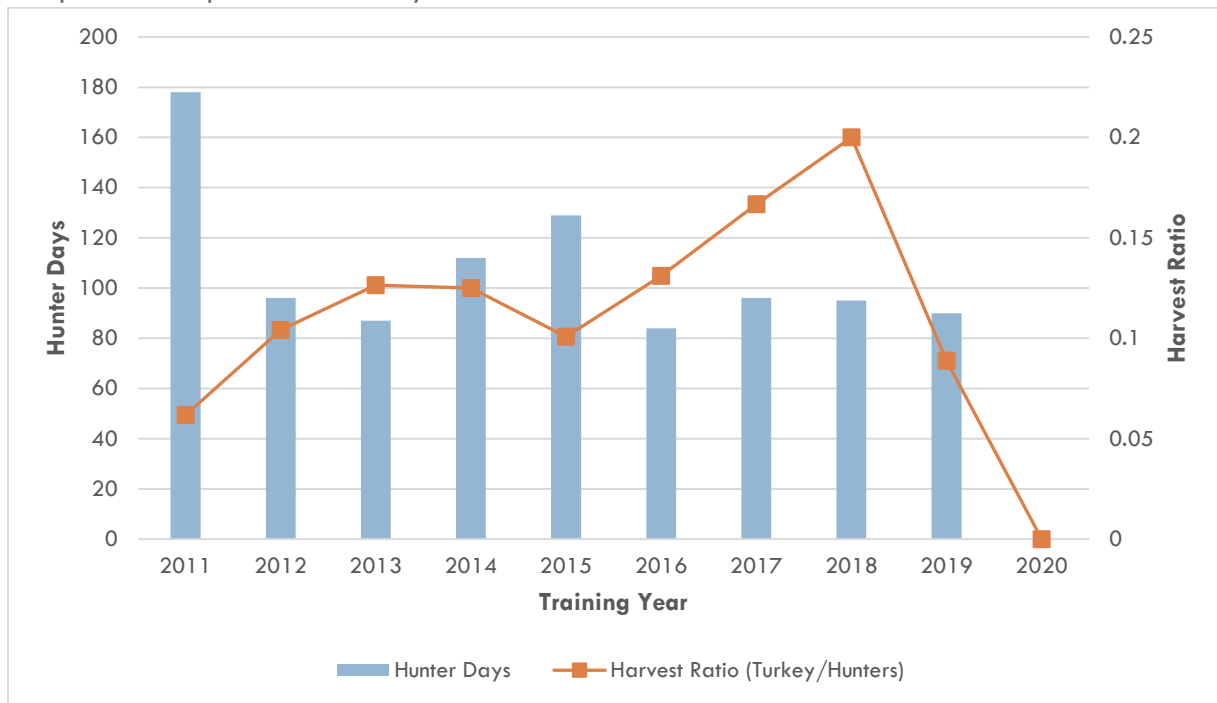
The goal of the hunt program is to provide recreational opportunities to the public and military and to harvest deer for the health of the herd and for ecosystem management. Deer harvests on base have been close to the 60 deer per year goal. Casual observations of browse on site do not indicate excessive browsing, except on specific species. These species are being preferentially browsed and are often state-listed plants. The Natural Resources Office has begun efforts to exclude deer from sites where this species-specific browse has been observed. The Natural Resources Office, Range Control, and the Southeast District of DFW have continued to make as many days and acres available to hunting as is possible given safety concerns and staff resources. Efforts to advertise the hunt were also aimed at increasing harvest as well as recreational use of the site.

### 3.5.5 Wild Turkey Hunt

Due to the statewide shutdown for coronavirus in the spring, the turkey hunt was canceled in TY 2020. This decision was made to protect the health and safety of the hunting community and the personnel engaged in the

hunt. This information was communicated by DFW to the hunting community in several ways: advertisement on their website, social media pages, and information sent directly to the sporting community. Graph 3-6 provides information on the wild turkey hunts conducted in the spring since TY 2011.

Graph 3-6 Camp Edwards Turkey Harvest



Note: Hunter Days is the sum of the number of hunters each day for each day of the annual hunt. In TY 2020, the turkey hunt was canceled due to the statewide shutdown for the Covid-19 pandemic.

### 3.5.6 Restoration Activities

The Natural Resources/ITAM Program completed significant restoration work on four training sites and habitat patches throughout the base. These projects were conducted in Battle Position (BP) 24, BP-20, Wheelock Overlook, and Training Areas BA-6 and BA-7.

#### 3.5.6.1 BP-24 Restoration

Funded through Training Area management funds and devised in accordance with military requests to develop an air assault-suitable training site adjacent to Wheelock Overlook Observation Point, this site was chosen based on historic disturbance, lack of habitat value (prior to this project), and proximity to the trail network and other training assets.

A contractor was hired to remove 1.3 acres of impenetrably dense pitch pine regeneration. The woody material was removed from the base and the site was subsequently rough-graded and seeded with regionally appropriate warm and cool-season grasses and legumes.

#### 3.5.6.2 BP-20 Timber Harvest

Funded through Training Area management funds and devised in accordance with military requests to develop a large training focus in the northwest maneuver box (suitable objective for a Battalion-level exercise), this site was chosen based on desirable topography, road access and proximity to BPs-12, 14, and 16.

A contractor was hired to conduct a selective timber harvest on 41 acres, preserving larger canopy trees >8” DBH (diameter at breast height) while heavily thinning the midstory and understory. The prescription was determined

by consultation with a forester with Northeast Forest and Fire Management, LLC. The prescription was significantly informed by lessons learned from previous harvests on the base. It left more standing trees and reduced the cut rate along steep slopes, providing benefits for site stability and training value. For example, our Observation Point 9 and 10 harvest in 2017 prescribed leaving ~20 trees per acre, whereas this project retained 114 trees per acre. In total, 38 acres were harvested at the full prescription while 3 acres were harvested at a reduced rate for slope preservation and to retain cover and concealment. The project has already met military objectives, drawing multiple units to a previously underused part of the training area.

Based on the response to earlier harvests, the overstory thinning accomplished by this site is expected to facilitate dramatic regeneration of the shrubby understory critical to many of our threatened and rare species. All woody material resulting from the harvest was removed from the base, meeting our desired conditions for fuel management, reducing the potential for dangerous fire behavior in an otherwise under-managed part of the training area.

The project was programmed for winter months to meet best management practices for minimizing risk to Eastern Box Turtles while reducing compaction caused by forestry equipment.



Photograph 3-4 BP-20

### 3.5.6.3 Wheelock Overlook Vegetation Management

Hardwood coppice regeneration (i.e., oak tree stump sprouting) has exceeded expectations on previously harvested sites on the base. Compared to understory and shrubby regeneration, this coppice regrowth is so dense and productive that it requires management before the rest of the site is ready for standard management (e.g., prescribed fire), jeopardizing the benefits sought in the original management objectives. Overshading by dense canopy is one of the major causes of decline for many state-listed plants and animals at Camp Edwards and the density of tree oak resprouting can facilitate natural community transitions at the expense of biodiversity. Failure to address tree oak coppicing following initial restoration management could compromise the investment and conservation value of the project. The current density of trees is primarily due to land use history evidenced by

even-aged stands of trees with poor health characteristics and a fundamental objective of the restoration projects is to reduce tree density and canopy closure for ecosystem health.

The program consulted with professionals in the Division of Fisheries and Wildlife, seeking successful best management practices from their harvests. In accordance with their advice, the program conducted selective herbicide spraying on regenerating coppices on 40 acres of the Wheelock Overlook timber harvest, conducted in 2019. The spraying was conducted by a licensed professional, using a utility vehicle with an herbicide tank and spray wand. The contractor was instructed to spray 75% of regenerating coppices, leaving the remainder to regenerate naturally. It is our hope that this will provide additional age class diversity as the site develops in coming years.

The contractors were directed to use a product with the active ingredient Triclopyr, which has a history of use on the base. The contractors applied the product to each sprout individually; there was no boom or mist spraying. The contractors were also directed to consider weather conditions and spray pattern to minimize impacts on the surrounding shrub layer. A total of 155 pounds of active ingredient were used on the site, distributed across 40 acres.

Effective conservation management requires focused use of multiple tools to address combined impacts of long-term land use and neglect. It also requires planning and maintenance to meet long-term ecosystem goals. Interagency partnerships, knowledge sharing, and collaboration are critical to success as are developing integrative methods and treatments that can reduce impacts through targeted application. The Wheelock Overlook restoration area is part of the mitigation for the MPMG and overall JBCC mitigation bank discussed in more detail below.

#### 3.5.6.4 BA-6, BA-7 Snag Mowing

As a result of intense fire, there was a large number of standing dead trees (snags) in training areas BA-6 and BA-7. The trees had decayed to the point where they presented an unacceptable injury risk for troops training and were such a smoke hazard that they prevented further fire management.

Following consultation with a licensed forester and burn boss, the program contracted a forestry firm to enter the training areas with an excavator-mounted forestry mulching head to push over and break up the snags. This was a highly targeted operation intended to cause little to no impact on either the understory or live trees. The prescription called for leaving one or two snags per acre throughout the project area for conservation value while removing all others to facilitate continued habitat restoration and soldier training.

The first iteration of this project was conducted on 107 acres in BA-6 and BA-7 in February to March 2020, intended in part to be a proof of concept. The results met all expectations and were so successful that the program contracted an identical treatment of a further 157 acres in BA-7, to be conducted in December 2020. The project was programmed for winter months to meet best management practices for minimizing risk to Eastern Box Turtles while reducing compaction caused by forestry equipment. This project typifies the program's focus on setting the conditions for long-term maintenance of our management projects.

#### 3.5.6.5 Pending Projects

The following two projects were conceived and funded in TY 2020, but are scheduled for execution in TY 2021.

**Nuclear, Biological, Chemical (NBC) Mastication:** This project was devised in accordance with military requests to increase tactical training options at the NBC site in Training Area A-4. This site is a popular training venue with a variety of structural training aides and is conveniently located near major roads. The woods surrounding the site had an increasingly overstocked understory and midstory, occluding lines of sight and hindering maneuver. The area was previously managed with prescribed fire in May 2004, leading to significant habitat



benefit, much of which has been lost due to aggressive oak coppice growth resulting from top killing over dense oak trees. Tree slices, taken from a downed pitch pine within the project area in 2019, provide anecdotal evidence of this habitat shift. This 137-year-old tree showed a remarkable increase in growth rate following the 2004 prescribed fire, but gradually slowed as high-density oaks began to compete for resources.

This project involves masticating (mechanically mowing/mulching) trees  $\leq 6$ " DBH in 42 acres surrounding the current perimeter of the site. All material resulting from this project is to be left on the ground for consumption by prescribed fire. The project will not impact mature trees and will open the midstory to permit vision into and out of the site for perimeter defense training. The understory management will also allow dismounted maneuver around the site, permitting infiltration training. All of this will also restore habitat conditions more suitable for species such as the Eastern Whip-poor-will and others of conservation concern.

BA-7 Snag Mowing continued: Following a successful pilot project in December 2019, we programmed another snag mowing contract in Training Area BA-7, to continue removing hazardous snag trees in a further 157 acres.

Like the original 2019 contract, this project will involve pushing over and breaking up standing dead trees that are hazards for smoke management and troop injuries. This project is not wholesale mowing of the entire site. It is a highly targeted approach to remove decaying dead trees to allow reopening Training Area BA-7 for prescribed fire management and troop maneuver. Approximately one to two snags per acre will remain for habitat value.

#### 3.5.6.6 In-House Efforts

Natural Resources and ITAM staff continue to conduct in-house maintenance of bivouacs, battle positions, maneuver trails, and helicopter landing zones. Staff conducted mowing to improve bivouac and maneuver potential in Training Area BA-6, BPs 1, 27, and 28. Additional mowing reopened helicopter landing zones Pinnacle and Deep Bottom Pond. Staff hand-pulled invasive plants encroaching on BP-1, Wheelock Overlook, and Demo-2. Finally, a section of maneuver trail and drainage was repaired at BP-20.

## 3.6 FIRE MANAGEMENT

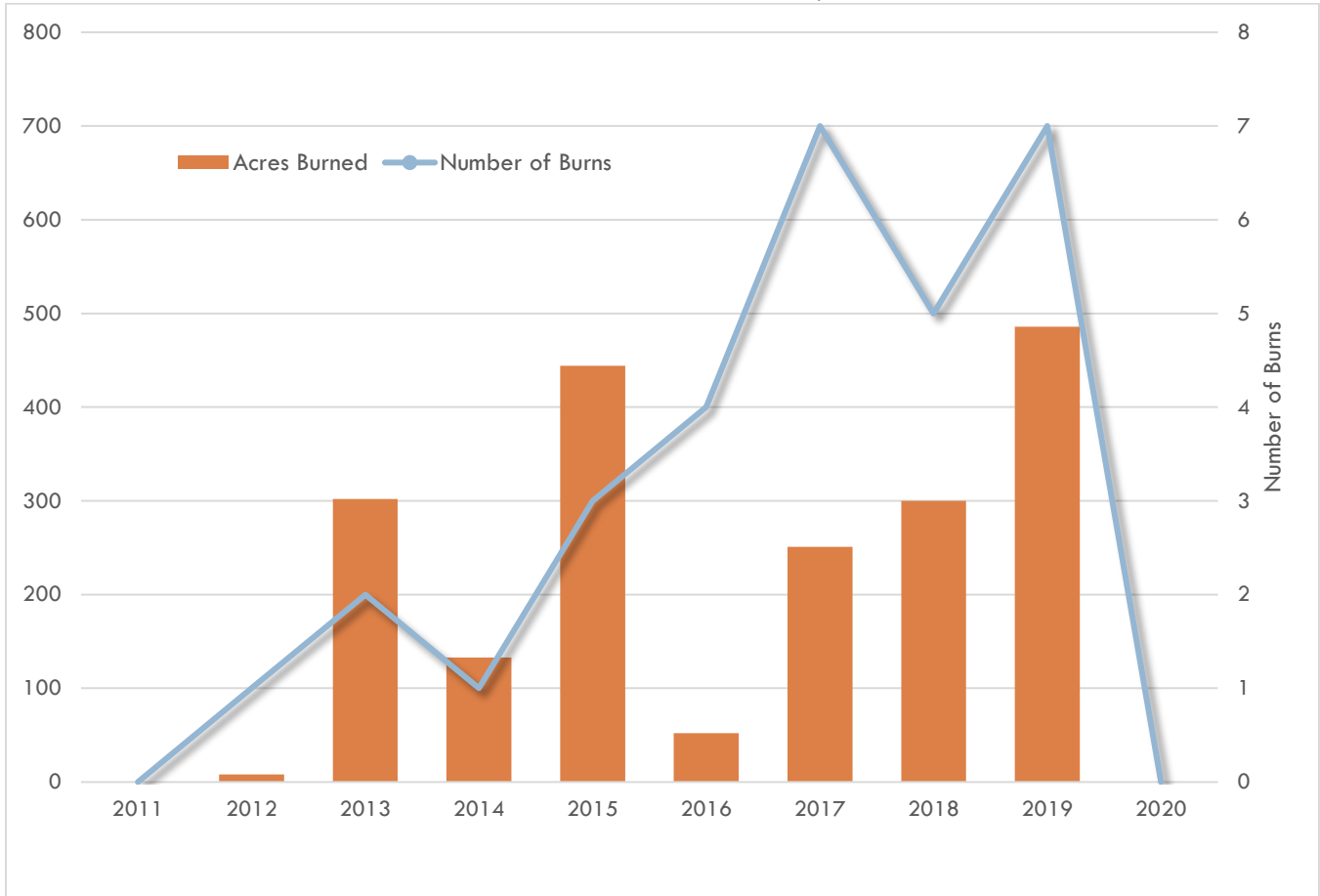
### 3.6.1 Prescribed Burn Program

The Natural Resources Office utilizes a prescribed burn program to manage habitat, reduce fuel loads and help prevent wildfires. The program is outlined in the Camp Edwards Fire Management Plan which is available on the E&RC's website: <https://www.massnationalguard.org/ERC/publications.htm>. The Camp Edwards smoke management permit (#4F02008) was renewed November 4, 2020 and is valid through December 31, 2022.

No prescribed burning was conducted within the Training Area/Reserve in TY 2020. The fall weather conditions of 2019 were not conducive to prescribed burning on site. The Covid-19 pandemic began just before the 2020 spring burn season and precluded any burn operations. This was a combination of concerns for personnel on burns (e.g., combining firefighters on engines and other teams) and smoke management during a respiratory illness outbreak. The latter concern was more due to appearances and public perception as typical smoke management would avoid negative impacts but was a prohibitive concern.

The ten-year prescribed fire accomplishment within the Training Area/Reserve is shown in Graph 3-7. Prescribed fire goals for TY 2021 are again to have at least eight operational days and burn approximately 600 acres or more of pine barrens (550+ acres) and grassland habitat (40-60 acres). This is a good balance of objectives to meet primary habitat and training lands management objectives while maintaining overall programmatic functions. Significant emphasis has been placed on burning units in the Impact Area buffer and immediately outside this buffer zone. This serves to maximize the mutual benefits and objectives of every operation – improving and maintaining pine barrens habitat, reducing hazardous fuel loading and wildfire potential, and improving training

Graph 3-7 Prescribed Fire Accomplishment within the Training Area/Reserve



Note: Training Year acreage is graphed on the left and the number of burns is graphed on the right axis. Grassland burns are excluded. In TY 2020, no prescribed burns were conducted due to weather conditions in the fall and the Covid-19 pandemic in the spring.

lands for soldiers. The primary limiting factor for wildland fire has recently been weather/climate with more extreme fluctuations in conditions (e.g., extended drought broken by extreme rain events) and more frequently shifting weather conditions – particularly with respect to wind and precipitation. Shifting weather forecasts led to multiple instances within TY 2018 of planning and notifying of burn operations with favorable weather forecast, followed by cancellation due to unsuitable conditions developing.

Wildland fire efforts for TY 2020 were focused on building the wildland fire program and planning efforts for future years. The most significant success was hiring a dedicated Wildland Fire Program Coordinator (WFPC), which is a new, full-time position within the Natural Resource-ITAM Program, jointly funded by Conservation and Facilities. The new WFPC started in August 2020 and has been working on long-term planning for the program, including updating the Integrated Wildland Fire Management Plan. Additionally, a firebreak assessment was contracted and completed by Northeast Forest and Fire Management, LLC that incorporated on-site vegetation and infrastructure assessment and state of the art wildfire computer modeling to develop recommendations. The assessment provides spatially explicit and data driven recommendations for fuels management (e.g., understory mowing, development of shaded fuel breaks) and firebreak improvements to support the active training within the Training Area/Reserve, including current and future operations (e.g., MPMG range use).

### 3.6.2 Fire Management Training

Wildland fire training remains a critical component of natural resources management and interagency partnerships. The Natural Resources office contracted Northeast Forest and Fire Management, LLC, to assist in again hosting a fall fire training event for partner agencies in November 2019. Based on much feedback from partner agencies and our own needs, Northeast Forest and Fire Management developed and coordinated an advanced course of RX-410, Smoke Management Techniques. As this is a complex course to host, the usual fall mini-academy was not offered. An exceptional instructor cadre for the course represented multiple regions of the US Forest Service, Pennsylvania Game Commission, US EPA, and Northeast Forest and Fire Management. Thirty-one students took the course (free of charge) representing 11 different states and 14 different agencies and organizations.

No wildland fire training was completed during Spring 2020 and no Fall fire academy was planned or hosted during 2020 due to the Covid-19 pandemic. Hopefully, a return to critical wildland fire training will occur in Spring 2021.

## 3.7 PEST MANAGEMENT

During TY 2020, Natural Resources and ITAM contracted precisely targeted herbicide spraying of oak coppice regeneration at Wheelock Overlook. Forty acres were treated with Alligare Triclopyr 3 (Triclopyr 3,5,6). In total, 155 pounds of active ingredient (PAI) were used over the 40 acres. The application was precise, targeting individual clumps and did not involve boom, mist, or aerial spraying (see section 3.5.6 for details). As described under invasive species management, above, the Natural Resources Office also contracted a targeted invasive plant control project totaling roughly 5 acres of spot-spraying and cut-paint methods primarily in training area C15. The areas chosen were some of the most impacted by invasive plants and a total of 17.0 PAI of Ranger Pro Glyphosate and 8.0 PAI Alligare Triclopyr 4 (Triclopyr 3,5,6) were applied to vegetation. Natural Resources-ITAM also used hand pulling to remove spotted knapweed (*Centaurea stoebe*) from restored training sites on BP-1, Demo-2, and Wheelock Overlook, covering 7 acres.

## 3.8 AIR QUALITY MANAGEMENT

### 3.8.1 Air Quality Permits

Potential air emissions from stationary sources at Camp Edwards are below the established federal and state thresholds for the designated primary air pollutants (carbon monoxide, nitrogen oxide, particulate matter, sulfur dioxide, and volatile organic compounds); therefore, Camp Edwards does not require an air quality control permit for stationary source emissions under the provisions of the Clean Air Act (CAA) or to measure and report actual emissions from its stationary sources.

The prescribed burn program requires an air quality control permit. The MassDEP Southeast Regional Office renewed the Camp Edwards smoke management and prescribed burn permit (#4F02008) on November 4, 2020. The permit is valid through December 31, 2022.

### 3.8.2 Air Quality Reports

310 CMR (Code of Massachusetts Regulations) 7.12(2)(b) requires that any person having control of a fuel burning facility or facilities with a maximum energy input capacity of 10,000,000 Btu/hr of natural gas report certain information to MassDEP once every three years. Because of the number of facilities at Camp Edwards, the MAARNG is required to submit a Source Registration/Emissions Statement (SR/ES) report for Camp Edwards every three years on or before the date established by the MassDEP. The Camp Edwards SR/ES report

was submitted December 13, 2019 using calendar year 2017 data; reporting due dates were delayed due to MassDEP's eFile system.

The only MAARNG stationary source emissions locations in the Training Area/Reserve on Camp Edwards are Range Control and the Ammunition Supply Point.

Biennial smoke management reports administered by MassDEP require reporting and renewal submission at the end of each two-year period. The Camp Edwards smoke management permit (#4F02008) was renewed November 4, 2020 and is valid through December 31, 2022. The biennial smoke management report was submitted May 15, 2019. Information on prescribed burn activities within the Training Area/Reserve for TY 2020 is provided in Section 3.6.

### 3.9 NOISE MANAGEMENT

The MAARNG published a Statewide Operational Noise Management Plan in December 2007 that provides a strategy for noise management at MAARNG facilities, including Camp Edwards. The plan includes a description of noise environments, including levels from small arms and aircraft training activities. Elements of the plan include education, complaint management, possible noise and vibration mitigation, noise abatement procedures, and land use management. Specific procedures are provided for noise complaints and protocols are provided for providing public notification for detonation of unexploded ordnance in place and for other unusual noise events.

### 3.10 STORMWATER MANAGEMENT

There were no new stormwater runoff increases in the Training Area/Reserve due to military training activities, and no new stormwater discharges from military training activities were made directly into wetland resource areas in the Training Area/Reserve.

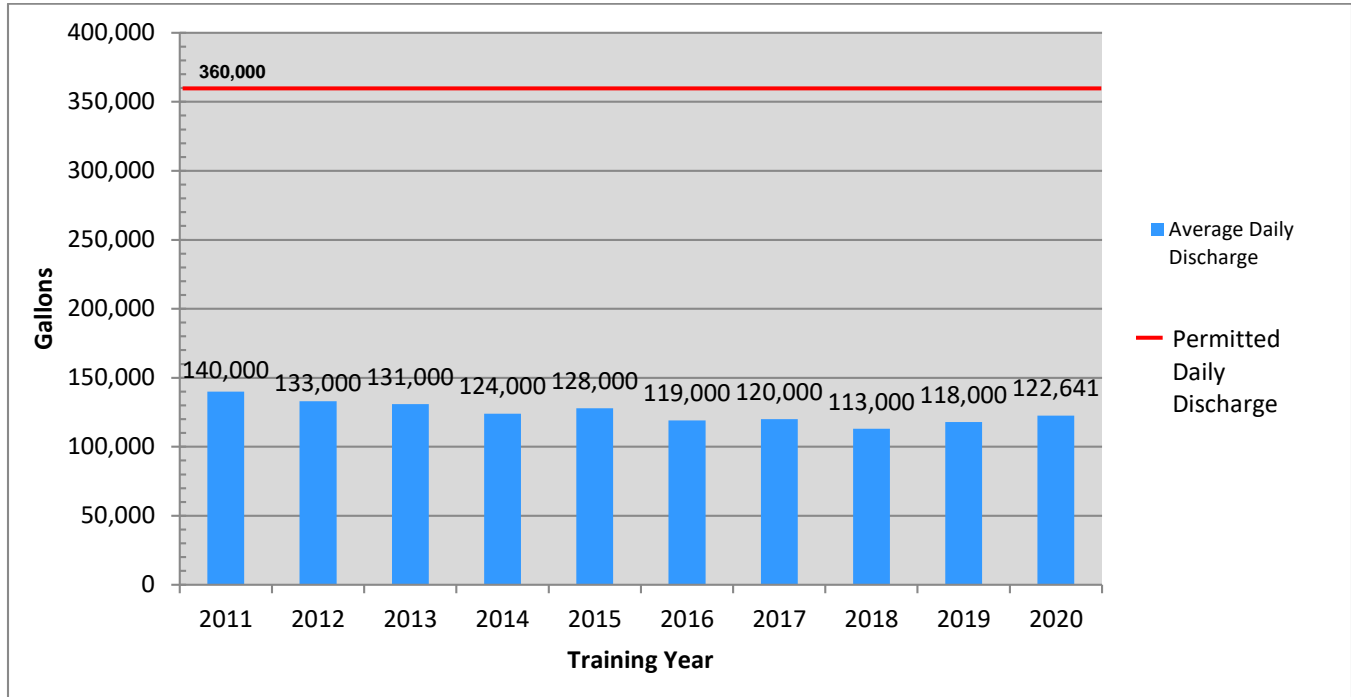
### 3.11 WASTEWATER MANAGEMENT

Depending on the location of facilities, wastewater and sewage from MAARNG training activities in the Training Area/Reserve was pumped from portable toilet facilities and hauled off base for disposal at licensed disposal facilities or discharged through the normal operation of existing septic systems (1,000 gallon) at Range Control and the Ammunition Supply Point that are regulated by MassDEP. (Note: There is a septic system at the former Otis Fish & Game Club located on Camp Edwards in the southwestern corner of the Training Area/Reserve; it is not in use at this time because the building is out of service. There are septic systems within the boundary of the Training Area/Reserve, at Cape Cod AFS and the USCG Communications Station, that are not subject to Chapter 47 of the Acts of 2002 and the EPSs, but which are regulated by MassDEP.)

#### 3.11.1 Wastewater Treatment Plant Discharge

The Otis ANGB wastewater treatment plant operated within the discharge volume limits of its wastewater discharge permit during TY 2020. The plant discharged 44,763,780 gallons of sewage into the sand filtration beds in the Training Area/Reserve; a daily average of 122,641 gallons versus its permitted twelve-month moving average flow of 360,000 gallons. Graph 3-8 shows the daily average pumping rate of the Otis system since TY 2011.

Graph 3-8 Wastewater Treatment Plant Discharge



### 3.12 SOLID WASTE MANAGEMENT

The Camp Edwards Ammunition Supply Point did not turn in any ammunition casings for recycling to the Defense Logistics Agency office in Groton, Connecticut, during TY 2020. Casings are turned in periodically when economical.

The MAARNG published a Statewide Integrated Solid Waste Management Plan for all of its Army National Guard facilities in August 2010. The plan establishes MAARNG policy, responsibilities, goals, and objectives for compliance with statutory requirements for waste minimization, recycling, and solid waste disposal. Chapter 8 of the plan includes solid waste management procedures specific to Camp Edwards, as well as identifying potential future solid waste management alternatives.

### 3.13 HAZARDOUS MATERIALS MANAGEMENT

Camp Edwards has appropriate protocols in place to respond to oils or hazardous materials releases, such as fuel spills, in the Training Area/Reserve. These protocols include the Soldiers Field Card that outlines how Training Area/Reserve users respond if a spill occurs, and Camp Edwards has trained staff to initiate all required spill response actions. All users of the Camp Edwards training lands, including civilians, are required to complete a series of Range Control briefings. Users are directed via verbal instruction, as well as in training videos, to report spills and/or releases of any size to Range Control immediately.

There were no oils or hazardous materials releases in the Training Area/Reserve during TY 2020.

### 3.14 HAZARDOUS WASTE MANAGEMENT

The MAARNG complied with its policy of not performing maintenance activities on military vehicles in the Training Area/Reserve throughout the year. Thus, hazardous wastes normally associated with vehicle maintenance and repair facilities were not generated or stored in the Training Area/Reserve. Vehicle maintenance is completed at the UTES facility, which is outside of the Training Area/Reserve. In instances where the

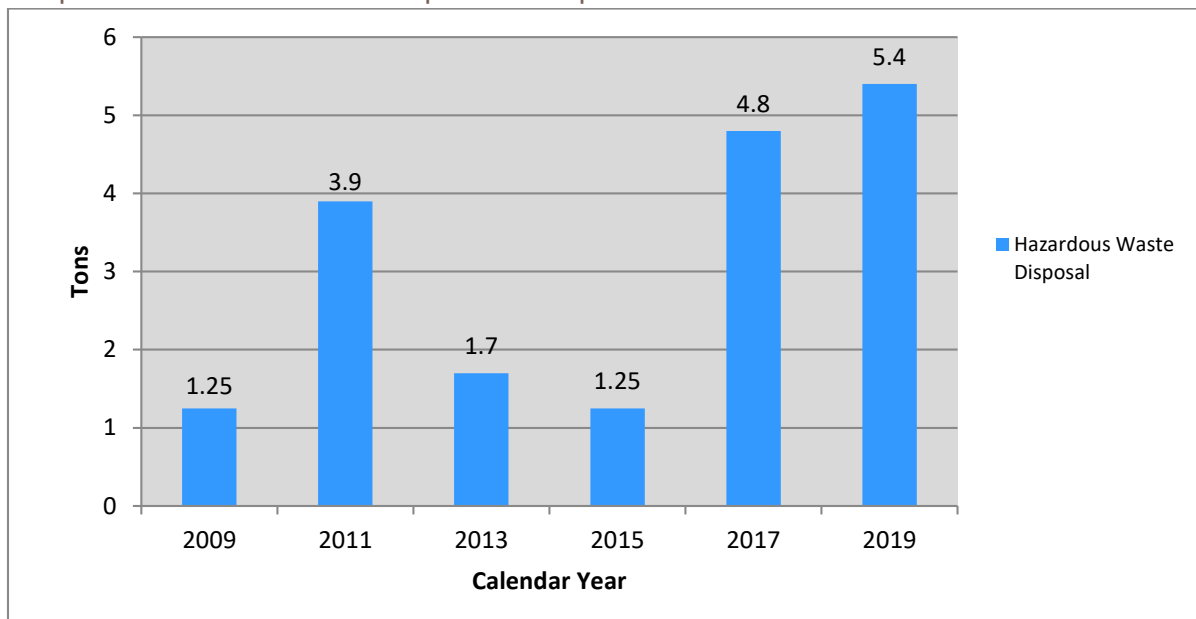
Installation Restoration Program (IRP) or IAGWSP use the EPA identification number of the MAARNG to dispose of wastes generated by remediation activities in the Training Area/Reserve, MAARNG Environmental tracks the procedure to ensure compliance with applicable regulations.

There is one hazardous waste Satellite Accumulation Point in the Training Area/Reserve, established at Range Control in January 2012. Range control accumulates one 55-gallon drum of weapons cleaning rags and patches, and one 55-gallon drum of clean up debris of automotive fluids (i.e., rags, speedy dry and soil contaminated with gasoline, diesel and/or oil). Wastes generated at the Range Control Satellite Accumulation Point are minimal, with a slight increase during Annual Training. On average, the Range Control Satellite Accumulation Point will generate one full 55-gallon drum of waste annually.

### 3.14.1 Hazardous Waste Disposal and Reporting

A biennial Hazardous Waste Report must be prepared and submitted to the EPA and MassDEP in March of even-numbered years reporting on hazardous waste generated by large quantity generators (LQG) during the preceding odd-numbered year. The last report for Camp Edwards was in February 2020 for hazardous waste disposed of during calendar year 2019. Graph 3-9 provides information on the volumes of hazardous waste disposal reported for the past six biennial reports. In addition to the amounts generated and reported in the biennial report, the MAARNG removed approximately 4,400 tons of lead-contaminated soil as part of the IAGWSP cleanup effort in 2017. This material was not reported as part of the biennial report as it was exported to Canada and hazardous waste exported outside the US is not required to be reported in the biennial report.

Graph 3-9 Hazardous Waste Disposal – Camp Edwards



## 3.15 VEHICLE MANAGEMENT

Unauthorized All Terrain Vehicle (ATV) and dirt bike access to the Training Area continued to be a problem in TY 2020. Range Control officials provided information to the Environmental Police as to locations and times such use was identified to help them adjust their patrols accordingly. As the level of unauthorized ATV and dirt bike access increases, continued coordination with the Environmental and local police takes place. Current efforts have seemed to slow the illegal use of the Training Area/Reserve for ATV and dirt bike riding. However, this will be an ongoing effort. The entire Training Area/Reserve is now posted as off limits. This should help with public awareness and the enforcement of no trespass laws.

### 3.16 GENERAL USE AND ACCESS MANAGEMENT

Public access to Camp Edwards is limited; however, under certain circumstances public access to Camp Edwards may be available such as hunting during the deer and turkey seasons (See Section 3.5.4 and 3.5.5).

### 3.17 CULTURAL RESOURCES MANAGEMENT

All MAARNG actions in the Training Area/Reserve are reviewed by the MAARNG Cultural Resource Manager to ensure compliance with all applicable federal, state, and local cultural resource regulations. The MAARNG consults regularly with the Massachusetts State Historic Preservation Office (MA SHPO) ensuring actions are in compliance with Section 106 of the National Historic Preservation Act. In addition to the MA SHPO, the MAARNG consults regularly with the Wampanoag Tribe of Gay Head (Aquinnah) and the Mashpee Wampanoag Tribe on undertakings that may affect historic properties that the Tribe has attached religious and cultural significance.

### 3.18 EPS VIOLATIONS

On October 25, 2019, the MAARNG reported to the EMC a nonconformance with EPS 11 Training Area Fire Management Performance Standard, specifically EPS 11.4 “Other than the above, no open fires are allowed.” While conducting an inspection of the SVL, two burn barrels (55-gallon drums) were found at SVL 1 and one burn barrel was found at SVL 2.

Corrective actions included ensuring all full-time and Mobilization Day staff are instructed to review Training Area Clearing processes and they have been re-briefed on guiding regulations and standards that apply to the Camp Edwards Training Area / Upper Cape Water Supply Reserve. Clear and obvious signage stating that open burning is prohibited has been posted at Range Control, and the Camp Edwards Operations and Training Regulation 350-2 has been updated to clearly state the requirement for clearing training areas and that open burning is prohibited on Camp Edwards.

In a letter dated November 26, 2019, the EMC stated that it concurs that the corrective actions identified in the letter are appropriate and required the MAARNG to update and incorporate the corrective actions into the appropriate sections of a revised Camp Edwards Operations and Training Regulation 350-2.

Appendix G lists violations reported since TY 2011.

### 3.19 MITIGATION

Outstanding and ongoing mitigation requirements are focused on formalized agreements with the MA DFW: NHESP under MESA. Elements below are broken into three categories and are the responsibility of two separate services at JBCC, however a holistic mitigation structure is in development for the joint MANG elements. There are now two formal and ongoing mitigation requirements within the Training Area/Reserve and at JBCC. Both are implemented under and governed by respective CMPs. Previously reported grassland mitigation requirements for the 102<sup>nd</sup> Intelligence Wing have been subsumed within the overarching “master planning” mitigation bank discussed below and established in 2020.

The mitigation associated with the Aggasiz’s Clam Shrimp CMP is discussed in additional detail in Section 3.3.4. In summary, two sites along Cat Road were repaired as *in situ* sites in TY 2020. This completed the habitat creation/improvement mitigation actions outlined in the CMP. The third of three years of monitoring required in the CMP was also completed in TY 2020. In TY 2021, an additional year of monitoring is planned beyond the permit requirements.

The MAARNG received a CMP for the MPMG and several other projects under a “master planning” framework proposed by DFW dated September 29, 2020. Primary projects incorporated into the mitigation strategy are the MPMG Range at the current KD Range location, an Infantry Squad Battle Course at the formerly used Infantry Battle Course location, expansion of Tango and Sierra ranges, Cantonment modernization including the addition of a running track at the gym and classroom buildings in the 1300 area, and the potential for future solar development. The mitigation plan combines project design/impact minimization, take avoidance, land transfers, extensive habitat improvement, and long-term monitoring to provide for net benefit of a large number of state-listed species.

The mitigation plan focuses on species guilds (pine barrens, sandplain grassland) for the majority of species with similar habitat condition needs and/or threats (e.g., loss of open canopy condition through forest closure). The Eastern Box Turtle is treated separately as it has differing needs and threats compared to the other species. Mitigation focal areas, tied to the guilds, have been identified to localize various mitigation actions for maximized benefit. Standards for mitigation have been developed for each type of guild and focal area to ensure sufficient commitments exist and to provide assurances to DFW for net benefit. For example, pine barrens mitigation will require 20% to 40% of habitat improvement work to be in the form of mechanical forestry as the majority of the pine barrens guild species are threatened and declining due to tree encroachment and canopy closure. In addition to pine barrens and grassland focal areas, forest canopy retention areas are identified for box turtle hibernation and these areas will be managed or left to maintain later successional forest condition and closed tree canopy.

Extensive land protection through real property actions was a fundamental component of the master CMP. One parcel (Special Military Reserve Commission Tract 5) that had already been transferred to DFW was included in this agreement as it had been transferred for a project that did not occur and the transfer was specified as mitigation. Additionally, Special Military Reserve Commission Tracts 1-4 were transferred to DFW as mitigation through this agreement in 2020. Tracts 1-5 in total are 260 acres directly adjacent to Crane Wildlife Management area and a significant expansion to this public conservation area. Another parcel previously identified for mitigation land transfer, but not previously completed was Parcel H of Unit K, which is 150 acres of former parade field in cantonment. This transfer was included within the master CMP agreement. The parcel was transferred to Military Division in 2020 and will be fully transferred to DFW with anticipated completion in 2021. The Massachusetts National Guard will receive a license to maintain overall access and use to meet perpetual habitat conversion and long-term management requirements under the mitigation agreement on this parcel, which is outside of the Training Area/Reserve.

The Natural Resources Office budgeted for proactive mitigation implementation for the MPMG range. Early mitigation can better provide for net benefit by supplying improved or newly available habitat condition for impacted species prior to losses or impacts incurred through project development. A total of \$221,150 was spent specifically on contracted mitigation actions for the MPMG range in 2019. This includes the 52-acre timber harvest at Wheelock Overlook in Training Area A-5, eight days of prescribed burning (490 acres), and the development of a box turtle construction support and monitoring plan with an initial survey of the MPMG footprint. Consistent with the forest assessments completed in (1997 and 2003) there are no merchantable timber stands on Camp Edwards due to the species and high density of trees. None of the mechanical forestry projects have generated revenue and all have been contracted at the expense of MAARNG as restoration activities. Additional in-house TY 2019 efforts for actions included in the CMP or to address state-listed species include bat surveys, grassland bird surveys, site-wide bird surveys, Whip-poor-will surveys, and state-listed plant surveys.

Several major mitigation efforts were completed and/or initiated in TY 2020 addressing all the above listed components of the master CMP. Specific projects are listed below. A total of \$528,545 was spent specifically on implementation of mitigation projects under the master plan CMP in TY 2020, not including staff time, which was a significant investment for planning and project development/oversight.



- Project scoping, design minimization, NHESP review:
  - MPMG Range: completion of design and project review with submission to NHESP for review and approval. Completion and approval of turtle protection plan.
  - Tango Range: completion of design and project review with submission to NHESP for review and approval. Completion and approval of turtle protection plan.
  - Track and Field (1800 area): completion of design and project review with submission to NHESP for review and approval. Initial development of turtle protection plan.
  - ISBC Range: design consultation and internal review.
- Species protection:
  - MPMG Range: Intensive year 2 of Eastern Box Turtle surveys implementing approved turtle protection plan. Submission of interim report pending.
  - Tango Range: Completion of initial Eastern Box Turtle surveys and approval of submitted report to begin work on site. Site monitoring ongoing.
- Species monitoring:
  - Eastern Box Turtles: extensive in-house monitoring of box turtles found both opportunistically and during targeted surveys in 2019 and 2020 near future construction projects (see Section 3.3.6 for more details).
  - Bird surveys: completion of Cantonment and Training Area point count surveys and annual Eastern Whip-poor-will surveys – both reported in more detail above.
  - Lepidoptera (moths and butterflies): contracted scientific development of a monitoring plan to evaluate impacts of mitigation and range support habitat management efforts including prescribed burning and mechanical fuels management. MAARNG and DFW require a statistically sound, informative, and yet achievable monitoring protocol to evaluate impacts on listed moths and butterflies.
- Habitat management and planning
  - Forestry assessment: completed forestry assessment and timber harvest planning for burn unit RAW3 to restore pine barrens habitat conditions, including restoration of a large frost bottom feature.
  - Pine barrens restoration: Contracted and completed phase 2 treatment at Wheelock Overlook site as recommended by DFW. Targeted herbicide application was used across 50 acres to follow timber harvest and address tree oak coppicing that outcompetes and overshadows favored vegetation. Additional details above in Section 3.7 Pest Management
  - Pine barrens restoration: contracted phase 2 treatment in BA-7 mechanically mowing dead trees across 157 acres to facilitate second entry with prescribed fire and continue long-term pine barrens restoration. This is a critical step and includes spot mowing of shrub vegetation to introduce more heterogeneity in shrub layer structure.



Photograph 3-5 An Eastern Box Turtle being monitored by the Natural Resources Program. The radio transmitter is visible on the back left of the shell.

## SECTION 4

# REMEDIATION PROGRAM ACTIVITIES

### 4.0 INTRODUCTION

This section of the Annual Report provides summaries on remediation activities in the Training Area/Reserve during TY 2020

### 4.1 INVESTIGATION AND REMEDIATION PROGRAMS

There are two independent cleanup programs operating at JBCC: the Installation Restoration Program and the Impact Area Groundwater Study Program.

The IRP was initially established at the installation in 1982 under Air National Guard management. Oversight of the program was transitioned to the Air Force Center for Environmental Excellence, now known as the Air Force Civil Engineer Center (AFCEC), in 1996. The program operates under the regulatory guidance of the federal Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). The majority of the activity of the IRP has been focused in the Cantonment Area and in off-installation plumes emanating from the Cantonment Area. AFCEC is responsible for two IRP sites in the Training Area/Reserve: Chemical Spill-19 (CS-19) and Fuel Spill-12 (FS-12) and three Military Munitions Response Program (MMRP) sites: Old K Range, former Mock Village, and former Otis Gun Club. The MMRP addresses potential threats to human health and the environment from munitions and munitions constituents in non-operational range areas.

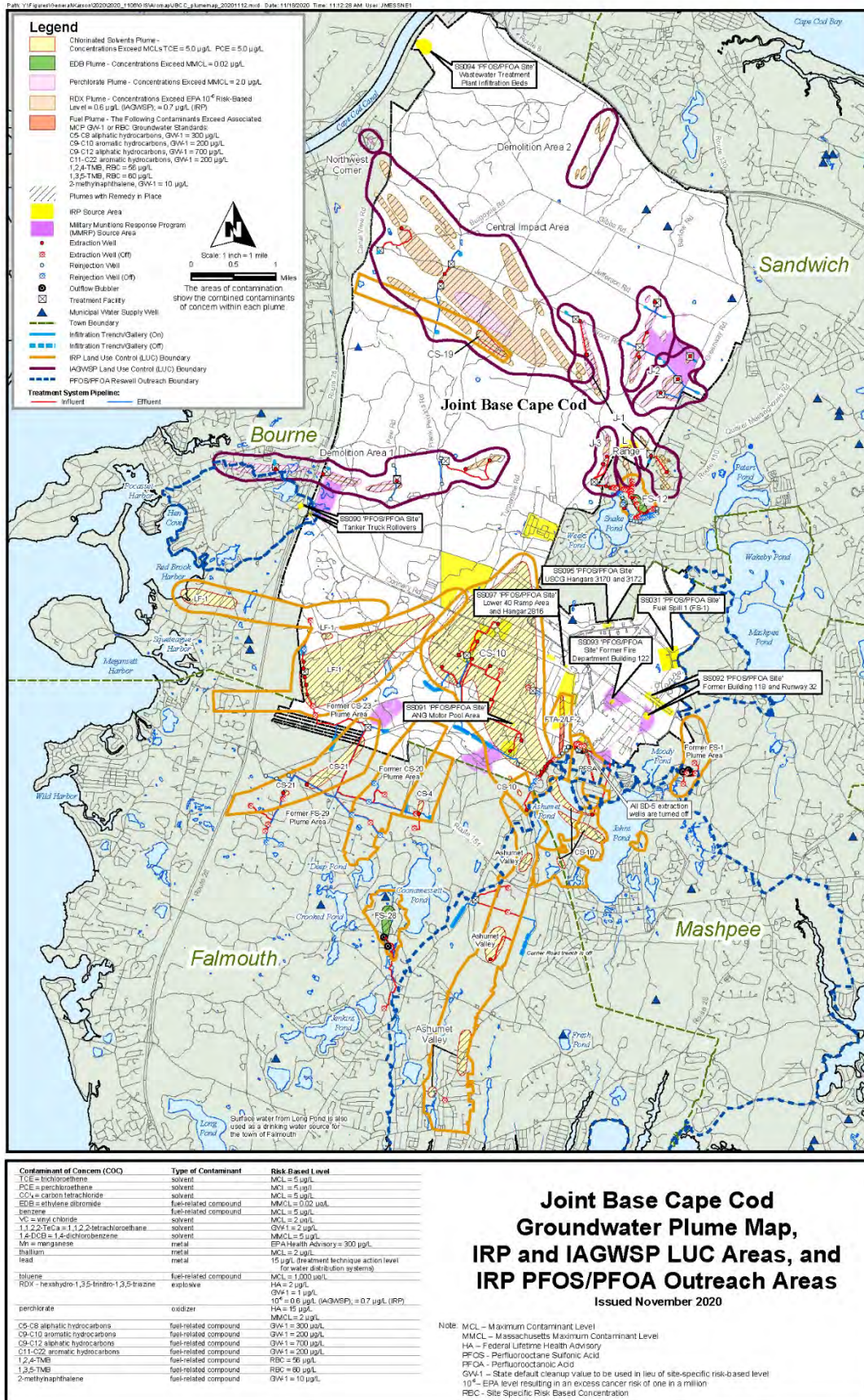
The IAGWSP is being managed by the Army National Guard. Investigation of the environmental impacts of legacy training in the upper 14,886 acres of JBCC began in 1996 and cleanup of groundwater contamination began in 2004. Seventeen treatment systems are currently operating on seven groundwater plumes to clean more than 4.1 million gallons of groundwater per day. More than 14 billion gallons of groundwater have been treated to date. While no public or private drinking water supplies are affected by the groundwater contamination being addressed by the IAGWSP, the contamination is being addressed to prevent any possible future exposures. Information on the IAGWSP can be obtained on its website: <http://jbcc-iagwsp.org>.

Both the IRP and IAGWSP have active regulatory participation and community involvement programs. The communities surrounding the installation are kept informed through neighborhood notices and meetings, media releases, community updates, fact sheets, publication and distribution of plans and reports, websites, and information repositories at local libraries.

The programs meet regularly with EPA Region 1 and MassDEP to discuss findings and determine appropriate response actions. Public comment periods are held, as necessary, to present and solicit input on proposed actions. The programs also provide updates on their activities to public meetings of the joint citizens' advisory team, the JBCC Cleanup Team. The JBCC Cleanup Team includes representatives from the surrounding communities and the regulatory agencies.

The IRP and IAGWSP each operate under different regulatory directives and mostly address different contaminants of concern. However, they share sampling results, equipment, technical innovations, and even a treatment facility. Figure 4-1 shows the areas under remediation by the IRP and the IAGWSP in the Training Area/Reserve. The map in Figure 4-1 is available at [jbcc-iagwsp.org/community/facts/jbcc\\_plume\\_map\\_051320.pdf](http://jbcc-iagwsp.org/community/facts/jbcc_plume_map_051320.pdf)

Figure 4-1 JBCC Groundwater Plume Map



## 4.2 INSTALLATION RESTORATION PROGRAM ACTIVITIES IN THE TRAINING AREA/RESERVE

In TY 2020, AFCEC finalized the Comprehensive Site Evaluation (CSE) Phase II (similar to a Site Inspection) investigation at 10 MMRP sites, including the three sites that are located in the Training Area/Reserve. A Streamlined Remedial Investigation/Feasibility Study (RI/FS) was prepared for the former Mock Village and has been finalized. A RI was completed in TY 2019 at the Old K Range and an FS is being drafted. Numerous 2.36-inch rockets and other ordnance were discovered at the Old K Range during the CSE Phase II and RI field work. Because some of the rockets contained high explosives, this site is currently off limits. A RI was also completed for the Otis Gun Club and an FS has been completed.

In addition to the MMRP sites, AFCEC manages two groundwater plumes in the Training Area/Reserve (CS-19 and FS-12). AFCEC closed a former site referred to as CS-18, which was also located in the Training Area/Reserve.

In TY 2020, groundwater monitoring was conducted at CS-19 where the contaminant of concern is RDX. RDX was detected above the EPA risk-based level of 0.97 µg/L in one of three monitoring wells sampled. The highest RDX concentration (1.3 µg/L) was detected at a well located just downgradient of the source area.

AFCEC also manages three 1.5 MW wind turbines at JBCC, two of which are located in the Training Area/Reserve. The turbines offset the energy use in the IRP by 100% (approximately \$1.5M per year). The turbine operation is curtailed for the Northern Long-Eared Bat from July 15 to October 15, 30 minutes before sunset to 30 minutes after sunrise for wind speeds less than 4.5 meters per second. There were no reported bat or bird strikes during TY 2020.

## 4.3 IMPACT AREA GROUNDWATER STUDY PROGRAM ACTIVITIES

During TY 2020, the IAGWSP operated groundwater treatment systems for plumes associated with the Demolition Area 1, J-3 Range, J-2 Range (northern and eastern), the J-1 Range (southern and northern), and the Central Impact Area (CIA). These systems are treating approximately 4.1 million gallons of water per day.

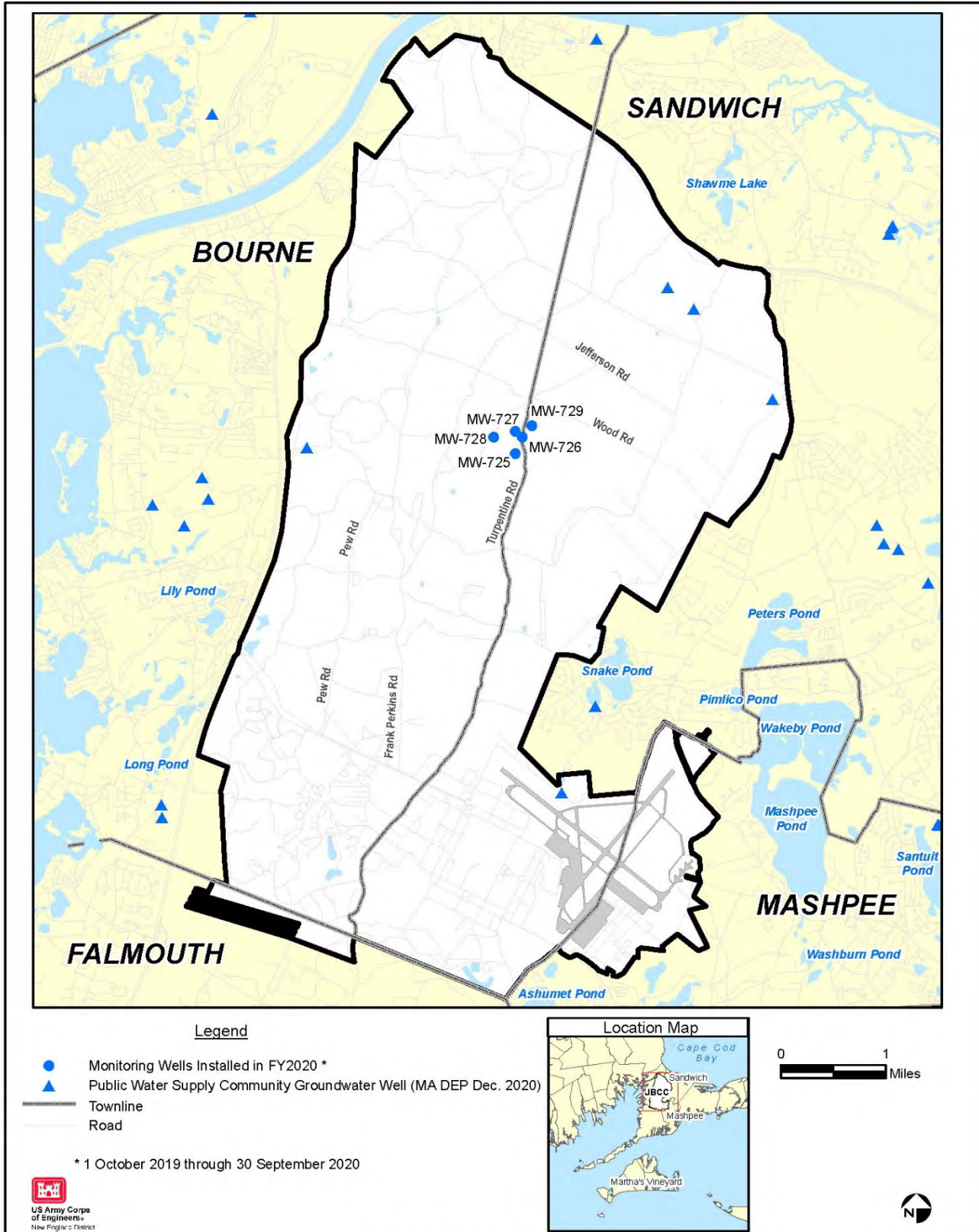
Removal of munitions from the source of the CIA plume continued in TY 2020. Work on Phase III Area 3 (10 acres) of the CIA long-term source area response continued throughout the year. In the Central Impact Area, 83 acres have been cleared to 90%. Teams from the Army Corps of Engineers used Metal Mapper, a multi-sensor electromagnetic detection technology, for the removal efforts. This geophysical technology is designed to discriminate between munitions and scrap metal in the subsurface. Use of the Metal Mapper allows the program to increase the efficiency of unexploded ordnance removal while reducing impacts to the surface soil and vegetation when compared to traditional excavation techniques.

The IAGWSP evaluated whether Per- and polyfluoroalkyl substances (PFAS) are present in the groundwater from sites where open burning/open detonation is known to have occurred. Sampling conducted in TY 2020 was a follow-up to 2019 PFAS sampling where results showed some detections but none exceeding the state or federal regulatory thresholds. Locations sampled in 2020 included: J-3 Demolition Area and J-3 melt/pour facility (where the melting/pouring or pressing of plastic bonded explosives occurred), J-1 Interberm Area, and J-2 Disposal Area 2 (where the subsequent disposal in liquid or solid form of the explosives occurred).

The 2020 J-2 Range results showed PFAS levels were below EPA and MassDEP thresholds. At the J-3 Range, two wells had detections above the Massachusetts Maximum Contaminant Level (MMCL) of 20 nanograms per liter (ng/L); PFAS compounds of concern were observed in 13 of the 17 wells at concentrations below the 20 ng/L MMCL standard, two were non-detect. Results from the J-1 Range are pending. Recommendations for sampling of additional wells and further investigations are being developed for Agency review and approval.

Five new monitoring wells were added in TY 2020 (Figure 4-2) in support of groundwater investigations at the Central Impact Area plume. Three water table wells were installed to monitor the impacts of ongoing munitions removal work; one well was installed to monitor downgradient of the 2,000-meter berm plume; and one downgradient of the junction of Turpentine & Tank Alley Roads to fill a gap between existing monitoring wells.

Figure 4-2 IAGWSP Wells Installed During TY 2020



Impact Area Groundwater Study Program  
Monitoring Wells Installed in FY2020

FIGURE  
1

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## SECTION 5

# MISCELLANEOUS MILITARY AND CIVILIAN ACTIVITIES AND ENVIRONMENTAL PROGRAM PRIORITIES

### 5.0 MISCELLANEOUS MILITARY ACTIVITIES

#### 5.1 PROJECTS AT CAMP EDWARDS

##### 5.1.1 Trespassing and Critical Infrastructure Protection

In coordination with the MANG and the EMC, using mitigation money received by the EMC from Eversource (then NStar) in 2012 for a wetlands-related EPS violation for the transmission lines running through the Training Area/Reserve, the DFW's Southeast District posted signage on the base border during TY 2019. The signs were posted every 100 feet on the perimeter of the Training Area/Reserve. The signs read "No Trespassing, Camp Edwards \* Upper Cape Water Supply Reserve, Access controlled by Camp Edwards Commander." Signage language was agreed upon by the MAARNG, DFW and the EMC. In TY 2020 three cameras, purchased using the same money, were installed in key areas where trespassing and infrastructure security is a concern.

#### 5.2 JOINT BASE CAPE COD EXECUTIVE DIRECTOR

The Adjutant General of the Massachusetts National Guard established the position of the Executive Director of JBCC in late TY 2012. The primary roles of the position are to ensure inter-agency communication and coordination are implemented and practiced and that government and community stakeholders are kept informed. Additionally, the Executive Director is responsible for looking at efficiencies that might be gained through consolidation and cost-sharing of base operating support operations and activities.

The Executive Director serves as the Adjutant General's representative to the Joint Oversight Group that considers items of mutual concern. The Executive Director also serves on the Commonwealth of Massachusetts's Military Asset and Security Strategy Task Force helping to secure the military bases of the Commonwealth. Brigadier General (ret) Christopher Faux was appointed JBCC Executive Director in June 2018.



Photograph 5-1 Signage posted on the perimeter of the Training Area/Reserve.

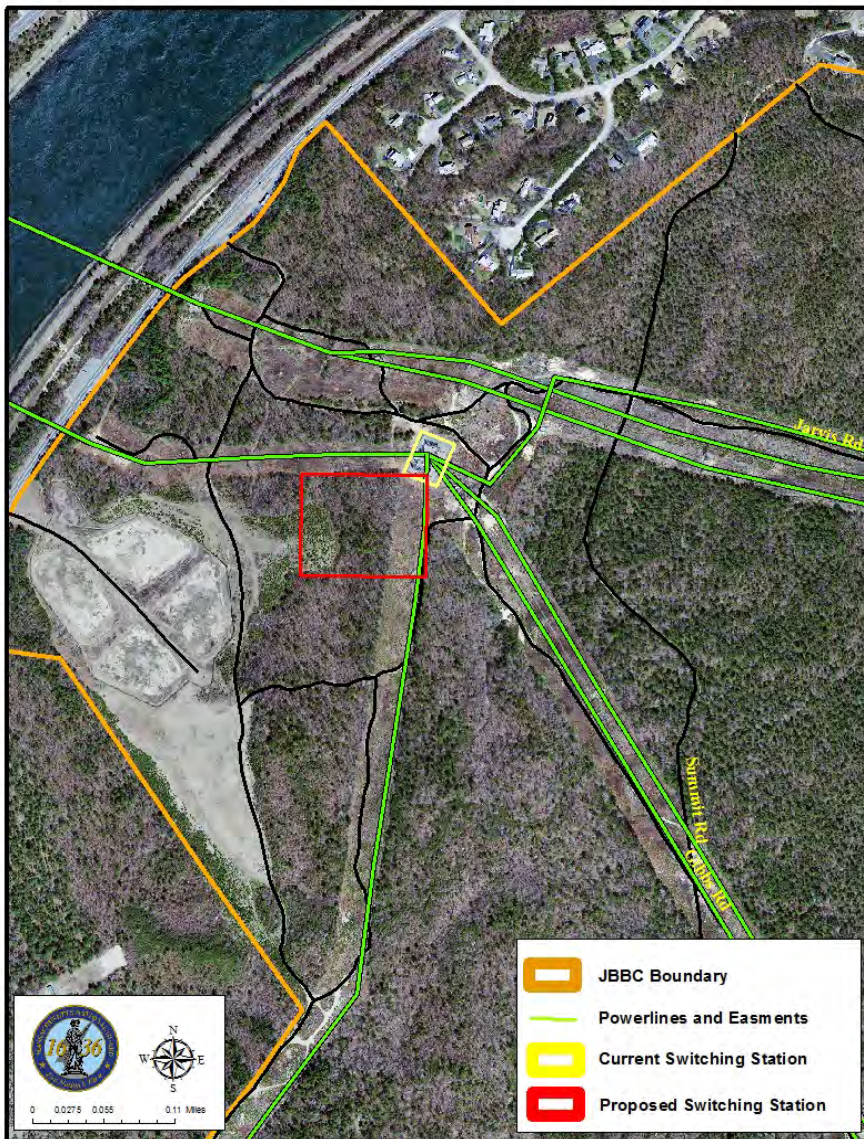


## 5.3 MISCELLANEOUS CIVILIAN ACTIVITIES

### 5.3.1 Eversource Projects

As part of the Mid Cape Reliability Project, Eversource is upgrading an existing Eversource switching station (Bourne Switching Station #917) located on an easement in the Training Area/Reserve (Figure 5-2). Eversource evaluated several sites for minimal loss of training land and impact to state priority habitat. Eversource is siting the switching station southwest of the current substation (Figure 5-1). The property transfers between Eversource and the state leaves a net benefit of approximately 2.51 acres for the MAARNG for training. Because the Training Area/Reserve is land protected under Article 97 Articles of Amendment to the Constitution of the Commonwealth of Massachusetts, legislation was required to be passed to change the use of the property. Governor Charlie Baker signed the bill to change its use in August 2018. Eversource submitted an Environmental Notification Form to the MEPA office on December 17, 2018. For this project, all review and permitting is complete. Completion of the project is anticipated for 2023.

Figure 5-1 Eversource Switching Station Area



As part of the construction, there will be approximately 52,000 cubic yards of soil that will be removed from the site. At the time of this report site preparation and soil removal are in process. Eversource had the soil sampled with samples being tested for the following characterization parameters: PFAS, PFOA, volatile organic compounds, semi-volatile organic compounds, total petroleum hydrocarbons, polychlorinated biphenyls, Massachusetts Contingency Plan (MCP; 310 CMR 40.0000) 14 metals, conductivity, corrosivity, ignitability, reactivity, pH, pesticides, herbicides, perchlorate, and explosives. All samples were below or within regulatory guidelines, specifically MassDEP S1 standards. The MAARNG will be able to repurpose most of the material for use on Camp Edwards at Dig Site 3 to be used for repair and maintenance as needed and for engineering training within the dig site. Over the last eight years, the EMC and the MANG at Camp Edwards have been involved stakeholders in Eversource's proposal to replace the switching station. Other partner agencies include MEPA, NHESP and DFW, the Cape Cod Commission, and the four Upper Cape Cod towns surrounding JBCC.

In TY 2019, Eversource came to the MAARNG with a new reliability project for another utility line from the switching station running down Cape to the Town of Barnstable. This will create a redundant line that will help ensure the Cape has reliable power. Eversource will use its current easement for the project.

### 5.3.2 Cape Cod Canal Transportation Study

In November 2014, the Massachusetts Department of Transportation (MassDOT) announced that it is conducting the Cape Cod Canal Transportation Study to identify existing and future transportation deficiencies and needs around the Cape Cod Canal area in Bourne and Sandwich. Due to the age of the Bourne and Sagamore bridges crossing the canal and the increasing need to maintain them, the study was devised to entail the development and analysis of a full range of transportation alternatives including highway, interchange, and non-highway improvements, as well as options and design elements that improve access for all transportation modes.

The final study was released in October 2019 and recommends intersection improvements including upgrades to the Bourne Rotary, interchange investments at Belmont Circle, relocation the Route 6 westbound Exit 1C and adding an additional Route 6 eastbound travel lane from the Canal to approximately Exit 2. Some changes could have potential impacts to JBCC and specifically the Camp Edwards Training Site. The final report is available online at <https://www.mass.gov/lists/cape-cod-canal-study-documents#cape-cod-canal-transportation-study:-final-report-> MassDOT established a "Working Group" comprised of town and regional officials and interested organizations to obtain input on the study. The Working Group included representation from the JBCC commands and the EMC.

The Army Corps of Engineers conducted its own study of the Bourne and Sagamore Bridges: the Major Rehabilitation Evaluation Report. The Army Corps of Engineers held a comment period on the draft report, released October 2019, with five public meetings, once of which was held in Bourne on October 16, 2019. The final report was released in March 2020, which recommends replacing the Bourne and Sagamore bridges with new bridges parallel to the old bridges. Each new bridge would have four travel lanes, an auxiliary lane, a median, shoulders and a bicycle/pedestrian lane. It is estimated that the Army Corps of Engineers would need to acquire 4.5 acres for the Sagamore Bridge and 11 acres for the Bourne Bridge. The report states that commercial properties in Bourne and Sagamore would need to be acquired.

### 5.3.3 Mayflower Wind

The Massachusetts Department of Public Utilities has contracted with Mayflower Wind to bring offshore wind power to Massachusetts. Mayflower Wind is proposing to use Eversource's easement and switching station as their power interconnect for bringing offshore power to the state. Mayflower Wind has been meeting with Camp Edwards, the EMC, Eversource, and MassDEP to keep them apprised of their progress and to determine the processes they need to complete to bring this transmission line through the Training Area/Reserve.

## 5.4 ENVIRONMENTAL PROGRAM PRIORITIES

### 5.4.1 TY 2020 Environmental Program Priorities

The following subsections provide a list of the environmental program priorities established for TY 2020 as published in the TY 2019 Annual Report for its activities associated with the Training Area/Reserve and the status of achieving them.

#### Natural Resources and ITAM Management

- Engage appropriate stakeholders to conduct an INRMP review of operation and effect and update as needed. (Accomplished)
- Address potential federal status changes to species at Camp Edwards through interagency consultation and planning. (On going)
- Further develop supplemental plans for Natural Resources/ITAM long-term budgets and implementation, including invasive species, wildland fire, and land rehabilitation. (On going)
- Continue implementation and refinement of management focused monitoring of rare species, habitat management, and training capabilities. (On going)
- Continue offering regional wildland fire training to support regional programs and partner agencies and organizations. (Accomplished)
- Continue upscaling of habitat and land management actions, including mechanical work and prescribed burning, through internal actions and partnerships. (On going)
- Continue and further develop interagency partnerships with Massachusetts Division of Fisheries and Wildlife, NHESP, US Fish and Wildlife Service, EMC, DCR, MassDEP, and others through active engagement to seek mutual benefit. (On going)

#### Cultural Resources Management

- Conduct applicable reviews of all IAGWSP, IRP and MAARNG proposed activities in the Training Area/Reserve for potential cultural resources impacts. (Accomplished)
- Document any new occurrences of identified cultural resources. (None identified)

#### Other E&RC Environmental Management Programs

- Coordinate required soil, lysimeter and groundwater sampling at active small arms ranges in accordance with approved range management plans. (Accomplished)
- Provide appropriate support to Camp Edwards for small arms range development. (Accomplished)
- Continue to support Camp Edwards through the environmental process for proposed training venues in the Training Area/Reserve. (Accomplished)
- Provide support as needed to the JBCC Executive Director Office with regards to community involvement and environmental and training issues. (Accomplished)
- Attend all scheduled EMC, CAC and SAC meetings, both internally and externally, that may involve activities within and surrounding the Training Area/Reserve. (Accomplished)
- Provide information on environmental program activities regarding the Training Area/Reserve.
- Work closely with Camp Edwards, the Natural Resources Office, and the EMC to ensure training is compatible with the EPSs. (Accomplished)

- Provide support for the EMC and its advisory councils as required in Chapter 47 of the Acts of 2002. (Accomplished)
- Publish the final TY 2019 State of the Reservation Report. (Accomplished)

### 5.4.2 TY 2021 Environmental Program Priorities

The following subsections provide a list of environmental program priorities for Camp Edwards for activities associated with the Training Area/Reserve in TY 2020.

#### Natural Resources and ITAM Management

- Finalize Sikes Act signatures on updated INRMP and implement annual review.
- Implement projects and planning identified in the Conservation and Management Permit that established an onsite mitigation bank and long-term habitat management and resource monitoring requirements.
- Continue to address potential federal status changes to species at Camp Edwards through interagency consultation, planning, and partnership.
- Further develop supplemental plans for Natural Resources/ITAM long-term budgets and implementation, including invasive species, wildland fire, and land rehabilitation.
- Continue implementation and refinement of management focused monitoring of rare species, habitat management, and training capabilities.
- Continue to update wildland fire planning and program opportunities after hiring dedicated Wildland Fire Program Coordinator, including updating Integrated Wildland Fire Management Plan and planning for increased range usage.
- Continue upscaling of habitat and land management actions, including mechanical work and prescribed burning, through internal actions and partnerships, to increase long-term ecosystem health and resilience.
- Develop water feature conservation plans that provide for ephemeral features (e.g., vernal pools) while minimizing impacts to wildlife and training.
- Continue and further develop interagency partnerships with Massachusetts Division of Fisheries and Wildlife, NHESP, US Fish and Wildlife Service, EMC, DCR, MassDEP, and others through active engagement to seek mutual benefit.

#### Other E&RC Environmental Management Programs

- Coordinate required soil, lysimeter and groundwater sampling at active small arms ranges in accordance with approved range management plans.
- Provide appropriate support to Camp Edwards for small arms range development.
- Continue to support Camp Edwards through the environmental process for proposed training venues in the Training Area/Reserve.
- Provide support as needed to the JBCC Executive Director Office with regards to community involvement and environmental and training issues.
- Attend all scheduled EMC, CAC and SAC meetings, both internally and externally, that may involve activities within and surrounding the Training Area/Reserve.
- Provide information on environmental program activities regarding the Training Area/Reserve.
- Work closely with Camp Edwards, the Natural Resources Office, and the EMC to ensure training is compatible with the EPSs.

- Provide support for the EMC and its advisory councils as required in Chapter 47 of the Acts of 2002.
- Publish the final TY 2020 *State of the Reservation Report*.